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Effectiveness of Fenugreek Water to Reduce Random Blood Glucose Level among Patients with Type II Diabetes Mellitus in Mothrowala Dehradun

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ABSTRACT

Background: Type II Diabetes Mellitus (T2DM) is a global health challenge, with India having a particularly high disease burden. While pharmacological treatments are effective, their cost and side effects have increased interest in complementary and alternative therapies. Fenugreek (Trigonella foenum-graecum) is a traditional remedy with proven hypoglycemic properties, attributed to bioactive compounds like soluble fiber (galactomannan) and 4-hydroxylsoleucine. However, limited clinical evidence exists for the specific effectiveness of fenugreek seed water, a simple and culturally accepted preparation. Methods: A quantitative pre-experimental study using a one-group pre-test post-test design was conducted. A sample of 60 patients with T2DM was selected from Mothrowala, Dehradun, via convenient sampling. The intervention involved the daily consumption of 10 grams of fenugreek seeds soaked overnight in 250 ml of water, taken on an empty stomach for 30 consecutive days. Random Blood Glucose (RBG) levels were measured using a calibrated glucometer before and after the intervention. Data were analyzed using descriptive statistics, a paired t-test, and the Chi-square test. Results: The pre-intervention mean RBG level was 219.32 mg/dL, with 55% of participants in the moderate (181-250 mg/dL) and 25% in the high (>250 mg/dL) categories. Post-intervention, the mean RBG level significantly decreased to 180 mg/dL. A substantial majority of participants (66.7%) achieved controlled RBG levels (140-180 mg/dL) after the intervention. The paired t-test revealed a statistically significant reduction in RBG levels ($t=8.118$, $p<0.05$). No significant association was found between the improvement in RBG levels and selected demographic variables. The intervention demonstrated 100% adherence and high acceptability with no reported adverse effects. Conclusion: The study concludes that fenugreek water is an effective, safe, affordable, and culturally acceptable complementary therapy for reducing random blood glucose levels in patients with Type II Diabetes Mellitus. Its integration into community-based diabetes management strategies is recommended to enhance glycaemic control.

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KEYWORDS: *Type II Diabetes Mellitus, Fenugreek Water, Random Blood Glucose, Glycaemic Control, Complementary Therapy, Pre-Experimental Study, Community area.*

INTRODUCTION

Diabetes Mellitus is a chronic metabolic disorder characterized by increased blood glucose levels resulting from defects in insulin secretion, insulin action, or both. Among its types, Type II Diabetes Mellitus (T2DM) is the most common, accounting for nearly 90–95% of diabetes cases globally. It is closely associated with sedentary lifestyle, poor dietary habits, obesity, and genetic predisposition. With the growing urbanization and lifestyle changes, Type II diabetes has emerged as a major public health concern worldwide, especially in developing countries like India.

Diabetes mellitus, often referred to simply as diabetes, is a long-term metabolic disorder characterized by consistently elevated blood glucose levels. This condition results from the body's inability to produce insulin, inadequate insulin secretion, or the body's impaired response to insulin. Insulin, a hormone released by the pancreas, is vital for transporting glucose into cells, where it is either used as an energy source or stored for later. It also plays an important role in the metabolism of proteins and fats. As of recent estimates, around 537 million adults aged 20–79 is living with diabetes globally. This figure is projected to increase to 643 million by 2030 and further to 783 million by 2045, with a projected prevalence rate surpassing 12.8% by 2045. The sharp rise in Type II diabetes is linked to several risk factors, including rapid urbanization, population aging, reduced physical activity, and the growing prevalence of overweight and obesity. In addition, genetic predispositions, environmental exposures, and socioeconomic changes also contribute significantly to this global health concern. **(IDF Diabetes Atlas, 10th Edition, 2021**)

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of fenugreek water to reduce random blood glucose level among patients with Type II diabetes mellitus in Mothrowala, Dehradun.

OBJECTIVES

1. To assess the pretest level of random blood glucose among patients with type II diabetes mellitus.
2. To assess the post-test level of random blood glucose among patients with type II Diabetes Mellitus.
3. To evaluate the effectiveness of fenugreek water on reducing random blood glucose level among patients with type II Diabetes Mellitus.
4. To find out the association between the pretest level of random blood glucose with selected demographic variables among patients with type II diabetes mellitus.

