THE EFFECT OF BINAHONG LEAF DECOCTION (*ANREDERA CORDIFOLIA*) ON BLOOD SUGAR LEVELS OF PATIENTS WITH DIABETES MELLITUS IN THE GARUDA PEKANBARU HEALTH CENTER AREA

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Abstract
Diabetes Mellitus (DM) is one of the global health problems that is receiving serious attention. DM is a group of metabolic diseases characterized by increased blood sugar levels due to disturbances in insulin secretion, insulin function, or both. The purpose of this study was to determine the effect of binahong leaf decoction in reducing blood sugar levels in diabetes mellitus patients in the Garuda Pekanbaru Health Center Area. The number of respondents in this study was 17 respondents. This type of research is a quantitative research using a quasi-experimental method with a pre post without control grub approach. The sampling technique in this study uses a non-probability sampling technique (random random sample) with an accidental sampling method. The instruments used in this study were SOP, glucometer, and observation sheet. This research was conducted on February 11, 2025. The intervention was carried out for 3 consecutive days by giving 400 ml binahong leaf decoction in the morning and evening. This study uses the analysis of the paired T-Test test. The mean value of blood pressure in the systolic pre-test was 254.47 mg/dl and post-test 178.24 mg/dl. Based on the results of statistical tests, it was found that the p value was 0.001 (< 0.05), so there was an effect of boiling binahong leaves in lowering blood sugar levels in patients with diabetes mellitus in the Garuda Pekanbaru Health Center Area. This study is a treatment recommendation as an adjunct therapy to medical therapy by giving binahong leaf decoction in lowering blood sugar levels in patients with diabetes mellitus.
Keyword: Diabetes Mellitus; Blood sugar levels; Binahong leaf decoction

INTRODUCTION

Over the past few decades, the global disease pattern has shifted from infectious diseases to non-communicable diseases (NCDs) or degenerative disorders [1]. NCDs have become a major public health concern that requires serious attention. Among these, Diabetes Mellitus (DM) is one of the most prevalent and rapidly increasing metabolic disorders worldwide [2]. In 2021, approximately 537 million adults aged 20–79 years were living with diabetes, equivalent to one in ten adults. This number is projected to rise to 643 million by 2030 and 783 million by 2045 [3].

In Indonesia, the burden of DM continues to grow. According to data from the Pekanbaru City Health Office (2023), there were 19,587 DM cases reported across all community health centers (Puskesmas) in Pekanbaru. The highest prevalence was found in Puskesmas Garuda with 1,848 cases, followed by Payung Sekaki (1,513), Simpang Tiga (1,461), Sidomulyo (1,426), and Sail (1,335) (Dinkes Provinsi Riau, 2023). This indicates that Puskesmas Garuda has the highest number of DM cases in the city.

Diabetes Mellitus is a metabolic disorder caused by impaired insulin secretion, insulin action, or both, resulting in chronic hyperglycemia [4]. Long-term pharmacological therapy is necessary for DM management but often leads to side effects such as gastrointestinal disturbances, risk of hypoglycemia, and potential damage to vital organs like the liver and

kidneys [5]. Therefore, non-pharmacological interventions such as dietary management, physical activity, and herbal therapy are widely explored as complementary approaches [6].
One of the promising medicinal plants used in traditional therapy for DM is Binahong (Anredera cordifolia) [7]. This climbing plant grows easily in Indonesia and is characterized by small stems, strong rhizomes, and oval green leaves [8]. The leaves are preferred over the stems and roots for medicinal purposes because they are abundant and harvesting them does not harm the plant [9].

Phytochemical analyses have shown that binahong leaves contain flavonoids, saponins, alkaloids, polyphenols, and polysaccharides [10]. In 20 grams of leaf extract, the total saponin (triterpenoid and steroid) content is approximately 28.14 ± 0.22. Saponins are natural glycosides that can mimic insulin activity by inhibiting lipolysis, improving glucose uptake in adipose tissue, and enhancing insulin sensitivity. Moreover, saponins are heat-resistant, so boiling does not degrade their bioactive compounds. These properties suggest that binahong leaf decoction may serve as an effective and safe herbal therapy for managing hyperglycemia [7].

