

Effectiveness of Raw Lady's Finger Extract in Blood Glucose Control Among Patients with Type 2 Diabetes Mellitus: A True Experimental Study

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Cite this paper as: Mrs. Shivasankari S L, Mr. John Sundar D, Dr. Vijayasamundeswari P, Dr. Grace Jebakani Sweetey G, Mr. Bala Sivanandan S, (2025) Effectiveness of Raw Lady's Finger Extract in Blood Glucose Control Among Patients with Type 2 Diabetes Mellitus: A True Experimental Study. *Journal of Neonatal Surgery*, 14 (6s), 782-787.

ABSTRACT

Background: Diabetes mellitus is a major public health concern, and effective blood glucose control is essential in preventing complications. Natural remedies, including herbal treatments, have gained attention for their potential benefits in managing diabetes. This study assesses the effectiveness of raw lady's finger (*Abelmoschus esculentus*) extract in controlling blood glucose levels among patients with Type 2 Diabetes Mellitus.

Objective: To evaluate the impact of raw lady's finger extract on fasting and postprandial blood glucose levels in patients with Type 2 Diabetes Mellitus.

Methods: A true experimental study with a quantitative research approach was conducted at the Diabetology wards of Rajiv Gandhi Government General Hospital, Chennai. A total of 60 participants aged 40–60 years with Type 2 Diabetes Mellitus were selected through simple random sampling and divided equally into experimental and control groups. The experimental group received raw lady's finger extract, while the control group continued their routine diabetic management. Fasting blood sugar (FBS) and postprandial blood sugar (PPBS) levels were measured before and after the intervention. Statistical analysis was performed using independent t-tests and paired t-tests to determine the significance of changes in blood glucose levels.

Results: The experimental group showed a significant reduction in FBS (170.20 mg/dL to 145.13 mg/dL) and PPBS (260.23 mg/dL to 220.77 mg/dL) after consuming raw lady's finger extract, whereas the control group exhibited minimal changes. The results indicate that raw lady's finger extract is effective in lowering blood glucose levels.

Conclusion: Raw lady's finger extract demonstrated a significant reduction in blood glucose levels, suggesting its potential as a complementary therapy for managing Type 2 Diabetes Mellitus. Further research with larger sample sizes and extended study durations is recommended to validate these findings.

Keywords: Type 2 Diabetes Mellitus, raw lady's finger extract, blood glucose control, fasting blood sugar, postprandial blood sugar, herbal therapy.

1. INTRODUCTION

"I'm not ill, just my pancreas is lazy." — Healthline

Metabolism, derived from the Greek word meaning "change," encompasses the life-sustaining biochemical reactions within living cells. Carbohydrate metabolism, a crucial metabolic pathway, facilitates the breakdown and utilization of glucose—the primary energy source for cells. The body naturally regulates blood glucose levels to maintain metabolic homeostasis.

However, dysregulation of glucose metabolism can lead to conditions such as hyperglycemia (high blood sugar) or hypoglycemia (low blood sugar), both of which can have serious health implications.

Diabetes mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia due to either insufficient insulin production or cellular resistance to insulin. It manifests in different forms: Type 1 diabetes (autoimmune destruction of pancreatic beta cells), Type 2 diabetes (insulin resistance leading to insufficient insulin production), and gestational diabetes (glucose intolerance during pregnancy). Uncontrolled diabetes can lead to severe complications, including cardiovascular disease, kidney failure, neuropathy, and retinopathy. With diabetes prevalence rising globally, finding effective and sustainable interventions for blood glucose control is crucial.

Diabetes has reached epidemic proportions, affecting an estimated 382 million people worldwide as of 2013, with projections suggesting a rise to 592 million by 2035. Type 2 diabetes accounts for 90% of cases and is strongly linked to sedentary lifestyles, poor dietary habits, and obesity. The economic burden of diabetes is also significant, with global healthcare costs exceeding \$548 billion in 2013. Managing diabetes requires a multifaceted approach, including pharmacological and non-pharmacological interventions (Adisha et al, 2015).

Okra (*Abelmoschus esculentus*), commonly known as lady's finger, is emerging as a promising natural remedy for diabetes management. It has a low glycemic index and is rich in soluble fiber, which slows carbohydrate digestion and reduces postprandial blood sugar spikes. Additionally, okra contains alpha-glucosidase inhibitors that prevent the conversion of starch into glucose, potentially stabilizing blood sugar levels. Given its nutritional profile and potential anti-diabetic properties, this study aims to evaluate the effectiveness of raw lady's finger extract in blood glucose control among patients with Type 2 diabetes mellitus (Mokgalaboni K et al, 2023)

Statement of the problem

A study to assess the effectiveness of raw lady's finger extract on blood glucose control among the patients with Type-2 Diabetes Mellitus admitted in Rajiv Gandhi Government General Hospital, Chennai.

