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Original Research

Bay Leaf Brewing Lowers Blood Sugar Levels in Elderly People with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Type 2 diabetes mellitus in the elderly can cause increased blood sugar levels that risk damaging various body systems. One natural alternative to help lower blood sugar levels is to utilize bay leaves, which are known to have active ingredients that have the potential to be antidiabetic. This study aims to determine the effect of boiled bay leaves on blood sugar levels in elderly people with type 2 diabetes mellitus. **Methods:** The study used a pre-experimental design with a one group pre and post test design approach. The study population was elderly people with type 2 diabetes mellitus in the Abang II Health Center, Karangasem, Bali Province, Indonesia with a sample size of 49 people selected using the proportional stratified random sampling technique. Respondents were given an intervention in the form of consuming 220 ml of boiled bay leaf water every morning before eating for seven consecutive days. The bay leaves used were old leaves weighing 2 grams. Blood sugar levels were measured using the Easy Touch tool, with established standard procedures. **Results:** The results showed that before the intervention, all respondents had random blood sugar levels >200 mg/dL. After the intervention, 93.9% of respondents experienced a decrease in blood sugar levels to <200 mg/dL. The paired t-test statistical test showed a p value = 0.001 (p <0.05), which means there was a statistically significant decrease in blood sugar levels. **Conclusions:** The conclusion of this study is that boiled bay leaf water is effective in lowering blood sugar levels in elderly people with type 2 diabetes. It is recommended to use it as a safe and natural additional therapy, while continuing to consult a doctor for further monitoring.

Keywords: Bay leaf; brewing; blood sugar levels; elderly; parents; type 2 diabetes mellitus

1. INTRODUCTION

Non-communicable diseases (NCDs) such as diabetes mellitus, hypertension, stroke, arthritis, and rheumatism have shown an increasing trend over the years.(1) Diabetes mellitus is a chronic condition characterized by elevated blood glucose levels, with type 2 diabetes being the most common form. It typically affects adults and results from a combination of impaired insulin secretion by the pancreas and the inability of body tissues to respond effectively to insulin.

The relevance of similar research findings, the reasons why this research needs to be done, and the research gaps are that several studies have shown that bay leaves contain active compounds that can lower blood sugar levels. However, most studies have been conducted on animals or using extracts in laboratory doses, not in the form of

infusions as commonly consumed by the public. Elderly people with type 2 diabetes need safe, easy, and affordable natural therapy alternatives. Therefore, this study is important to prove the effectiveness of bay leaf infusion in lowering blood sugar levels in the elderly scientifically and applicatively.

According to the International Diabetes Federation (2017), Indonesia ranked seventh globally in the number of diabetes cases, with 10.7 million people affected.[2] In Bali Province, the 2018 Riskesdas showed a diabetes prevalence of 1.3%, with the highest in Denpasar City (1.39%) and Karangasem Regency at 0.78%. By 2022, the number of diabetes cases in Bali had increased to 51,226, with 3,687 recorded in Karangasem.[1] The global aging population is another critical factor, with the number of people aged 60 and above expected to rise from 1 billion in 2020 to 2.1 billion by 2050. Aging is associated with metabolic disorders, reduced insulin sensitivity, impaired oxidative defense, and decreased mitochondrial function. In older adults, high blood sugar levels can damage multiple body systems, particularly nerves and blood vessels, leading to complications such as hypertension, stroke, coronary heart disease, cataracts, glaucoma, blindness, liver dysfunction, delayed wound healing, and amputations, especially of the lower limbs.[3]

While oral hypoglycemic drugs (OHD) are effective in managing blood glucose levels, they do not fully prevent complications, prompting the need for safe, accessible, and alternative treatments—such as medicinal plants.[4] One such plant is bay leaf (*Syzygium polyanthum*), commonly found across Indonesia. Bay leaves, either fresh or dried, are traditionally used in cooking but also have health benefits, including managing type 2 diabetes. Their active compounds include flavonoids, tannins, and terpenoids, known for their antidiabetic properties.[4] A study by Wigati and Rukmi (2021) titled "The Effect of Boiled Bay Leaf Water on Reducing Blood Glucose Levels in Type 2 Diabetes Mellitus Patients" found that bay leaf decoction helped lower blood glucose levels in patients in Katikan Village, Ngawi.[5] The quasi-experimental study involved 56 participants and showed a reduction in blood sugar, although the p-value (0.346) was not statistically significant.[5] Based on these findings, researchers are interested in further investigating the effect of bay leaf decoction on reducing blood glucose levels in elderly individuals with type 2 diabetes mellitus. The study was conducted in the working area of Abang II Public Health Center, Abang District, Karangasem Regency, Bali Province, Indonesia. It is hoped that bay leaf decoction can be developed as a complementary herbal therapy for managing type 2 diabetes in the elderly.