Several studies support the antidiabetic potential of binahong. according to the researcher, demonstrated that binahong leaf extract significantly reduced blood glucose levels in alloxan induced mice ($p < 0.05$), with the most effective dose being 400 mg/kg body weight [11]. Similarly, another researcher reported that elderly patients with type II DM experienced a significant reduction in mean blood glucose levels from 182.41 mg/dL to 151.82 mg/dL after consuming binahong leaf decoction ($p = 0.001$; $\alpha < 0.05$). These findings confirm that binahong leaves have measurable hypoglycemic effects in both animal and human studies [8].

A preliminary survey conducted by the researcher on October 19, 2023, among 10 DM patients in the Puskesmas Garuda area revealed that 40% of respondents regularly visited the health center, monitored their blood glucose levels, and used both prescribed medications and traditional remedies such as cinnamon or soursop leaf decoctions. However, 60% reported irregular health monitoring due to limited access to healthcare facilities and lack of knowledge about diabetes management. Interestingly, most respondents recognized binahong as a common climbing plant but were unaware of its medicinal properties. This indicates a low level of public awareness regarding the potential of herbal therapies in diabetes care. Therefore, this study aims to investigate the effect of binahong leaf decoction (Anredera cordifolia) on blood glucose levels in patients with Diabetes Mellitus as a non-pharmacological approach that could complement conventional therapy.

RESEARCH METHODS

This study employed a quantitative research approach with a quasi-experimental design, specifically a *pre- and post-test without control group* design. The study population consisted of patients diagnosed with Diabetes Mellitus in the working area of Garuda Public Health Center (Puskesmas Garuda), Pekanbaru, totaling 119 cases.

The data collection instrument used in this study was an observation sheet that included respondent information such as initials, age, gender, educational background, occupation, duration of illness, and blood glucose levels before and after consuming Binahong (Anredera cordifolia) leaf decoction. This instrument was designed to assess the effect of Binahong leaf decoction on reducing blood glucose levels among Diabetes Mellitus patients.

Prior to data collection, all respondents were asked to sign an informed consent form to indicate their voluntary participation. The researcher then conducted interviews to obtain respondent information as listed on the observation sheet. Following that, a pre-test blood

glucose measurement was performed, and the researcher explained the study procedure, which involved consuming 800 ml of Binahong leaf decoction daily (400 ml in the morning and 400 ml in the afternoon) for three consecutive days.

A post-test blood glucose measurement was carried out on the third day, approximately 10–15 minutes after the final consumption of the decoction. Once all data were collected, the researcher conducted statistical analysis using parametric tests appropriate to the data characteristics. A normality test was also performed on both pre-test and post-test data to ensure data suitability for further analysis.

RESEARCH RESULTS

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A. Univariate Analysis

Univariate analysis is an analysis used to obtain data on the characteristics of respondents. The univariate results obtained in this study are:

Table 1. Characteristics of Respondents of Diabetes Mellitus Patients in the Garuda Health Center Area, Pekanbaru City

NO	Characteristics	Frequency	Percentage (%)
1.	**Gender**		
	a. Men	3	17.6
	b. Woman	14	82.4
	Total	**17**	**100%**
2	**Age**		
	a. Early Adulthood (26-35 years old)	3	17.6
	b. Late Adulthood (36-45 years old)	4	23.5
	c. Early Elderly (46-55 years old)	10	58.8
	Total	**17**	**100%**
3	**Final Education**		
	a. Elementary School	2	11.8
	b. Junior High School	2	11.8
	c. Senior High School	12	70.6
	d. University	1	5.9
	Total	**17**	**100%**
4	**Work**		
	Homemaker	10	58.8
	Self-employed	6	35.3
	Civil Servant	1	5.9
	Total	**17**	**100%**
5	**Long Suffering from DM**		
	a. <1 year	3	17.6
	b. 1-5 years	11	64.7
	c. > 5 years	3	17.6
	Total	**17**	**100%**

(Source: Primary Data Analysis 2025)

Table 1 shows that almost all respondents were female, totaling 14 respondents (82.4%). More than half of the respondents were in the early elderly age range (46–55 years), with 10 respondents (58.8%). More than half, or 12 respondents (70.6%), had a senior high school education, and more than half were homemakers, totaling 10 respondents (58.8%). In addition, most respondents had suffered from diabetes mellitus for 1–5 years, with 11 respondents (64.7%).

