https://doi.org/10.48047/AFJBS.6.15.2024.9378-9386

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Effectiveness of drumstick leaves powder (Moringa olifera) on blood glucose level among selected pre diabetic patients

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Volume 6, Issue 15, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

doi: 10.48047/AFJBS.6.15.2024.9378-9386

ABSTRACT

BACKGROUND: A body with prediabetes is exhibiting symptoms that may eventually result in type 2 diabetes. Drumstick leaves is nature product with many beneficial characteristics. Primary aim was evaluating the effectiveness of drumstick leaves powder on blood glucose level.

METHODS: Quantitative approach and quasi experimental pretest posttest control group design was used for this study. 52 pre diabetic patients (26 in experimental and 26 in control group) were selected by non-probability convenient sampling technique. Pretest and posttest PP2BS blood sugar was taken by electronic glucometer.

RESULT: In the experimental group, the pretest blood glucose levels' mean was 165 (±13.99) and posttest levels' mean was of 156 (±12.75). The paired t-test yielded a t-score of 10.44 with a corresponding P-value of 0.000, indicating a highly significant difference in blood glucose levels before and after the intervention. Chi square analysis state that demographic variables related to Dietary Patterns were found to be significantly associated with blood glucose levels at a P value <0.05.

DISCUSSION: This concluded that drumstick leaves powder (Moringa olifera) as an intervention found effective in reduction of blood glucose level in pre diabetic patients. Patients can use this herbal powder along with pharmacological management to reduce and manage hyperglycemia.

Key words: Metabolic disorders**,** Drumstick leaves powder, Medicinal plant, Pre diabetic patients, pre diabetes

INTRODUCTION:

The variety of metabolic disorders referred to as diabetes mellitus are typified by elevated blood glucose levels (hyperglycemia), which can be caused by abnormalities in insulin secretion, action, or both. 2016a, American Diabetes Association [ADA]. Below are a few risk factors and causes: relatives having a history of diabetes, such as parents or siblings, Body mass index greater than 30 kg/m² or 2.20% over target body weight are markers for obesity. The racial and ethnic composition of a group, such as Native Americans, African Americans, Hispanic Americans, or Southeast Asians, When the age reaches 45 years or above, Earlier results showed impaired glucose tolerance or impaired fasting glucose, 90 mm Hg of hypertension. cholesterol level of $35 mg/dL (0.90 mmol/L) for high density lipoprotein (HDL) and/or triglyceride level of ≥250 mg/dL (2.8 mmol/L), antenatal diabetes diagnosis or delivery of a baby measuring more than 4 kg. (1)

A body with prediabetes is exhibiting symptoms that may eventually result in type 2 diabetes. Although not as much as in diabetes, prediabetes has been defined by an excess of glucose in the blood. Many people who have prediabetes don't even exhibit any symptoms. A medical professional may choose to perform a prediabetes test based on a patient's age, weight, ethnicity, family history of the disease, history of gestational diabetes, or other health issues. (2)

The recent significant shifts in people's economic status have raised concerns about lifestyle and health. It's why they prefer towards natural objects. The drumsticks (Moringa Olifera) are one such tree with many health and nutrition benefits. It has a multitude of macro- and micronutrients as well as additional bioactive compounds that are vital for the body's regular operation and for protecting against particular illnesses. This tree has many beneficial qualities, including antidiabetic, anticancer, antiulcer, antimicrobial, and antioxidant effects. Its leaves, flowers, seeds, and nearly every other part are edible. (3)

According to flower colour, there are two types of Sigru identified in classical medical texts: white (Sveta) and red (Rakta). These varieties have bitter and sweet (katumadhura) tastes, and are referred to as katusigru and madhusigru, respectively. As an antihistaminic, abortifacient, anthelmintic, antiseptic, aphrodisiac, astringent, cardiotonic, carminative, stomachic, and tonic, Sigru, additionally referred to as Sobhanjana, is a medicinal product. It is used to treat wounds,

rheumatism, splenic disorders, intermittent fever, obesity, cancerous tumors, and paralysis of various organs. [4]