Objectives of the study

- To assess the demographic variables among experiment and control group.
- To assess the fasting and postprandial blood glucose level among the experiment and control group before intervention.
- To determine the effectiveness of raw lady's finger extract on fasting and postprandial blood glucose level among experiment and control group.
- To compare the effectiveness of raw lady's finger extract on blood glucose level among experiment and control group.

Hypotheses of the study

- H1- There will be a significant difference in the posttest blood sugar levels among the experiment and control group after the intervention.

2. MATERIALS AND METHODS

A true experimental research design was adopted to assess the effectiveness of raw lady's finger extract on blood glucose control among patients with Type 2 Diabetes Mellitus. A total of 60 subjects, aged 40 to 60 years and meeting the inclusion criteria, were selected using a simple random sampling technique. The study was conducted at the Diabetology wards of Rajiv Gandhi Government General Hospital, Chennai. The subjects were randomly assigned to either the experimental or control group, with 30 participants in each group. The experimental group received raw lady's finger extract, while the control group continued with routine diabetic medications.

The intervention involved soaking a medium-sized lady's finger (approximately 10 cm) in 200 mL of water overnight, which was then consumed by the participants on an empty stomach the next morning. Data collection included demographic information, medical history, and fasting and postprandial blood glucose levels assessed through laboratory methods.

Descriptive and inferential statistics were used for data analysis. Frequency and percentage distribution were applied to analyze demographic data, while mean and standard deviation assessed blood glucose levels. An independent t-test was conducted to compare the effectiveness of the intervention between the experimental and control groups, and a paired t-test analyzed pre- and post-intervention differences within each group. Additionally, a chi-square test was used to determine associations between blood glucose levels and selected demographic variables.

Ethical approval was obtained from the Institutional Ethics Committee, and informed consent was secured from all participants. The projected outcome of the study was a significant reduction in blood glucose levels in the experimental group, demonstrating the potential of raw lady's finger extract as an adjunct to diabetes management.

3. RESULTS

The results indicate that after administering the raw lady's finger extract to the experimental group, there was a significant reduction in both Fasting Blood Sugar (FBS) and Postprandial Blood Sugar (PPBS) levels. In the experimental group, the FBS decreased from an average of 170.20 mg/dL to 145.13 mg/dL, a reduction of 25.07 mg/dL, which was statistically significant ($p < 0.05$). Similarly, the PPBS reduced from 260.23 mg/dL to 220.77 mg/dL, showing a difference of 39.47 mg/dL, also statistically significant ($p < 0.05$). In contrast, the control group, which continued with routine diabetic medications, showed only a minimal change in both FBS and PPBS levels. FBS decreased by 0.97 mg/dL, and PPBS decreased by 1.96 mg/dL, which were not statistically significant.

Table 1: Frequency and percentage of the demographic variables of experiment and control group

Demographic Variable	Experiment (N = 30)	Control (N = 30)
Age (yrs)		
40-45	6 (20.0%)	9 (30.0%)
46-50	4 (13.4%)	6 (20.0%)
51-55	10 (33.3%)	7 (23.3%)
56-60	10 (33.3%)	8 (26.7%)
Sex		
Male	19 (63.3%)	19 (63.3%)
Female	11 (36.7%)	11 (36.7%)
Religion		
Hindu	19 (63.3%)	17 (56.7%)
Christian	7 (23.3%)	6 (20.0%)
Muslim	4 (13.3%)	7 (23.3%)
Education		
Illiterate	11 (36.7%)	10 (33.3%)
Primary	14 (46.7%)	16 (53.3%)
Secondary	5 (16.6%)	4 (13.4%)
Occupation		
Unemployed	13 (43.3%)	16 (53.3%)
Government	1 (3.3%)	3 (10.0%)
Private	12 (40.0%)	5 (16.7%)
Business	3 (10.0%)	4 (13.3%)
Pensioner	1 (3.3%)	2 (6.7%)
Income (Rs.)		
<Rs. 1,000	18 (60.0%)	13 (43.3%)
Rs. 1,000-Rs. 3,999	3 (10.0%)	8 (26.7%)
Rs. 4,000-Rs. 6,999	7 (23.3%)	8 (26.7%)
Rs. 7,000-Rs. 9,999	2 (6.7%)	1 (3.3%)
Marital Status		