RESEARCH HYPOTHESIS

- H1: There is a significant difference in the random blood glucose levels before and after the intervention among patients with type II Diabetes Mellitus.
- H2: There is a significant association between the pre-test level of random blood glucose and selected demographic variables among patients with Type II Diabetes Mellites.

OPERATIONAL DEFINITION

Assess: In the study Assess, refers to an organized systematic process of collecting data about the pretest or protest knowledge from the diabetic patient and their effects.

Effectiveness: In this study ―Effectiveness‖ refers to the extent to which fenugreek water is successful in reducing the random blood glucose levels among patients with type II diabetes mellitus, as determined by the different between pre-test and post-test blood glucose reading.

Fenugreek Water: In this study, ―Fenugreek water‖ refers to a natural preparation made by soaking measured quantity (e.g., 10 grams) of fenugreek seeds in 100 ml of water overnight, which is then consumed by the participants in the morning on an empty stomach for a specified intervention period.

Level of Random blood sugar level (RBS): In this study Random blood sugar level refers to the amount of glucose presents in the blood at any random time of the day, regardless of food intake. In this study, it is measured in milligrams per decilitre (mg/dl) using a glucometer.

Patients with type II Diabetes Mellitus: In this study, ―patients with type II diabetes mellitus‖ refers to individuals who have been medically diagnosed with type II diabetes, are on treatment or lifestyle modification, and have random blood glucose levels above the normal range (> 140 mg/dl).

ASSUMPTIONS

1. Patients with Type II diabetes mellitus may have elevated random blood glucose levels due to poor insulin sensitivity or secretion.
2. Fenugreek seeds contain active components that may have hypoglycaemic effects when consumed regularly in the form of fenugreek water.
3. Daily intake of fenugreek water over a period of 30 days may contribute to improved glycaemic control in patients with Type II diabetes mellitus.
4. Patients admitted in the medical ward may follow the intervention protocol under supervision, leading to consistent intake of fenugreek water.
5. Random blood glucose levels can be affected by dietary intake, physical activity, stress, and medications in addition to the fenugreek water intervention.
6. Monitoring of random blood glucose levels before and after the intervention period will help in evaluating the effectiveness of fenugreek water.

7. Participants will cooperate and provide honest information during data collection.

DELIMITATION OF STUDY: The Delimitations of study include:

- The study is limited to patients diagnosed with Type II diabetes mellitus.
- Only adult patients aged between 30 and 65 years are included in the study.
- The study includes patients who are willing to participate and provide informed consent.
- The duration of the intervention is restricted to 30 consecutive days, during which fenugreek water will be administered once daily under supervision.
- The study focuses on the effect of fenugreek water only and does not account for other herbal or alternative therapies being used by the participants.
- Random blood glucose levels are the only outcome measure used to assess the effectiveness of the intervention; other parameters like HbA1c or fasting blood sugar are not considered
- The study does not control or modify the patient's prescribed anti-diabetic medications, diet, or other ongoing treatments.
- The findings of the study are not generalizable to Type I diabetic patients, gestational diabetes, or patients with other comorbidities such as renal failure or liver cirrhosis.

RESEARCH APPROACH: The Quantitative Research Approach was used for this study.

RESEARCH DESIGN: The study adopted a Pre-Experimental One Group Pre-Test Post-Test Design.

VARIABLES OF THE STUDY

- **Independent Variable:** Administration of Fenugreek Water (10 grams soaked overnight in 250 ml water and consumed on an empty stomach daily for 30 days).
- **Dependent Variable:** Random Blood Glucose Level of patients, measured before and after the intervention.

SETTING OF THE STUDY: The study was conducted in Mothrowala, Dehradun, Uttarakhand.

- **Target Population:** All individuals diagnosed with Type II Diabetes Mellitus in Selected community area, Dehradun.
- **Sample:** Individuals with Type II Diabetes Mellitus meeting the inclusion criteria.
- **Sampling Technique:** Non-probability Convenient Sampling was used, where participants were selected based on availability and willingness to participate. Though it limits generalization, it is practical in community-based interventions.
- **Sample Size:** A total of 60 diabetic patients were included in the study.