The number of people with diabetes worldwide was estimated by J E Shaw, et al., in their study, "Global estimates of the prevalence of diabetes for 2010 and 2030." By 2010, there will be 285 million adults around the world (aged 20 to 79) with a 6.4% prevalence of diabetes; by 2030, that number will rise to 439 million adults (aged 20 to 79) [5]. It's thought that diabetes causes decrease of the glucose transporter, which leads to hyperglycemia tolerance. [6]

Above information shows that Diabetes mellitus is globally widespread disease. Alone pharmacological management cannot control the Diabetes mellitus. This Moringa would be beneficial to manage DM. The researcher wants to do this study on prediabetic patient for prevention of further advancement of diseases.

MATERIALS AND METHODS:

Research approach & research design: In this research study quantitative approach and quasi experimental pretest posttest control group design was used.

Objectives:

• To assess the pretest blood glucose level among experimental & control group.

• To assess the posttest blood glucose level among experimental & control group.

• To compare the pre & posttest blood glucose level among experimental & control group.

• To find the association between the posttest level of blood glucose among selected pre diabetic patient with their selected demographic variables in experimental group.

Samples: Total 52 patients (26 in control & 26 in experimental) were selected by using nonprobability convenient sampling technique.

Criteria for sample collection:

Inclusion criteria:

Pre diabetic patients who are,

• Patients who are willing to participate in the study.

• Patients whose age above 20 years age.

• Patients who are on advice of dietary and exercise management.

• Patients whose PP2BS sugar level is between 140 to 199 mg/dl.

Exclusion criteria:

• Pregnant mothers & eligible couple.

• Who have Chronic diseases.

• Who take Anti diabetic medicines and insulin therapy.

Research tool and validation:

There were mainly two tools used for this study

Section A: Demographic variables such as age, sex, educational status, occupational status, family income, family history of diabetes mellitus, habits, Dietary patterns and if any medication going on or not.

Section B: Blood glucose level monitoring sheet.

Data were collected through electronic glucometer for pre and posttest which was calibrated.

Tool was validated by 7 subject experts (four was nursing experts and two were consultations) including AYUSH & community medicine doctors and one language expert.

Ethical consideration: This research study was approved by the institutional ethical committee (IEC/BU/147/Faculty/05/319/2023). Approval taken from the HOD of the institute. After getting ethical approval letter data collection was started. Written consent was taken from the participants prior to data collection and explain all the facts about research study.

Data collection procedure: After taking prior consent and AYUSH doctor suggestion data collection process was started. This research study was done on February-march,2024. All participants were instructed by researcher to administer this powder in oral route and quantity is ½ teaspoon at one time (approx. 2.80 to 3 gm). On first six days, sample was collected and pretest

was administered. Then, Drumstick leaves powder was given to experimental group. Drumstick leaves powder was administered under the researcher's supervision and guidance for twice a day to next 30 consecutive days. On the 31st day post test was conducted.

RESULTS AND DISCUSSION:

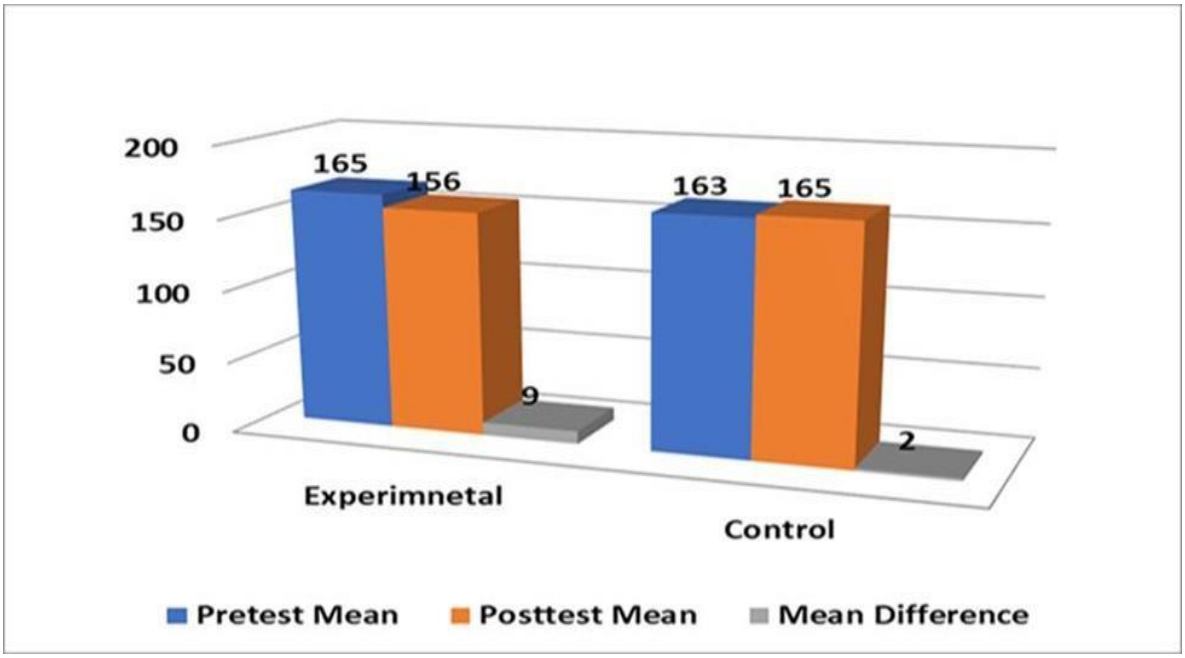
The experimental group of 26 pre-diabetic patients had a diverse age distribution: 26.9% each were aged 21-30, 31-40, and 41-50 years, while 19.2% were 51 years and above. Gender was balanced with 53.8% males and 46.2% females. Educational levels included 38.5% graduates/postgraduates, and 19.2% each in higher secondary, primary, or no formal education. Family income varied, with 38.5% earning >15,000 Rs, and others earning ≤15,000 Rs. Nearly half (46.2%) had a family history of diabetes. Most participants had no bad habits (65.4%), followed a vegetarian diet (50%), were not on other medication (88.5%), and few exercised regularly (7.7%). (Table 1)

Table 1: Frequency and percentage distribution of demographic variables of pre-diabetic patients in experimental and control group. (n=52)

Demographic Variables	Experimental Group		Control Group	
	Frequency	Percentage	Frequency	Percentage
Age in Year				
21 to 30 years	7	26.9%	5	19.2%
31 to 40 years	7	26.9%	13	50%
41 to 50 years	7	26.9%	1	3.8%
51 and above	5	19.2%	7	26.9%
Gender				
Male	14	53.8%	16	61.5%
Female	12	46.2%	10	38.5%
Educational Status				
No Formal Education	5	19.2%	5	19.2%
Primary	5	19.2%	5	19.2%
Higher Secondary	6	19.2%	11	42.3%
Graduate & Post Graduate	10	38.5%	5	19.2%

Family Monthly Income				
≤5000 Rs	10	38.5%	8	30.8%
5001-10,000 Rs	7	26.9%	6	23.1%
10001-15000 Rs	5	19.2%	9	34.6%
>15000 Rs	4	15.4%	3	11.5%
Family History of Diabetes				
No any History of DM	14	53.8%	21	80.8%
Present History of DM	12	46.2%	5	19.2%
Bad Habits				
Yes (Tobacco, Smoking)	9	34.6%	8	30.8%
Not any bad Habit	17	65.4%	18	69.2%
Dietary Patterns				
Vegetarian	13	50%	10	38.5%
Non-Vegetarian	13	50%	16	61.5%
If Any Other Medication				
No	23	88.5%	24	92.3%
Yes	3	11.5%	2	7.7%
If any Exercise				
Yes	2	7.7%	2	7.7%
No	24	92.3%	24	92.3%

In the experimental group, the pretest blood glucose levels ranged from 143 to 191, with a mean of 165 (±13.99) and posttest levels ranged from 141 to 185, with a mean of 156 (±12.75). This indicates a decrease in mean blood glucose levels following the intervention with drumstick leaves powder. Similarly, in the control group, the pretest blood glucose levels ranged from 142 to 195, with a mean of 163 (±14.86) and posttest levels ranged from 145 to 193, with a mean of 165 (±12.48). The control group also shows a slight increase in mean blood glucose levels after the study period without the intervention. These findings suggest a potential positive impact of the intervention on blood glucose regulation in the experimental group, evidenced by a decrease in mean blood glucose levels post-intervention compared to pre-intervention levels. (Graph 1)



