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The Effect of Pandan Leaf Decoction on Reducing Blood Glucose Levels among Patients with Diabetes Mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor

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Abstract: Diabetes mellitus is a chronic metabolic disease characterized by elevated blood glucose levels and may lead to serious complications if not properly controlled. The use of accessible herbal-based complementary therapies, such as pandan leaf decoction, has become an alternative approach to support blood glucose management in the community. **Objective:** This study aimed to determine the effect of pandan leaf decoction on reducing blood glucose levels among patients with diabetes mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor. **Method:** This study employed a quantitative quasi-experimental design using a one-group pretest-posttest approach. A total of 18 respondents were selected through purposive sampling. Data were collected by measuring fasting blood glucose levels before and after the administration of 200 ml pandan leaf decoction once daily for five consecutive days. Data were analyzed using univariate analysis and the paired sample t-test. **Findings:** The results showed that the mean fasting blood glucose level decreased from 279.61 mg/dL before the intervention to 153.78 mg/dL after the intervention. Statistical analysis revealed a significant difference between pretest and posttest measurements, with a p-value of 0.001, indicating that pandan leaf decoction was associated with a significant reduction in blood glucose levels among patients with diabetes mellitus. **Implications:** The findings suggest that pandan leaf decoction may be utilized as an affordable and accessible complementary non-pharmacological intervention to support blood glucose control in community-based diabetes management programs. The results may also serve as a reference for nursing practice and public health promotion related to complementary therapies. **Originality:** The originality of this study lies in providing empirical evidence from a community setting regarding the potential use of pandan leaf decoction as a complementary herbal intervention for reducing blood glucose levels among patients with diabetes mellitus. This study contributes practical knowledge on the utilization of local herbal resources in supporting diabetes management.

Keywords: diabetes mellitus; blood glucose; pandan leaf decoction; complementary therapy; non-pharmacological intervention

INTRODUCTION

According to the Ministry of Health of the Republic of Indonesia in 2022, diabetes mellitus is one of the most prevalent health problems worldwide, including in Indonesia. Data from the Ministry of Health of the Republic of Indonesia showed that the number of people living with diabetes in Indonesia reached 10.7 million in 2020 and is projected to

continue increasing along with changes in lifestyle and dietary patterns among the population (Dinas Kesehatan Kabupaten, 2020). This disease not only affects individual health but also creates a substantial economic burden on healthcare systems and society. Diabetes mellitus is a disease that affects the body's ability to regulate blood glucose levels, resulting in hyperglycemia. According to the International Diabetes Federation, the number of individuals with diabetes worldwide continues to rise and is estimated to reach 41.817 people globally (International Diabetes, 2021).

Based on data from the World Health Organization, diabetes is a chronic disease that occurs when the pancreas does not produce sufficient insulin or when the body cannot effectively utilize insulin. Insulin is a hormone responsible for regulating blood sugar levels. Hyperglycemia, or elevated blood glucose levels, is a common condition associated with uncontrolled diabetes and may lead to severe damage to body systems, particularly nerves and blood vessels, if left untreated (World Health, 2024). The number of people affected by diabetes increased from 200 million in 1990 to 830 million in 2022. This increase occurred more rapidly in low- and middle-income countries compared to developed countries.

According to data from the Bogor City Health Office, the number of non-communicable disease cases, particularly diabetes mellitus, has increased over the past three years. In 2021, there were 17,601 reported cases, which increased to 17,670 cases in 2022 and further rose to 21,297 cases in 2023. Meanwhile, the Bogor Regency Health Office reported that 65,751 residents were diagnosed with diabetes mellitus throughout 2024. This figure was obtained from screening conducted on 713,142 individuals aged 15–59 years. Rohjayanti, Head of the Non-Communicable Disease Prevention and Control Division of the Bogor Regency Health Office, explained that diabetes mellitus is a high-risk disease that may lead to mortality because it can trigger severe complications such as cardiovascular disease and kidney failure (Dinas Kesehatan Kabupaten, 2020).

In Indonesia, diabetes mellitus has become a serious public health concern because it may lead to blindness, kidney failure requiring amputation, heart disease, and stroke. Uncontrolled blood glucose levels may result in severe complications such as hypoglycemia, metabolic ketoacidosis, and hyperosmolar diabetic syndrome. High blood glucose levels may also cause serious health problems, including cardiovascular disease, kidney damage, and neuropathy. Although pharmacological treatment is commonly used

to manage diabetes, it may not always be effective and can produce side effects. Therefore, many patients seek alternative therapies, including the use of natural ingredients.