2. METHODS

2.1 Study Design

The type of research used in this study is quantitative research. The method applied is a pre-experimental one-group pretest-posttest design.[6] In this design, observations are conducted both before and after the intervention. This approach aims to measure the effect of the intervention by comparing the results of the pretest and posttest within the same group.

2.2 Population, Sample Size and Sampling Techniques

The population in this study consists of individuals with type 2 diabetes mellitus aged 45 years and older in the working area of Abang II Public Health Center, Abang Subdistrict, Karangasem Regency, Bali Province, Indonesia, totaling 171 people. Determining sample size is done by using the limited population proportion formula, or you can also use the Slovin formula as a simple approach.The sample size was 49 individuals. The sampling technique used was proportional stratified random sampling.[6] Respondents were instructed to consume 220 ml of boiled bay leaf water every morning before meals. This intervention was administered once daily for one week.

2.3 Variable

The independent variable in this study is the consumption of bay leaf decoction. The dependent variable is the blood glucose level in elderly individuals with type 2 diabetes mellitus. The study aims to observe changes in blood glucose levels before and after the intervention. This relationship is analyzed to determine the effectiveness of bay leaf decoction in lowering blood sugar levels.

2.4 Data Collection

The instruments used in this study included an observation sheet for recording blood sugar level measurements. Blood sugar levels were measured using an Easy Touch device. Additionally, a Standard Operating Procedure (SOP) was used for the preparation and administration of bay leaf decoction. A measuring cup was used to ensure the accurate dosage of the decoction. The bay leaves used in this study were mature

leaves. Each decoction used 2 grams of bay leaves to maintain consistent dosing.

2.5 Data Analysis

The statistical test used in this study was the Paired t-test, which aims to compare the two means of paired samples, specifically blood sugar levels before and after the intervention of boiled bay leaf water. The significance level was set at $\alpha < 0.05$.

2.6 Ethical Approval

This research has obtained ethical approval from the Chairperson of the Health Research Ethics Commission of Denpasar Polytechnic with Number: DP.04.02/F.XXXII.25/0312/2024.

3. RESULTS

3.1 Distribution of Respondent Characteristics

The results of the study in Table 1 illustrate that all respondents in this study were aged 60 years and above, indicating that the sample consisted of the elderly group as a whole. The majority of respondents were women (77.6%), indicating a high participation or prevalence of women in this study. Most respondents had a basic education level (51.0%), indicating that their educational background was relatively low. In addition, as many as 87.8% of respondents had suffered from type 2 diabetes mellitus for 6–10 years, illustrating that most had experienced this disease for a fairly long period of time.

Table 1. Distribution of respondent characteristics of bay leaf decoction lowers blood sugar levels in elderly People with type 2 diabetes mellitus

Characteristics	Frequency	%
Age (≥ 60 year)	49	100.0
Gender		
Man	11	22.4
Woman	38	77.6
Education		
Elementary school	25	51.0
Junior high school	4	8.2
Senior high school	18	36.7
College (diploma, bachelor's degree)	2	4.1
Long time suffering from DM		
1-5 year	1	2.0
6-10 year	43	87.8
>10 year	5	10.2
Total	49	100

3.2 Data Comparison of Blood Sugar Levels Before and After Intervention

Table 2 shows a comparison of respondents' blood sugar levels before and after the bay leaf infusion intervention. Before the intervention, most respondents (93.9%) had blood sugar levels in the range of 200–300 mg/dL, and 6.1% were above 300 mg/dL. After the intervention, there was a significant decrease, where only 73.5% were still in the range of 200–300 mg/dL, and 26.5% had blood sugar levels above 300 mg/dL. These results indicate a change in the distribution of blood sugar levels which indicates a positive effect of the intervention.

Table 2. Comparison of blood sugar levels before and after intervention (n = 49)

Blood sugar	After (%)	Before (%)
200 - 300 mg/dL	36 (73.5)	46 (93.9)
> 300 mg/dL	13 (26.5)	3 (6.1)
Total	49 (100)	49 (100)

3.3 Blood Sugar Normality Test Results Before and After Intervention

Based on the results of the Shapiro-Wilk normality test, in Table 3, it shows that the blood sugar level data before and after the intervention showed a significance value of 0.113 and 0.105, respectively. Because the significance values of both are greater than 0.05, it can be concluded that the data is normally distributed and meets the assumptions for parametric testing.