Graph 1: Comparison of Mean difference score of blood glucose level Before & After intervention

The paired t-test yielded a t-score of 10.44 with a corresponding P-value of 0.000, indicating a highly significant difference in blood glucose levels before and after the intervention. This suggests that drumstick leaves powder may be effective in lowering blood glucose levels in pre-diabetic individuals within the experimental group. (Table 2)

Table 2: The Paired t-test comparison to assesses the effectiveness of drumstick leaves powder on blood glucose level among pre diabetic patient in experimental group (P<0.05 level of Significance)**

Blood Glucose level Before and After	**Mean**	**Std. Deviation**	**Mean Difference Score**	**Paired-t score**	**df**	**P- Value**

Experimental Pretest	165	13.99	**9**	**10.44****	**25**	**0.000 S**
Experimental Posttest	156	12.75				

The independent t-test for pretest blood glucose levels shows no significant difference between the experimental and control groups before the intervention, with a P-value of 0.745 (not significant). The independent t-test for posttest blood glucose levels reveals a significant difference between the experimental and control groups after the intervention. (Table 3)

Table 3: Comparison to assesses the effectiveness of drumstick leaves powder on blood glucose level among pre diabetic patient in Experimental and Control group: Independent t-Test Analysis (Table 3)

	Independent Sample t-test for Equality of Means Comparison					
Variable	**Groups**	**Mean Score**	**Std. Deviation**	**Mean Difference Score**	**Independent t-test**	**P- Value**
Pretest Blood Glucose	Pretest Experimental	165	13.99	2	0.327	0.745 NS
	Pretest Control	163	14.86			
Posttest Blood Glucose	**Posttest Experimental**	**156**	**12.74**	**9**	**2.759**	**0.008 S**
	Posttest Control	165	12.48			

**** P<0.05 level**

chi square analysis that was performed to determine the relationship between the pre-diabetic patients' chosen demographic variables and the mean difference in their blood glucose levels. Among which, the demographic variables related to Dietary Patterns were found to be significantly associated with blood glucose levels at a P value <0.05.

DISCUSSION:

One pilot clinical trial was conducted by Lassana Sissoko et al. (2020) [7] and state that Moringa oleifera leaf powder reduced post-prandial glycaemia in diabetic patients.

And this study supports their study's conclusion because after intervention of month hyperglycemia is reduced in experimental group among prediabetic patients. This indicating the potential effectiveness of drumstick leaves powder in lowering blood glucose levels among pre-diabetic patients in the experimental group compared to the control group. There is no any adverse reaction was seen during this study.

CONCLUSION:

This concluded that drumstick leaves powder(Moringa olifera) as a intervention found effective in reduction of blood glucose level in pre diabetic patients.By controlling blood sugar level in initial stage we can get good outcomes because premorbid glucose levels control determines how acute high blood sugar impacts the outcome of other critical diseases [8].The findings suggest a potential positive impact of the intervention on blood glucose regulation in the experimental group, evidenced by a decrease in mean blood glucose levels post-intervention compared to pre-intervention levels. It will increase people's awareness regarding ayurvedic and primordial prevention of diabetes and other diseases.

IMPLICATIONS OF THE STUDY:

- Educate people and organize awareness programme regarding prevention and management of pre diabetes and diabetes mellitus.
- Drumstick leaves powder serve as a complementary treatment to manage blood glucose levels in individuals with prediabetes along with medical intervention and prevent further advancement of diabetes.
- Include ayurvedic management and home base management of diabetes mellitus in nursing curriculum. It will increase people's awareness regarding ayurvedic and primordial prevention.
- In nursing education for new learning related to nurse led diabetes self-management education programme.

- Researcher can use these study's finding to educate people and aware about ayurvedic and basic home management.

Limitations:

- This study is limited post prandial blood sugar level.
- Only limited samples were taken.

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