Diabetes mellitus can be managed through pharmacological and non-pharmacological approaches. Long-term pharmacological therapy using anti-glycemic agents often causes side effects; therefore, safer non-pharmacological alternatives are needed. Oral hypoglycemic agents or insulin are commonly used in diabetes treatment. Proper diabetes management may reduce morbidity and mortality among diabetes patients (Imelda et al., 2022). In addition, non-pharmacological management focuses on dietary regulation, where patients are encouraged to consume foods rich in fiber and antioxidants.

Blood glucose management can also be achieved through pharmacological and non-pharmacological therapies. Pharmacological therapy includes medications such as metformin, sulfonylureas, and insulin, while non-pharmacological therapy involves dietary regulation, increased physical activity, weight control, and stress management. Furthermore, the use of medicinal plants such as moringa leaves, pandan leaves, cinnamon, and ginger may help reduce blood glucose levels (Salleh et al., 2021). One effective non-pharmacological method for reducing blood glucose levels is the utilization of herbal plants and spices. Several herbal ingredients known to have positive effects in controlling blood glucose levels include cinnamon, ginger, turmeric, pandan leaves, and fenugreek (Amalia et al., 2022; SORMIN, 2022).

The use of herbal plants as an alternative treatment for hyperglycemia is still largely based on community experience and requires stronger scientific evidence. Therefore, healthcare professionals have an important responsibility to educate the public regarding evidence-based traditional medicine. Several herbal plants known to help lower blood glucose levels include moringa leaves, pandan leaves, cinnamon, bitter melon, ginseng, ginger, and fenugreek (Firdous et al., 2025).

Another non-pharmacological therapy that is considered effective in lowering blood glucose levels is pandan leaf. Pandan leaf is a natural ingredient commonly used in traditional medicine and is widely recognized for its distinctive aroma. In addition to its culinary use, pandan leaves possess several significant health benefits. Research has shown that pandan leaves contain active compounds such as flavonoids and polyphenols, which exhibit antioxidant, anti-inflammatory, and antimicrobial properties (Wang et al., 2024).

Another study entitled *"The Effect of Pandan Leaf Tea on Blood Glucose Levels among Patients with Type 2 Diabetes Mellitus"* found that the mean blood glucose level of

respondents before the intervention was 250 mg/dL. After consuming pandan leaf tea, blood glucose levels decreased to 190 mg/dL, indicating a reduction of 60 mg/dL. This reduction was presumed to be associated with the soluble fiber content in pandan leaves, which slows glucose absorption and improves insulin sensitivity.

Pandan leaf (*Pandanus amaryllifolius*) is one of the herbal plants that has long been used in traditional medicine to help control blood glucose levels among patients with diabetes mellitus. Pandan leaves are known to contain active compounds such as flavonoids, alkaloids, tannins, and polyphenols, which function as natural antioxidants in the body. The flavonoid compounds contained in pandan leaves, such as quercetin and kaempferol, are believed to improve insulin sensitivity and support glucose metabolism, thereby helping maintain controlled blood glucose levels (Buddhakala & Yongkhamcha, 2025). In addition, pandan leaves possess anti-inflammatory properties that may reduce oxidative stress caused by elevated blood glucose levels among diabetic patients (Buddhakala & Yongkhamcha, 2025). Therefore, pandan leaf decoction may be utilized as a supportive non-pharmacological therapy for reducing blood glucose levels.

A preliminary study conducted by the researchers in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor showed that among 180 surveyed residents, 10 individuals were diagnosed with diabetes mellitus. Based on interview results, diabetic patients ranged from 30 to 65 years of age. Three respondents (30%) routinely consumed metformin to lower blood glucose levels, three respondents (30%) only consumed medication when symptoms occurred, and four respondents (40%) were unaware that they had elevated blood glucose levels and had never used herbal therapy such as pandan leaf decoction to help control blood glucose levels.

The preliminary findings indicated that many community members still lacked awareness regarding the importance of blood glucose control and the utilization of non-pharmacological therapies. Therefore, the researchers were interested in conducting a study regarding the effect of pandan leaf decoction on reducing blood glucose levels among patients with diabetes mellitus in the area.