Table 3. Blood sugar normality test results before and after intervention

	Shapiro-Wilk		
	Statistic	df	Sig.
Before Intervention	0.962	49	0.113
After Intervention	0.961	49	0.105

3.4 Bay Leaf Decoction Reduces Blood Sugar Levels in Elderly People with Type 2 Diabetes Mellitus

The results of the paired sample t-test in Table 4, show a significant difference between blood sugar levels before and after the bay leaf decoction intervention, with a p-value of 0.001 ($p < 0.05$). This proves that bay leaf decoction is effective in lowering blood sugar levels in elderly people with type 2 diabetes mellitus in the Abang II Health Center work area.

3.5 Changes in Respondents' Blood Sugar Before and After Intervention

The results of the study in Figure 1 show that there was a decrease in the average blood sugar levels in respondents after being given bay leaf boiled water intervention. This indicates that bay leaf decoction is effective in helping to lower blood sugar levels in elderly people with type 2 diabetes mellitus.

Table 4. Bay leaf decoction reduces blood sugar levels in elderly people with type 2 diabetes mellitus in the Abang II Health Center work area

	Paired samples test			
	Mean	**Sd**	**df**	**Sig. (2 tailed)**
Before intervention - after intervention	129.28	49.28	48	0.001

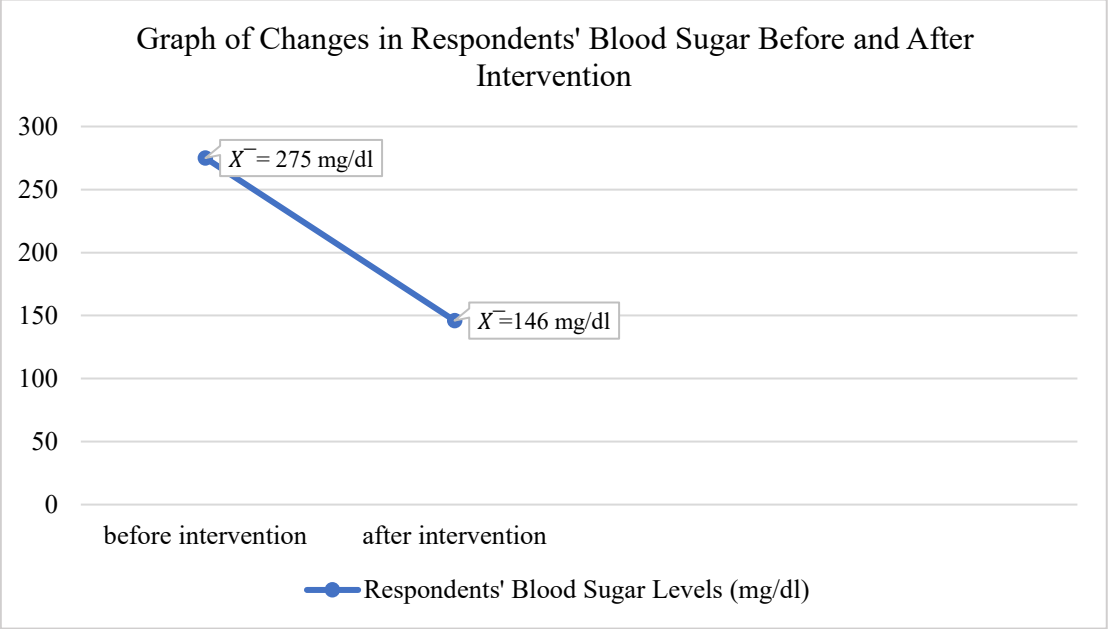

Figure 1. Graph of average changes in respondents' blood sugar before and after intervention

4. DISCUSSION

The study results showed that before the intervention with boiled bay leaf water, the majority of respondents had blood sugar levels between 200–300 mg/dL (73.5%), and 26.5% had blood sugar levels above 300 mg/dL. This indicates that most elderly individuals with type 2 diabetes mellitus experienced relatively high levels of hyperglycemia. Elevated blood sugar levels in the elderly may be caused by several factors, including uncontrolled dietary habits, insulin resistance, and decreased physical activity with advancing age.[7,8]

After a one-week intervention with 220 ml of boiled bay leaf water given daily before breakfast, there was a significant reduction in blood sugar levels. A total of 93.9% of respondents had blood sugar levels below 200 mg/dL, and only 6.1% remained in the 200–300 mg/dL range. These findings demonstrate the effectiveness of bay leaf decoction as an additional therapy in controlling blood sugar levels in elderly individuals with type 2 diabetes mellitus. Bay leaves (*Syzygium polyanthum*) are known to contain active compounds such as flavonoids, tannins, and eugenol, which contribute to lowering blood sugar levels by enhancing insulin sensitivity and inhibiting the enzyme α-glucosidase, which slows down glucose absorption in the intestines.[9,10] These compounds also act as antioxidants that help repair cellular damage caused by oxidative stress, which is commonly experienced by diabetic patients (11).