Unmarried	2 (6.7%)	3 (10.0%)
Married	25 (83.3%)	20 (66.7%)
Separated	1 (3.3%)	3 (10.0%)
Widower/Widow	2 (6.7%)	4 (13.3%)
Dietary Pattern		
Vegetarian	5 (16.7%)	5 (16.7%)
Non-vegetarian	25 (83.3%)	25 (83.3%)
Location		
Urban	16 (53.3%)	20 (66.7%)
Rural	14 (46.7%)	10 (33.3%)
Type of Family		
Joint Family	10 (33.3%)	13 (43.3%)
Nuclear Family	20 (66.7%)	17 (56.7%)
Type of Diet		
Diabetic Diet	15 (50.0%)	18 (60.0%)
Non-Diabetic Diet	15 (50.0%)	12 (40.0%)

Table 2: Pre assessment level of blood glucose levels in experiment and control group.

	No. of patients	Experiment Mean \pm SD	Control Mean \pm SD	Mean difference	Student's independent t-test
FBS	30	170.20 \pm 50.64	169.50 \pm 50.64	0.70	t=0.05 p=0.96 not significant
PPBS	30	260.23 \pm 78.19	257.93 \pm 69.70	2.30	t=0.12 P 0.91 not significant

Table 3: Post assessment level of blood glucose levels in experiment and control group.

	No. of patients	Experiment Mean \pm SD	Control Mean \pm SD	Mean difference	Student's independent t-test
FBS	30	145.13 \pm 41.96	168.53 \pm 48.79	23.40	t=1.99 p=0.05* Significant
PPBS	30	220.77 \pm 66.41	255.97 \pm 71.17	35.20	t=1.97 P 0.05* Significant

Table 4: Comparison of pre assessment and post assessment of blood glucose levels in experiment and control group

		No. of patients	Pretest	Posttest	Mean difference	Student's paired t-test
			Mean±SD	Mean±SD		
FBS	Experimental	30	170.20±50.64	145.13±41.96	25.07	t = 2.08 P= 0.64* significant
	Control	30	169.5 ±50.64	168.53±48.79	0.97	t=1.05 P = 0.30 Not significant
PPBS	Experimental	30	260.23±78.19	220.77±66.41	39.47	t=12.06 P =0.01** significant
	Control	30	257.93±69.70	255.97 ±71.17	1.96	t = 1.12 P= 0.28 not significant

The comparison between the experimental and control groups revealed that the raw lady's finger extract significantly contributed to the reduction in blood glucose levels when compared to routine care. The effectiveness was observed as a 14.7% reduction in FBS and a 15.2% reduction in PPBS in the experimental group. The findings suggest that raw lady's finger extract could be a beneficial natural remedy for controlling blood glucose levels in patients with Type 2 Diabetes Mellitus. Further analysis also indicated that demographic factors such as age, sex, and diet influenced the degree of reduction in blood glucose, with female patients and those on a diabetic diet showing more significant reductions.

4. DISCUSSION

The experimental group, which consumed the raw lady's finger extract, showed a marked reduction in both Fasting Blood Sugar (FBS) and Postprandial Blood Sugar (PPBS), supporting the potential of this natural remedy in managing diabetes. These results align with previous studies that have explored the use of herbal medicines and natural remedies in diabetes management, highlighting the importance of alternative therapies alongside conventional treatments. The significant reduction in blood glucose levels in the experimental group compared to the control group, which only received routine diabetic care, further emphasizes the effectiveness of raw lady's finger extract.

The study also sheds light on the influence of socio-demographic factors such as age, sex, and dietary habits on the effectiveness of the treatment. Female patients and those adhering to a diabetic diet exhibited more substantial improvements in their blood glucose levels, suggesting that lifestyle factors may enhance the therapeutic effects of raw lady's finger extract. While the results are promising, further studies with larger sample sizes and long-term follow-up are needed to confirm the sustainability and broader applicability of raw lady's finger extract in diabetes management. Overall, this study contributes valuable insights into natural interventions for Type 2 Diabetes Mellitus and opens avenues for future research in this area.

5. ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my research guide, Dr. Vijayasamundeswari for her unwavering support and expert guidance throughout this study. My heartfelt thanks go to the faculty members, the institutional ethics committee, and the patients at Rajiv Gandhi Government General Hospital for their participation and cooperation. I also appreciate the emotional support from my family and friends, whose encouragement kept me motivated. Lastly, I extend my thanks to everyone who contributed to the success of this research, either directly or indirectly.

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