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The Effect of Pakkat (Calamus caesius Blume) Consumptionon Blood Glucose Levels in Diabetes Mellitus Patients

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Abstract

Background: Diabetes Mellitus (DM) is a global health problem with increasing prevalence. Pakkat (Calamus caesius Blume), a local plant from North Sumatra, is hypothesized to have hypoglycemic effects due to its phytochemical content, including flavonoids, saponins, and tannins. Objective: To determine the effect of pakkat consumption on blood glucose levels in DM patients. Methods: A quasi-experimental study with a one-group pretest-posttest design was conducted on 23 DM patients at Batang Toru Community Health Center. The intervention involved consuming 100 grams of pakkat for 4 consecutive days. Blood glucose levels were measured before and after the intervention. Data were analyzed using the Wilcoxon test. Results: The mean blood glucose level decreased from 238.1 mg/dL (pretest) to 181.4 mg/dL (posttest). Statistical analysis showed a significant difference (p-value < 0.05). *Conclusion: Pakkat consumption effectively reduces blood glucose levels in DM patients.*

.***Keywords:*** *Pakkat, Blood Glucose Levels, Diabetes Mellitus, Hypoglycemic*

INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia due to impaired insulin secretion or action. According to the International Diabetes Federation (IDF, 2021), approximately 19.5 million people in Indonesia suffer from DM, with projections reaching 28.6 million by 2045. Lifestyle factors, such as poor diet and physical inactivity, significantly contribute to the rising prevalence of DM.

Traditional medicinal plants, such as pakkat (Calamus caesius Blume), have gained attention for their potential hypoglycemic properties. Pakkat, a young rattan consumed in North Sumatra, contains bioactive compounds like flavonoids, saponins, and tannins, which may improve glucose metabolism by inhibiting α-glucosidase, enhancing insulin sensitivity, and reducing intestinal glucose absorption (Utomo et al., 2021). This study aimed to evaluate the effect of pakkat consumption on blood glucose levels in DM patients.

METHODS

Study Design: A quasi-experimental study with a one-group pretest-posttest design.

Participants: Twenty-three DM patients were selected through accidental sampling from a population of 228 at Batang Toru Community Health Center. Inclusion criteria: age <60 years, ability to communicate, and willingness to sign informed consent.

Intervention: Participants consumed 100 grams of boiled or roasted pakkat daily at 08:00 AM for 4 consecutive days.

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Data Collection: Fasting blood glucose levels were measured before (O1) and after (O2) the intervention using a glucometer.
Statistical Analysis: Descriptive statistics were used for data presentation, and the Wilcoxon test was employed to compare pre- and post-intervention glucose levels ($\alpha = 0.05$).

RESULT

1) Age

Type 2 diabetes is more common and usually appears after the age of 40, while type 1 is more common in children around 10-14 years old, but type 1 or type 2 diabetes is increasing at a young age (under 40 years old). The youngest diabetes sufferer in the study was 36 years old and the oldest was 59 years old. The age grouping of sufferers can be seen in table 1.

Table 1. Distribution of diabetes sufferers by age group

Age (Years)	Frequency (n)	%
< 40	4	17,39
≥ 40	19	82,61
Total	23	100,00

2) Gender

Table 2. Distribution of diabetes sufferers by gender

Gender	Frequency (n)	%
Man	9	39,1
Woman	14	60,9
Total	23	100,0

Research shows that women have a higher risk of developing type 2 diabetes than men, with some studies showing that women are 3-7 times more likely to develop diabetes due to risk factors such as body mass index (BMI) and body composition, as well as hormonal changes such as decreased estrogen in women after menopause. This study is in accordance with research findings that describe 60.9% of diabetes mellitus sufferers are women.

3) Blood Sugar Levels Before and After Giving Pakkat

Table 3. Statistics of Blood Sugar Levels Before and After Giving Pakkat

Average blood sugar level	N	Range	Minimum	Maximum	Mean	Std.Dev
Before Intervention	23	75	210	285	238.09	20.04

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After Intervention	23	67	153	220	181.43	18.15

Before the provision of the pakkat intervention, the lowest blood sugar level was 285 mg/dL and the highest was 285 mg/dL with an average of 238.09 mg/dL and a standard deviation of 20.04 mg/dL. After the intervention, blood sugar levels decreased to 153 mg/dL, the lowest, and 220 mg/dL, the highest, with an average of 181.43 mg/dL and a standard deviation of 18.15 mg/dL. This means that the provision of pakkat can reduce the average blood sugar level from 238.09 to 181.43 mg/dL or a decrease of 56.66 mg/dL.