Inclusion Criteria:

- Confirmed diagnosis of Type II Diabetes Mellitus.
- Age between 30 and 60 years inclusive.
- Willingness to consume fenugreek water daily for the full 30-day study period.
- Availability and willingness to actively cooperate throughout the study duration.

Exclusion Criteria:

- Diagnosis of Type I Diabetes Mellitus.
- Known allergy or hypersensitivity to fenugreek or related compounds.
- Currently receiving insulin therapy.

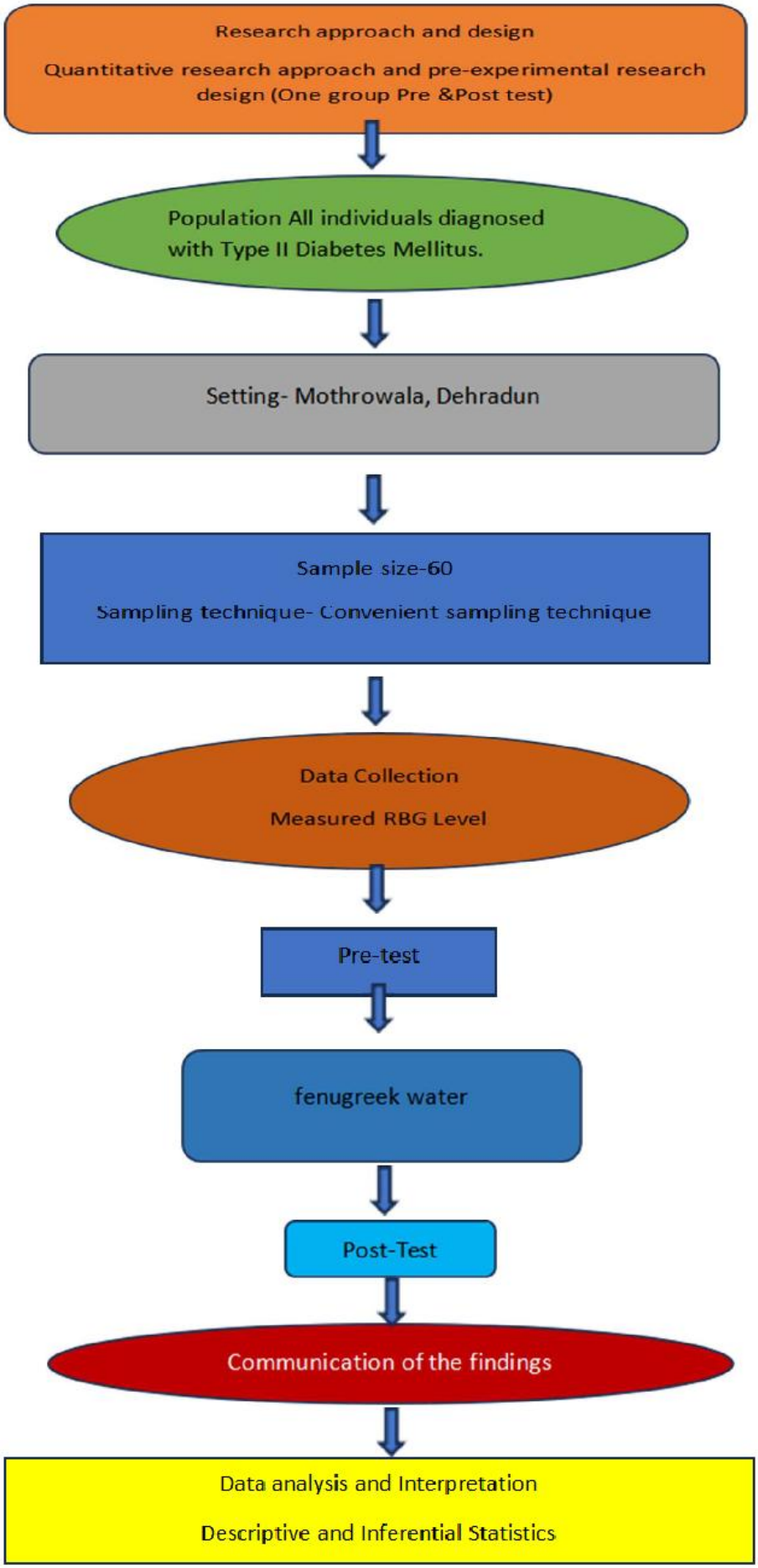
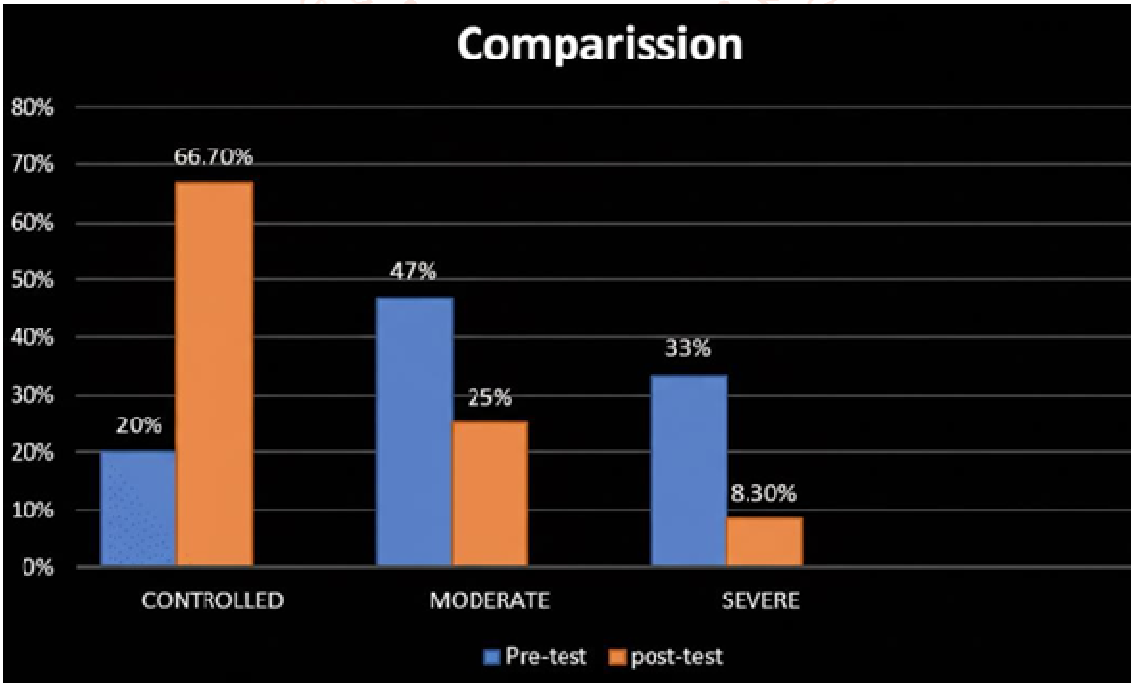