Although some patients routinely consumed medication, their blood glucose levels remained uncontrolled due to limited awareness regarding dietary management among patients with diabetes mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor. Consequently, several respondents experienced symptoms such as tingling sensations and blurred vision. Based on the interview results, many diabetic patients were

still unaware that affordable non-pharmacological therapies, such as pandan leaf decoction, could help reduce blood glucose levels.

Based on the background described above, the researchers intended to conduct a study entitled *"The Effect of Pandan Leaf Decoction on Reducing Blood Glucose Levels among Patients with Diabetes Mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor."* This study is expected to provide new insights into diabetes management and encourage the use of natural ingredients as complementary therapy for diabetes mellitus.

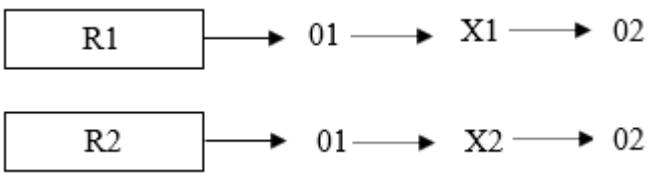
RESEARCH METHOD

Research Design

Research design refers to the method or strategy used by researchers to conduct a study and serves as a guideline for how the research process will be carried out. According to (Dharma, 2015), research design is determined based on the objectives and hypotheses to be tested. In other words, research design is a systematic plan and framework developed to assist researchers in answering the research questions through appropriate procedures and data analysis techniques. (Ismayani, 2019) explained that research design includes the stages undertaken by researchers, starting from hypothesis formulation to data analysis.

This study employed a quantitative research approach using a quasi-experimental method with a pretest–posttest without control group design. According to (Sugiyono, 2022), quasi-experimental research aims to examine the effect of a treatment on the observed variables. In this study, respondents received an intervention followed by observation of the outcomes. The pretest–posttest without control group design means that the intervention was conducted on a single group without a comparison group. The effectiveness of the intervention was assessed by comparing post-intervention measurements (posttest) with pre-intervention measurements (pretest) (Dharma, 2015).

The study involved one intervention group consisting of patients with diabetes mellitus whose blood glucose levels were measured before and after receiving pandan leaf decoction intervention. The research design can be illustrated as follows:



Where:

- R_2= Respondents receiving pandan leaf decoction intervention
- O_1= Pretest before intervention
- X_2= Administration of pandan leaf decoction
- O_2= Posttest after intervention

Population, Sample, and Sampling Technique

Population

According to Azhari (2023), population refers to all units that become the focus of a study and possess specific characteristics relevant to the research objectives. The population in this study consisted of all patients with diabetes mellitus residing in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor, totaling 58 individuals.

Sample

A sample is a subset of the population that shares similar characteristics with the overall population. The use of samples is essential because researchers often face limitations in terms of time, cost, and resources. By selecting a representative sample, researchers can obtain accurate and comprehensive information more efficiently (Notoatmodjo, 2018).

The sample size in this study was determined using the Federer formula as follows:

$$(\boldsymbol{t-1})(\boldsymbol{n-1}) > \mathbf{15}$$

Where:

- t= Number of treatment groups
- n= Number of samples

The calculation process was conducted as follows:

$$(2-1)(n-1) > 15$$
$$(1)(n-1) > 15$$
$$n-1 > 15$$
$$n = 16$$

To prevent respondent dropout, an additional 10% was added to the sample size calculation:

$$10\% \times 16 = 1.6$$
$$16 + 1.6 = 17.6 \approx 18$$

Thus, the total sample used in this study consisted of 18 respondents receiving the cinnamon and ginger decoction intervention and 18 respondents receiving the pandan leaf decoction intervention, resulting in a total sample of 36 respondents.

Sampling Technique

Sampling is a technique used to select elements from a larger population. Selecting a representative sample is important to ensure that the research findings can be generalized to the broader population (Sugiyono, 2022). This study used purposive sampling, which is a sampling method based on predetermined inclusion criteria relevant to the research objectives (Sudaryana, 2022).

Inclusion Criteria

The inclusion criteria in this study were as follows:

1. Patients with diabetes mellitus who were willing to participate as respondents.
2. Patients who were not consuming antidiabetic medication.
3. Patients with fasting blood glucose levels ≥ 126 mg/dL.