Table 2. Average Blood Sugar Levels Before and After Binahong Leaf Decoction Intervention in DM Patients

Variabel	N	Mean	Min-Max	SD
Intervention Groups			198-350	
Pre Test	17	254.47		50.663
Pre Test			123-250	
	17	178.24		41.653

(Source: Primary Data Analysis, 2025)

Based on Table 2, the results of the study showed that the mean pre-test and post-test blood glucose levels of diabetes mellitus patients before and after the administration of binahong leaf decoction were as follows: the mean pre-test value was 254.47 mg/dl, with a minimum value of 198 mg/dl and a maximum value of 350 mg/dl. Meanwhile, the mean post-test value was 178.24 mg/dl, with a minimum value of 123 mg/dl and a maximum value of 250 mg/dl.

B. Analyzes Bivariat

Bivariate analysis was carried out to see the effect of binahong leaf decoction on blood sugar levels in patients with diabetes mellitus in the Garuda Pekanbaru Health Center area where normality tests were previously carried out.

1. Normality Test

Table 3. Normality Test Results

	Shapiro-Wilk			
	Frequency	**Statistics**	**Df**	**P-Value**
Pretest	17	0.908	17	0.094
Posttest	17	0.922	17	0,157

(Source: Primary Data Analysis 2025)

Table 3 shows the results of the Shapiro–Wilk normality test, which indicated a significance value (sig.) of 0.094 for the pre-test and 0.157 for the post-test. It can be concluded that the data in this study were normally distributed ($p > 0.05$).

2. Difference in the Average Value of the Effect of Blood Sugar Levels on Diabetes Mellitus Patients Before and After in the Garuda Pekanbaru Health Center Area

Table 4. Difference in Mean Blood Glucose Levels Before and After Administration of Binahong Leaf Decoction

Variabel	*Mean*	SD	SE	95% CI		T	df	P *Value*
				Lower	*Upper*			
Pre-test Post-test	76.235	16.965	4.115	67.513	84.958	18.528	16	.000

(Source: Primary Data Analysis 2025)

Table 4 shows the results of the statistical analysis using the paired sample t-test. The mean difference between pre-test and post-test blood glucose levels was 76.235 mg/dl, with a 95% confidence interval ranging from 67.513 to 84.958 and a standard deviation of 16.965. The obtained p-value was 0.000 ($p < 0.05$), indicating that H_0 was rejected. Therefore, it can be concluded that there was a significant effect of binahong leaf decoction on blood glucose levels among diabetes mellitus patients in the working area of Garuda Public Health Center, Pekanbaru.

DISCUSSION

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A. Univariate Analysis

1. General Data

   a. Gender

   The results showed that most respondents were female (82.4%), while male respondents accounted for 17.6%. Women have a higher risk of developing Diabetes Mellitus due to physiological and hormonal factors that contribute to increased body mass index (BMI). Hormonal imbalance during pregnancy, particularly elevated progesterone levels, can raise blood glucose levels and increase the risk of Diabetes Mellitus [5].

   Fluctuations in estrogen levels also affect blood glucose regulation. Increased estrogen can lead to insulin resistance, while women tend to have higher low-density lipoprotein (LDL) and triglyceride levels than men. Psychological factors such as stress and anxiety may further elevate cortisol secretion, which interferes with glucose metabolism [12].

   Similarly, previous findings reported that women were more likely to experience Diabetes Mellitus (61%) compared to men (39%), primarily due to hormonal changes, higher body fat percentage, and less healthy lifestyle patterns. Women generally have 20–25% body fat compared to 15–20% in men, increasing their susceptibility to insulin resistance [13].

   Based on the researcher's assumption, the higher proportion of female respondents in this study indicates that women are more prone to metabolic disorders, including type II Diabetes Mellitus. This may be attributed to hormonal fluctuations, higher fat accumulation, and lower physical activity levels, which collectively contribute to elevated blood glucose levels.

   b. Age

   The respondents' ages were divided into three categories: early adulthood (25–35

years), late adulthood (36–45 years), and early elderly (46–55 years). The results showed that almost half of the respondents were in the 46–55 age group (58.8%). According to previous findings, the body's organs begin to experience aging after the age of 46, influenced by factors such as lifestyle, diet, physical inactivity, smoking, alcohol consumption, obesity, hypertension, and cultural habits. After the age of 40, particularly beyond 45, the body undergoes significant physiological decline, including reduced cellular regeneration [14].