The significant decrease in blood sugar levels within a short period reinforces the findings that herbal remedies like bay leaves can serve as a safe and

affordable complementary therapy to medical treatment, particularly for the elderly. Nevertheless, the use of bay leaf decoction should still be accompanied by healthcare professional supervision and not replace primary medical treatment, but rather support it as a complementary approach.[12] The results of the Paired Sample t-test showed a significant difference in blood sugar levels before and after the bay leaf decoction intervention in elderly individuals with type 2 diabetes mellitus, with a p-value of 0.001 ($p < 0.05$). This finding indicates that bay leaf decoction is effective in lowering blood sugar levels, consistent with previous studies that have demonstrated the antihyperglycemic effects of this herbal plant.[13,14] A total of 93.9% of respondents had blood sugar levels below 200 mg/dL after the intervention, showing a significant improvement in glucose control. This strengthens the hypothesis that active compounds in bay leaves, such as flavonoids and tannins, can enhance insulin sensitivity and reduce insulin resistance.[15,16]

Research by Suwanti and Muklisin supports these findings, reporting that consumption of bay leaf decoction significantly reduced blood glucose levels in patients with type 2 diabetes.[17] The primary mechanism of action is believed to involve the stimulation of insulin secretion and inhibition of the α-glucosidase enzyme involved in carbohydrate digestion.[18] In addition to its antihyperglycemic effect, bay leaf also possesses antioxidant activity that can reduce oxidative stress in individuals with diabetes. Oxidative stress is a major risk factor for diabetes complications such as neuropathy and vascular damage.[19] A study by Dewi et al. confirmed that the terpenoid components in bay leaves help reduce cell damage caused by free radicals.[20]

The elderly age group, which constituted the majority of the participants in this study, is an important factor, as older adults with diabetes are more susceptible to complications due to declining metabolic function and insulin sensitivity.[21] Therefore, using safe natural therapies such as bay leaf decoction can serve as an effective and low-risk supportive treatment.[22] These results are consistent with other studies that found herbal treatments can provide benefits in diabetes management without the risk of long-term toxicity.[23] However, it is important to combine the use of bay leaf decoction with regular medical supervision to ensure both the safety and effectiveness of the therapy.[24] Overall, this study provides strong evidence that bay leaf decoction can be used as an effective complementary therapy for lowering blood sugar levels in elderly patients with type 2 diabetes. Nevertheless, further research is needed to determine the optimal dosage and understand the molecular mechanisms involved.

This study has several limitations that need to be considered. First, the duration of the intervention was only one week so it does not reflect the long-term effects of consuming bay leaf infusion. Second, the absence of a control group makes it difficult to ensure that the decrease in blood sugar levels is entirely due to the intervention. Third, the measurement was only limited to random blood sugar levels, without involving other indicators such as HbA1c or insulin levels. In addition, because the study was conducted in one particular area, the results cannot be generalized to the elderly population with type 2 diabetes in other areas.

5. CONCLUSION

The conclusion of this study is that boiled bay leaf water is effective in lowering blood sugar levels in elderly individuals with type 2 diabetes mellitus. The results showed a significant decrease in blood glucose levels after consuming bay leaf decoction for one week. This suggests that bay leaf water can serve as a beneficial non-pharmacological alternative to help manage diabetes. Bay leaves contain active compounds such as flavonoids and tannins that contribute to their antidiabetic effects. Based on the findings, it is recommended that bay leaf decoction be used as a natural and safe complementary therapy. However, it should not replace medical treatment or prescribed medications. Elderly patients are advised to regularly consult with healthcare professionals to monitor their condition. Continuous lifestyle management, including diet and physical activity, remains essential for effective diabetes control.

Ethical Approval

This research has obtained ethical approval from the Chairperson of the Health Research Ethics Commission of Denpasar Polytechnic with Number: DP.04.02/F.XXXII.25/0312/2024.

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Competing Interests

All the authors declare that there are no conflicts of interest.

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Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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