Exclusion Criteria

The exclusion criteria in this study included:

1. Patients experiencing diabetic complications.
2. Patients with digestive disorders.
3. Patients with allergies to cinnamon and ginger.
4. Patients with allergies to pandan leaves.

Research Setting and Time

This study was conducted in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor. The research location was selected because many residents in this area experienced diabetes mellitus, yet awareness regarding non-pharmacological treatment such as pandan leaf decoction remained limited. Furthermore, no previous research had examined the effect of pandan leaf decoction in this area.

The study was conducted from April 2025 to July 2025, including preliminary surveys, initial data collection, intervention implementation, and research report preparation. Four ethical principles should be upheld in research implementation, including respect for human dignity, respect for privacy and confidentiality, justice and inclusiveness, and balancing benefits and harms. Respondents were informed about the objectives,

procedures, benefits, and possible risks of the study before signing informed consent forms. Confidentiality of respondent identity was maintained throughout the study.

Research Instruments

Research instruments are tools used to collect the data required in a study (Notoatmodjo, 2018). In this study, respondent characteristics were obtained through interviews using a questionnaire sheet focusing on age and gender characteristics.

The instruments used for blood glucose measurement included:

1. Glucometer
2. 28G lancet
3. Alcohol swab
4. Gloves
5. Observation sheet

The instruments used to prepare pandan leaf decoction included:

1. 10 grams of pandan leaves
2. Measuring cup
3. Digital scale
4. Food thermometer
5. Stove
6. Knife
7. Cutting board
8. Cooking pot

Data Collection Procedure

Administrative Procedure

After obtaining approval from the academic supervisor, the researcher requested research permission from STIKes Pertamedika. Subsequently, the research permit was submitted to the head of RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor before conducting data collection.

Technical Procedure

After obtaining permission to conduct the study, the researcher explained the objectives and procedures of the study to local health cadres and community leaders. The researcher was assisted by two nursing graduates responsible for recording and documentation. Respondents were gathered at the residence of a local health cadre. Respondents then received explanations regarding the study objectives and signed informed consent forms. Fasting blood glucose levels were measured before intervention. Respondents received 200 ml of pandan leaf decoction once daily in the morning before

meals for five consecutive days. After the intervention period, post-test blood glucose measurements were conducted, followed by data checking and analysis.

Data Processing

According to (Notoatmodjo, 2018) data processing involves several stages, including editing, coding, data entry, and data cleaning to ensure data completeness, consistency, and accuracy.

Data Analysis

Normality Test

The normality test was conducted to determine whether the collected data were normally distributed. Normality testing is essential for selecting the appropriate statistical method. In this study, normality testing was performed using skewness analysis. Data are considered normally distributed when the skewness ratio lies between −1.96 and +1.96 (Wardana, 2020).

The skewness formula is presented as follows:

$$\boldsymbol{Sk = \frac{\bar{X} - Mo}{S}}$$

Where:

- Sk= Skewness coefficient
- $\bar{X}$= Mean
- Mo= Mode
- S= Standard deviation

The normality test results indicated that all blood glucose data before and after intervention were normally distributed. Therefore, the paired t-test was used for statistical analysis.

Univariate Analysis

Univariate analysis is conducted to describe each research variable individually without making general conclusions (Notoatmodjo, 2018). This analysis aimed to describe the distribution and percentage of variables before and after pandan leaf decoction intervention among patients with diabetes mellitus. Descriptive statistical parameters

included mean, median, mode, variance, standard deviation, and range (Qomusuddin, 2022).

The frequency distribution formula used in this study was:

$$\boldsymbol{P = \frac{f}{N} \times 100\%}$$

Where:

- P= Percentage
- f= Frequency
- N= Number of respondents

The mean formula used was:

$$\boldsymbol{\bar{X} = \frac{\sum X}{n}}$$

Where:

- $\bar{X}$= Mean
- $\sum X$= Total score
- n= Number of observations

Bivariate Analysis

Bivariate analysis examines the relationship between independent and dependent variables (Notoatmodjo, 2018). In this study, bivariate analysis aimed to determine the effect of pandan leaf decoction on reducing blood glucose levels among patients with diabetes mellitus.

Because the data were normally distributed, the paired sample t-test was applied. According to (Adiputra et al., 2021) the paired t-test is used to compare differences between two related means, such as pre-test and post-test measurements.