A related study reported that individuals aged over 45 years have a four times higher risk of elevated blood glucose compared to those under 45, in both males and females. Research conducted at the Malang Public Health Center found that those under 45 are more commonly associated with type I diabetes, while type II diabetes risk increases with age, as noted by the American Diabetes Association (ADA). This is mainly due to abdominal fat accumulation, which leads to central obesity and triggers insulin resistance, marking the onset of diabetes. In older adults, insulin sensitivity also decreases, impairing glucose regulation. Moreover, pancreatic function declines with age, particularly in β-cell activity, which plays a key role in type II diabetes development [13].

Based on the results, it can be assumed that the majority of respondents aged 46–55 years (58.8%) are within the stage where aging processes contribute to an increased risk of Diabetes Mellitus. Physiological decline, reduced insulin sensitivity, and lifestyle factors such as poor diet, low physical activity, and obesity collectively heighten this risk. Therefore, age is an important determinant in the rising incidence of high blood glucose levels among the study population.

c. Education

The results showed that most respondents with Diabetes Mellitus had a senior high school education level (70.6%). Education level is one of the risk factors influencing the likelihood of developing Diabetes Mellitus, with individuals having a high school or equivalent education reported to be at the highest risk [15].

This finding is consistent with previous research stating that low education and knowledge levels contribute to the rising incidence of chronic diseases. Health education and promotion play an essential role in shaping healthy behaviors and reducing the risk of Diabetes Mellitus, supported by economic and environmental factors [16].

Education influences awareness of healthy lifestyles and physical activity. Individuals with lower education levels tend to pay less attention to their health and often have limited understanding of disease symptoms and prevention measures [17].

Based on the researcher's assumption, education level affects an individual's ability to understand and manage Diabetes Mellitus. Those with higher education are more likely to comprehend health information, such as maintaining blood glucose levels, adopting healthy dietary patterns, performing regular blood sugar checks, and engaging in consistent physical exercise.

d. Pekerjaan

Based on the results of this study, the majority of respondents were housewives, dominated by the intervention group with 10 respondents (58.8%). Occupation as a housewife falls into the category of light physical activity. Light physical activity has been reported to increase the risk of developing type 2 diabetes mellitus (T2DM) by 6.2 times compared to moderate and heavy physical activity levels. Occupational factors

influence the risk of diabetes mellitus, where jobs involving low physical activity can lead to reduced energy expenditure. Consequently, excess energy is stored as body fat, which may lead to obesity a major risk factor for diabetes mellitus [18].

A study also revealed that housewives tend to engage in light to moderate physical activities, such as household chores, which are insufficient to meet the recommended daily physical activity levels. This low level of physical activity can increase the risk of obesity and insulin resistance, both of which are key factors in the development of diabetes mellitus [17].

Based on the researchers' assumption, occupations as housewives characterized by light physical activity contribute to a higher risk of developing type 2 diabetes mellitus. Low physical activity leads to inadequate energy expenditure, causing excess energy to be stored as body fat, which may result in obesity. This condition can trigger insulin resistance, a major factor in the pathogenesis of diabetes mellitus. Therefore, housewives with low levels of physical activity have a greater risk of developing metabolic disorders compared to individuals with moderate or high physical activity levels.

e. Duration of Illness

Based on the results of this study, it was found that more than half of the respondents had suffered from diabetes mellitus (DM) for 1–5 years, totaling 11 respondents (64.7%). The duration of suffering from diabetes can affect the patient's psychological condition, leading to feelings of boredom and hopelessness in managing the disease.

This finding is consistent with a previous study [19], which reported that the duration of illness has a significant relationship with the quality of life of diabetic patients. Those who have lived with the disease for a longer period tend to experience lower quality of life, often feeling hopeless and resigned to their condition. The progressive nature of the disease can negatively impact their quality of life, including dependence on medication or medical assistance, fatigue, and limited energy levels.

Based on the results of this study, it can be assumed that the majority of respondents had suffered from diabetes mellitus for 1–5 years, which may affect their psychological condition and overall quality of life. A longer duration of illness tends to cause boredom, hopelessness, and decreased motivation to adhere to treatment. Over time, the progressive course of the disease can lead to fatigue, medication dependency, and physical activity limitations, contributing to a decline in patients' quality of life.