4) Decrease in Blood Sugar Levels

Table 4. Difference in blood sugar levels before and after the provision of pakkat intervention for 4 days

	Minimum	Maximum	Mean	Std.Dev
Blood sugar levels	37	83	56.65	10.85

Giving Pakat can reduce blood sugar levels by an average of 56.65 mg/dL, with the lowest decrease of 37 mg/dL and the largest 83 mg/dL. The variation in blood sugar levels between patients was 10.85 mg/dL.

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Table 5. Effect of Pakkat in reducing blood sugar levels

	Z	*P Value*
Before and after treatment	-4,200	0,000

The results of the statistical test with Wilcoxon obtained a Z value = -4.200 which shows that all samples in the study experienced a decrease in blood sugar levels and this result was statistically significant ($p < 0.05$), in other words, giving pakkat can reduce blood sugar levels.

DISCUSSION

This study proves that pakkat significantly reduces blood sugar levels in DM patients. Active compounds such as saponins inhibit the α-glucosidase enzyme, flavonoids increase insulin sensitivity, and tannins reduce glucose absorption in the intestine.

The results of this study indicate that consumption of pakkat (Calamus caesius Blume) significantly reduces blood sugar levels in patients with diabetes mellitus (DM), with an average decrease of 56.7 mg/dL (p-value = 0.000). This finding is in line with several previous studies that tested the effects of local plants with similar phytochemical content on blood glucose levels.

A study by Utomo et al. (2021) in the form of Intervention of Ethanol Extract of pakkat given to alloxan-induced diabetic rats, obtained results in the form of a decrease in blood sugar levels of 48.5 mg/dL after 14 days of administration. The mechanism in the form of Saponin in pakkat inhibits the α-glucosidase enzyme, reduces the conversion of carbohydrates to glucose, while flavonoids increase insulin sensitivity. Similarities with

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this study include a significant hypoglycemic effect, although Utomo's study used an animal model.
Study by Dewi et al. (2022) on Garlic (Allicin) with the intervention of giving allicin (the active compound of garlic) to patients with type 2 diabetes. The result was a decrease in fasting blood glucose of 29 mg/dL after 12 weeks, with the mechanism of Allicin increasing insulin secretion and reducing insulin resistance. Differences with this study indicate that pakkat has a faster effect (4 days vs. 12 weeks), presumably due to the combination of flavonoids, saponins, and tannins that work synergistically.
Study by Zakiyah et al. (2023) on Tannin from Guava Leaves with the intervention of tannin extract from guava leaves in patients with diabetes. The results found a decrease in blood sugar levels of 42 mg/dL after 7 days, with the mechanism of Tannin inhibiting glucose absorption in the intestine and increasing glycogenesis. Similarities with this study Pakkat also contains tannins, which are thought to play a role in reducing blood glucose.

Clinical Implications
Fast Effect through Reducing Blood Sugar Levels in a Short Time (4 Days) Shows the Potential of Pakkat as an Adjuvant Therapy in DM Patients Who Need Fast Glycemic Control, with Multicomponent Mechanisms, namely the Combination of Flavonoids, Saponins, and Tannins in Pakkat Provides a Stronger Effect Compared to Single Plants Such as Garlic or Guava.
Limitations of the study include the short duration of the study of 4 days and not evaluating long-term effects; no placebo control group; and variations in the processing of Pakkat (boiled/baked) may affect the bioactivity of the compound. Further research with design is needed.

CONCLUSION AND RECOMMENDATION

These findings strengthen the evidence that local plants rich in phytochemicals, such as pakkat, have the potential as complementary therapy for DM. The synergistic effects of flavonoids, saponins, and tannins make it a promising alternative. Recommendations for Further Research: Randomized Clinical Trial: Comparing Pakkat with Placebo or Conventional Antidiabetic Drugs with a Randomized Controlled Trial (RCT) Design to Validate the Results; Dose-Response Analysis to Determining the Optimal Dose for Maximum Hypoglycemic Effects; Molecular Mechanism Study by Testing the Effect of Pakkat on GLUT-4 Expression and Insulin Sensitivity.

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