The paired t-test formula is as follows:

$$\boldsymbol{t = \frac{\bar{d}}{SD_d/\sqrt{n}}}$$

Where:

- $\bar{d}$= Mean difference between pre-test and post-test
- SD_d= Standard deviation of the differences
- n= Number of samples

The significance criteria used in this study were as follows:

- If $p < 0.05$, $H_0$was rejected, indicating a significant effect of pandan leaf decoction on reducing blood glucose levels.
- If $p > 0.05$, $H_0$was accepted, indicating no significant effect of pandan leaf decoction on blood glucose reduction.

RESULT

Univariate Analysis

1. Characteristics of Respondents' Age

Table 1. Frequency Distribution Based on the Age of Respondents Receiving Pandan Leaf Decoction in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor, 2025 (n = 18)

No	Age Category	Frequency	Percentage (%)
1	Early Adulthood	2	11.1
2	Middle Adulthood	16	88.9
	Total	18	100

Based on Table 1, the characteristics of respondents in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor showed that the majority of respondents in the intervention group were in the middle adulthood category, totaling 16 respondents (88.9%), while respondents in the early adulthood category accounted for 2 respondents (11.1%).

2. Characteristics of Respondents' Gender

Table 2. Frequency Distribution Based on Gender of Respondents Receiving Pandan Leaf Decoction Intervention in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor, 2025 (n = 18)

No	Gender	Frequency	Percentage (%)
1	**Male**	**7**	**39**
2	**Female**	**11**	**61**
	Total	**18**	**100**

Based on Table 2, the characteristics of respondents in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor indicated that most respondents were female, accounting for 11 respondents (61%), while male respondents accounted for 7 respondents (39%).

3. Mean Blood Glucose Levels Before the Intervention

Table 3. Mean Blood Glucose Levels Before the Administration of Pandan Leaf Decoction Intervention in RT 02 RW 04 Kampung Sukamanah, Bogor, 2025 (n = 18)

Variable	Mean	SD	Min	Max
Pre-test (mg/dL)	279.61	52.26	201	412

Based on Table 3, before the administration of pandan leaf decoction intervention, the mean fasting blood glucose level was 279.61 mg/dL, with a minimum value of 201 mg/dL, a maximum value of 412 mg/dL, and a standard deviation of 52.260.

4. Mean Blood Glucose Levels After the Intervention

Table 4. Mean Blood Glucose Levels After the Administration of Pandan Leaf Decoction Intervention in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor, 2025 (n=18)

Variable	Mean	SD	Min	Max
Post-test (mg/dL)	153.78	59.366	89	290

Based on Table 4, after the intervention was administered, the mean fasting blood glucose level decreased to 153.78 mg/dL, with a minimum value of 89 mg/dL, a maximum value of 290 mg/dL, and a standard deviation of 59.366.

5. Difference in Mean Blood Glucose Reduction Before and After Intervention in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor

Table 5. Difference in Mean Blood Glucose Levels Before and After the Administration of Pandan Leaf Decoction Intervention in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor, 2025 (n = 18)

Variable	Mean	SD	Min	Max
Pre-test (mg/dL)	279.61	52.26	201	412
Post-test (mg/dL)	153.78	59.366	89	290

Table 5 demonstrates a difference in mean blood glucose levels before and after the administration of pandan leaf decoction intervention. The mean blood glucose level before the intervention was 279.61 mg/dL, whereas after the intervention it decreased to 153.78 mg/dL. These findings indicate that blood glucose levels declined after respondents received the pandan leaf decoction intervention.

Bivariate Analysis

Bivariate analysis was conducted to determine the direct effect between the independent variable and the dependent variable. In this study, bivariate analysis was used to examine the effect of pandan leaf decoction on reducing blood glucose levels among patients with diabetes mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor.

The statistical test used in this study was the Dependent t-test (Paired t-test), with the criteria that a significant effect was identified if the p-value ≤ 0.05, whereas no significant effect was identified if the p-value ≥ 0.05.

Table 7. Analysis of the Effect of Pandan Leaf Decoction Administration Before (Pre-test) and After (Post-test) Intervention in RT 02 RW 04 Kampung Sukamanah, Bogor, 2025 (n = 18)

Variable	Mean	SD	SE	P-Value
Pre-test (mg/dL)	279.61	52.26	12.318	
Post-test (mg/dL)	153.78	59.366	13.993	0.001

Table 7 shows that the mean blood glucose level before the intervention was 279.61 mg/dL, while the mean blood glucose level after the intervention decreased to 153.78 mg/dL.