2. Difference in the Average Value of the Effect of Blood Sugar Levels on Diabetes Mellitus Patients Before and After in the Garuda Pekanbaru Health Center Area

Based on the results of this study, the mean pretest and posttest blood glucose levels before and after the intervention with binahong leaf (Anredera cordifolia) decoction in patients with diabetes mellitus were obtained. The mean pretest value was 254.47 mg/dL, with a minimum value of 198 mg/dL and a maximum value of 350 mg/dL. Meanwhile, the mean posttest value was 178.24 mg/dL, with a minimum value of 123 mg/dL and a maximum value of 250 mg/dL. These findings indicate that the intervention effectively reduced blood glucose levels among diabetic patients.

This result is consistent with a previous study [20], which showed that before consuming binahong leaf decoction, the average blood glucose level of respondents was 270.67 mg/dL, with all respondents classified as diabetes mellitus patients. After consuming the decoction, there was a significant decrease in blood glucose levels in most respondents, with 40% achieving normal blood glucose levels.

Similarly, a study by Sijabat *et al.* [8] using a paired-sample t-test found that the mean blood glucose level in elderly patients with type II diabetes mellitus before consuming binahong leaf decoction was 182.41 mg/dL (SD = 31.304), with a minimum of 89 mg/dL and a maximum of 201 mg/dL. After consuming the decoction, the mean blood glucose level decreased to 151.82 mg/dL (SD = 31.304), indicating a significant reduction.

Based on the researcher's assumption, the administration of binahong leaf decoction has a significant effect on lowering blood glucose levels in diabetic patients. The active compounds contained in binahong leaves, such as saponins, flavonoids, and alkaloids, may enhance insulin sensitivity and glucose metabolism, contributing to better glycemic control.

B. Analyzes Bivariat

Based on the results of the *paired sample t-test* analysis of pretest and posttest blood glucose levels among diabetes mellitus patients, it was found that the mean difference between pretest and posttest was 76.235, with a confidence interval ranging from 67.513 to 84.958 and a standard deviation of 16.965. The *p*-value obtained was 0.000, which is less than 0.05. Therefore, H_0 is rejected, indicating a significant effect of binahong leaf (*Anredera cordifolia*) decoction on blood glucose levels among diabetes mellitus patients in the working area of Puskesmas Garuda, Pekanbaru.

This finding aligns with a study by Ardiani *et al.* [11], which investigated the effects of binahong leaf extract (400 mg/kg body weight) on alloxan-induced diabetic rats. The study demonstrated that the extract significantly reduced blood glucose levels ($p < 0.05$). The extract contains alkaloids, flavonoids, and polyphenols, which exhibit pharmacological effects as antidiabetic and hypoglycemic agents. These compounds help decrease blood glucose levels and reduce the risk of oxidative stress in cells and tissues, suggesting that binahong leaves have potential as a phytopharmaceutical alternative therapy for diabetes.

Similarly, Dora [2] conducted a *paired sample t-test* analysis and reported a significant difference ($p = 0.001$, SD = 23.316) between pretest and posttest blood glucose levels after administration of binahong leaf decoction. The decrease in blood glucose levels was attributed to the presence of saponins, alkaloids, polyphenols, flavonoids, and polysaccharides, which play a role in improving glucose metabolism and insulin sensitivity.

Consistent results were also reported by Sijabat *et al.* [8], who found a significant difference ($p = 0.001$, SD = 28.473, $t = 5.039$) between pretest and posttest blood glucose levels following the intervention with binahong leaf decoction among type II diabetes mellitus patients at Puskesmas Kota Datar Hamparan Perak.

Based on the researcher's assumption, the consumption of binahong leaf decoction effectively lowers blood glucose levels in diabetic patients. The active compounds—particularly saponins and flavonoids—act as natural antidiabetic agents by enhancing insulin sensitivity, promoting glucose uptake, and reducing oxidative stress.

CONCLUSION

Based on the results of this study entitled *"The Effect of Binahong (Anredera cordifolia) Leaf Decoction on Blood Glucose Levels in Patients with Diabetes Mellitus at Garuda Public*

Health Center, Pekanbaru", it can be concluded that there is a significant effect of consuming Binahong leaf decoction on reducing blood glucose levels in patients with diabetes mellitus. The findings showed that the average blood glucose level before the intervention (pre-test) was 254.47 mg/dL, which decreased to 178.24 mg/dL after the intervention (post-test). Statistical analysis using the paired t-test revealed a p-value of 0.000 ($p < 0.05$), indicating that H_0 was rejected. Therefore, Binahong leaf decoction has a significant effect in lowering blood glucose levels among diabetic patients.

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