Figure 3.1: Schematic Representation of Research Methodology

Table 4.1 Frequency and percentage distribution of demographic variable

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age	30–40 years	17	28.0
	41–50 years	19	48.0
	51–60 years	14	23.0
Gender	Male	34	57.0
	Female	26	43.0
Education	Illiterate	17	28.0
	Primary	18	30.0
	Secondary	17	28.0
	Graduate and above	8	13.0
Duration of Diabetes	0-1 year	18	30.0
	1–3 years	17	28.0
	3–5 years	17	28.0
	More than 5 years	8	13.0
Dietary Pattern	Vegetarian	34	57.0
	Non-Vegetarian	26	43.0
Medication Usage	yes	60	100.0
	No	0	0.0
Family History of Diabetes	Yes	35	58.0
	No	25	42.0
Knowledge of Fenugreek Water	Yes	24	40.0
	No	36	60.0
Source of Information	Media	10	17.0
	Family	0	0.0
	Friends	9	15.0
	Health Personnel	8	13.0

PAIRED T-TEST ANALYSIS OF PRE-TEST AND POST-TEST RANDOM BLOOD GLUCOSE LEVEL



MAJOR FINDINGS

1. **Demographic Findings:** The demographic characteristics of the 60 participants in this study provided important context for understanding the background of individuals affected by Type II Diabetes Mellitus in Mothrowala, Dehradun. The majority of participants (41.7%) were in the 41–50 years age group, followed by 33.3% in the 51–60 years range, and 25% in the 30–40 years

group, indicating a higher prevalence of diabetes in middle-aged adults. In terms of gender, females slightly outnumbered males, with 53.3% female and 46.7% male representation. Educational status revealed that 40% had completed primary education, 30% had secondary education, 10% were graduates, and 20% were illiterate, suggesting the need for health education strategies that are easy to understand and accessible regardless of literacy level. Dietary habits showed that 63.3% of participants were vegetarians and 36.7% were non-vegetarians, which could have implications on blood glucose management. Regarding the duration of diabetes, 36.7% had been diagnosed within the last 1–3 years, 33.3% within 4–6 years, and 30% had lived with the condition for more than 6 years. A family history of diabetes was reported by 55% of participants, indicating a significant hereditary link. Additionally, 60% of participants reported no prior knowledge about fenugreek water, while 40% had heard of its potential benefits. These demographic findings underscore the importance of culturally sensitive, easy-to-implement interventions and highlight variables that may influence the response to such complementary treatments.

2. **Significant reduction in pre- and post-intervention blood glucose levels:** The study revealed a statistically significant decrease in the random blood glucose (RBG) levels of participants after a 30-day intervention with fenugreek water. The mean pre-test RBG was recorded at **195.88 mg/dL** with a standard deviation of ±36.34, indicating that the majority of participants had uncontrolled blood sugar levels at baseline. Following the intervention, the mean post-test RBG dropped to **157.13 mg/dL** with a standard deviation of ±28.21. This **mean difference of 38.75 mg/dL** was found to be highly significant using a paired t-test (**$t = 12.83$, $p < 0.001$**), suggesting that fenugreek water had a substantial impact on reducing blood glucose levels in Type II diabetic patients.

3. **Improvement in glycaemic control categorization:** Prior to the intervention, the majority of participants (66.7%) were categorized as having moderate blood glucose levels (181–250 mg/dL), while 16.7% each were classified under high (>250 mg/dL) and controlled (140–180 mg/dL) categories. After the 30-day intervention, 66.7% of participants shifted to the controlled category, reflecting significant clinical improvement. This redistribution shows not only statistical significance but also real-world relevance, indicating that fenugreek water helped transition a large portion of the population toward better glycaemic control.

4. **High adherence and acceptability of fenugreek water:** The intervention demonstrated excellent feasibility, with 100% adherence among all 60 participants. There were no reports of significant side effects, and informal feedback collected during follow-up revealed that participants found the preparation of fenugreek water simple, affordable, and acceptable. This high rate of adherence and absence of adverse events support the use of fenugreek water as a safe, sustainable, and culturally appropriate complementary therapy in diabetes management.

5. **Demographic variables influencing effectiveness:** The study found statistically significant associations between post-intervention RBG levels and selected demographic variables, particularly **age ($p = 0.002$)**, **duration of diabetes ($p = 0.012$)**, and **dietary pattern ($p = 0.013$)**. Younger participants, those with a shorter duration of diabetes, and those following a vegetarian diet experienced greater glycaemic improvements. This suggests that the effectiveness of fenugreek water may be moderated by physiological factors such as insulin reserve and by lifestyle factors such as diet. Other variables like gender, educational level, family history, and prior knowledge of fenugreek were not significantly associated, indicating that the intervention's benefits were broadly accessible regardless of these factors.

CONCLUSION

The present study concludes that fenugreek water is an effective, safe, and culturally accepted intervention for reducing random blood glucose levels among patients with Type II Diabetes Mellitus. Its administration over a period of 30 days led to a statistically and clinically significant improvement in glycaemic status. Given its affordability, ease of preparation, and minimal side effects, fenugreek water holds great promise as an adjunctive strategy alongside conventional pharmacotherapy.

LIMITATIONS

1. Absence of a control group limits the internal validity and makes it difficult to attribute all effects solely to the intervention.
2. The short duration (30 days) does not account for long-term sustainability or effects on complications.
3. The study used only random blood glucose as a

measure, while other indicators such as HbA1c, fasting glucose, or insulin sensitivity indices were not included.

4. Conducted in one geographic location with limited sample size (n=60), restricting generalizability.
5. Potential confounding variables such as diet, exercise, stress, and sleep patterns were not controlled.