The standard deviation of blood glucose levels before the intervention was 52.260 mg/dL, whereas after the intervention it was 59.366 mg/dL. Statistical analysis demonstrated a significant difference between blood glucose levels before and after the intervention, with a p-value of 0.001 ($p < 0.05$).

These findings indicate that the administration of pandan leaf decoction had a statistically significant effect on reducing blood glucose levels among patients with diabetes mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor.

DISCUSSION

Univariate Analysis

The findings of this study showed that the majority of respondents were in the middle adulthood age group, indicating that diabetes mellitus was more commonly experienced by individuals aged between thirty-five and fifty-nine years. This finding suggests that increasing age is associated with a higher risk of metabolic disorders, particularly diabetes

mellitus. According to (Putri, 2024) aging is closely related to decreased insulin sensitivity and impaired glucose metabolism, which contribute to elevated blood glucose levels. Physiological changes such as reduced muscle mass, increased body fat accumulation, and hormonal alterations may negatively affect the body's ability to regulate glucose effectively. In addition, lifestyle factors such as physical inactivity, unhealthy dietary habits, and prolonged stress may further increase the risk of diabetes mellitus among adults and elderly individuals. These findings are consistent with the study conducted by (Nurfitri, 2020), which reported that middle-aged and elderly respondents were more likely to experience uncontrolled blood glucose levels and demonstrated significant reductions in glucose levels following pandan leaf decoction intervention.

The gender distribution in this study demonstrated that the majority of respondents were female. This finding indicates that women may have a higher vulnerability to diabetes mellitus compared to men. According to (Torus et al., 2026), women tend to have higher body fat composition and experience hormonal changes associated with menstruation and menopause, which may contribute to increased insulin resistance and impaired glucose regulation. The decline in estrogen levels during menopause may also increase abdominal fat accumulation, thereby elevating the risk of diabetes mellitus. Furthermore, unhealthy lifestyle behaviors such as excessive consumption of sweetened beverages and fast food may worsen metabolic conditions among women. These findings are supported by the study conducted by Rahmawati, which demonstrated that pandan leaf decoction was increasingly utilized by female diabetes patients as a natural therapy for blood glucose control. The study further explained that pandan leaves contain flavonoids and polyphenols that function as antioxidants and improve insulin sensitivity (Wang et al., 2024). The results of this study also showed that respondents had relatively high fasting blood glucose levels before receiving pandan leaf decoction intervention. Elevated blood glucose levels among diabetes mellitus patients are commonly associated with insulin dysfunction and poor glycemic control. According to (Care, 2022) diabetes mellitus occurs when the body cannot produce or effectively utilize insulin, resulting in glucose accumulation in the bloodstream. Several factors contributing to this condition include genetic predisposition, unhealthy dietary habits, obesity, and lack of physical activity. Prolonged hyperglycemia may lead to severe complications affecting the kidneys, cardiovascular system, and nervous system (Saputri, 2020). The high blood glucose levels observed in this study may also have been influenced by irregular eating patterns and excessive consumption of sugary foods and

beverages among respondents. These findings are consistent with the study conducted by (Sakina, 2022), which reported that pandan leaf decoction intervention was associated with significant reductions in blood glucose levels among patients with diabetes mellitus.

Following the administration of pandan leaf decoction intervention, respondents experienced a considerable reduction in blood glucose levels. This finding indicates that pandan leaf decoction may contribute positively to glycemic control among diabetes mellitus patients. Pandan leaves (Pandanus amaryllifolius) contain bioactive compounds such as flavonoids, alkaloids, tannins, and polyphenols that possess antioxidant and anti-inflammatory properties. According to (Chiabchalard & Nooron, 2015), flavonoids contained in pandan leaves may improve insulin sensitivity and support glucose metabolism, thereby helping regulate blood glucose levels. The antioxidant activity of pandan leaves may also protect pancreatic cells from oxidative stress caused by prolonged hyperglycemia. Similar findings were reported by Lestari, who demonstrated that pandan leaf decoction significantly reduced fasting blood glucose levels among diabetes mellitus patients.

The difference observed between pre-test and post-test blood glucose levels further supports the effectiveness of pandan leaf decoction as a non-pharmacological intervention for diabetes management. Statistical analysis demonstrated a significant reduction in blood glucose levels after respondents consumed pandan leaf decoction for five consecutive days. These findings are in line with the study conducted by Putri Amelia, which reported a significant decrease in fasting blood glucose levels following pandan leaf decoction administration. According to (Chiabchalard & Nooron, 2015), the flavonoid compounds contained in pandan leaves may improve insulin sensitivity and facilitate glucose uptake into body cells. In addition, the anti-inflammatory effects of pandan leaves may help reduce oxidative stress associated with diabetes mellitus. (Nugroho & Handono, 2022), also explained that regular consumption of pandan leaf decoction may support natural diabetes management and reduce the risk of complications related to uncontrolled blood glucose levels.

According to the researchers' analysis, the significant reduction in blood glucose levels after the intervention indicates that pandan leaf decoction possesses therapeutic potential in improving glucose metabolism and supporting glycemic control among patients with diabetes mellitus. Therefore, pandan leaf decoction may be considered a complementary non-pharmacological therapy in diabetes management.

Bivariate Analysis

The results of the paired t-test demonstrated a statistically significant effect of pandan leaf decoction on reducing blood glucose levels among respondents. Prior to conducting the paired t-test, normality testing was performed using skewness analysis, which confirmed that the blood glucose data were normally distributed. Therefore, the use of parametric statistical analysis through the paired t-test was considered appropriate and valid.

The statistical findings revealed that the mean fasting blood glucose level before the intervention was substantially higher compared to the post-intervention mean. The p-value obtained from the paired t-test indicated a statistically significant difference between pre-test and post-test blood glucose levels, confirming that pandan leaf decoction effectively reduced blood glucose levels among patients with diabetes mellitus. These findings are consistent with the study conducted, which found that pandan leaf decoction significantly reduced blood glucose levels after seven days of intervention. The study suggested that herbal-based therapies may serve as effective complementary approaches in managing diabetes mellitus.

The effectiveness of pandan leaf decoction in reducing blood glucose levels may be explained through the pharmacological properties of its active compounds. Flavonoids and polyphenols contained in pandan leaves are known to possess antioxidant activity that may improve insulin sensitivity and reduce insulin resistance. These compounds may also support pancreatic function and improve glucose uptake into body cells. Furthermore, pandan leaves exhibit anti-inflammatory effects that may reduce oxidative stress caused by chronic hyperglycemia. Such mechanisms contribute to improved glucose regulation and better metabolic control among diabetes mellitus patients.

In addition to the herbal intervention, educational support provided during the intervention period may also have contributed to the improvement in respondents' blood glucose levels. Respondents received information regarding healthy dietary habits, physical activity, and blood glucose management. Education related to reducing sugar intake, consuming balanced nutrition, and increasing physical activity likely encouraged healthier behavioral changes among respondents. Therefore, the significant reduction in blood glucose levels observed in this study may have resulted not only from the herbal properties of pandan leaves but also from improvements in lifestyle behaviors during the intervention period.

Overall, the findings of this study indicate that pandan leaf decoction may serve as an effective and affordable non-pharmacological therapy for reducing blood glucose levels among patients with diabetes mellitus. The integration of herbal intervention and health education may provide optimal outcomes in community-based diabetes management programs.

CONCLUSION

This study found that the administration of pandan leaf decoction was associated with a decrease in fasting blood glucose levels among patients with diabetes mellitus in RT 02 RW 04 Kampung Sukamanah, Parung Panjang, Bogor. The mean blood glucose level decreased from 279.61 mg/dL before the intervention to 153.78 mg/dL after five consecutive days of intervention, with a p-value of 0.001. These findings indicate that pandan leaf decoction may help support blood glucose control as a complementary non-pharmacological approach.

The scientific contribution of this study lies in providing community-based empirical data regarding the potential use of pandan leaf decoction as an affordable and easily accessible herbal intervention for patients with diabetes mellitus. This study also adds practical evidence for nursing and public health practice, especially in promoting complementary strategies that can be integrated with education on diet, physical activity, and regular blood glucose monitoring.

However, this study has several limitations. The research used a pretest-posttest design without a control group, involved a relatively small number of respondents, and was conducted in one local community only. In addition, factors such as dietary intake, physical activity, medication history, and long-term changes in blood glucose levels were not fully controlled. Therefore, future studies are recommended to use a randomized controlled design, larger samples, longer intervention periods, and stricter control of confounding variables to confirm the effectiveness and safety of pandan leaf decoction in diabetes management.

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