



# AN ANALYTICAL STUDY ON MORINGA LEAVES AND ITS ASSOCIATED ANTI-HYPERGLYCEMIC EFFECT ON DIABETIC PATIENTS

<sup>1</sup>Sameera Begum, <sup>2</sup>Syeda Ruqaiya begum.

<sup>1</sup>M.sc in Nutrition & Dietetics, <sup>2</sup>M.sc in Nutrition & Dietetics, M.A  
Department of Nutrition & Dietetics, Islamia Degree & P.G College, Hyderabad, India.

**Abstract :** India is often referred to as the “Diabetes Capital of the World”, as it accounts for 17% of the total number of diabetes patient in the world. MO has been used in traditional medicine for the treatment of various conditions and more recently, has been proposed to be of benefit in numerous diseases including cardiovascular, diabetes, cancer, neurological, gastro-enterological, and inflammatory especially in low-income communities. The study was conducted to assess the significant association of consumption of the moringa leaves chutney and lowering of blood glucose levels in diabetic patients. An analytical study was carried out on 5 test sample. The test samples were selected by non-random selection, the selection was based on their blood glucose levels. The test sample were given moringa leaves chutney daily, the dose of 5 grams before meal and at bed time to consume and were tested with their pre and post meal blood glucose values by glucometer daily for up to 10 days. A well-structured questionnaire was framed to gather information. The study concluded that the moringa leave chutney consumed by the test samples shows a significant change in lowering of the pre and post blood glucose levels. The study concluded that there is a significant association between consumption of moringa leaves and lowering of the blood glucose levels in diabetic patient.

**Keywords:** Diabetes, Moringa leaves, Glucometer, Blood glucose, Anti-Inflammatory

## INTRODUCTION

India is often referred to as the “Diabetes Capital of the World”, as it accounts for 17% of the total number of diabetes patient in the world. There are currently close to 80 million people with diabetes in India and this number is expected to increase to 135 million by 2045. Diabetes belongs to one of the largest global health crises of this century. India has the second-largest number of diabetics worldwide. Diabetes Mellitus is a metabolic disease that causes high blood sugar. It prevents the body to utilize glucose completely or partially. It is characterized by raised glucose concentration in the blood and alteration in carbohydrates, protein and fat metabolism. Diabetes belongs to one of the largest global health crises of this century. India has the second-largest number of diabetics worldwide. According to an estimate, over 74 million Indians were diagnosed with diabetes in 2021, and this is expected to rise to over 124 million by 2045. Type 2 diabetes accounts for over 90 percent of all diabetic cases in India. Diabetes is a progressive disorder, if left undiagnosed and untreated, it could lead to disabling complications affecting multiple organs and systems in the body. Coronary heart disease, retinopathy, strokes, and nephropathy to mention a few. This, in turn, could result in premature morbidity and mortality with reduced life expectancy. The financial burden of diabetes can be distressing, specifically for the socio-economically disadvantaged, belonging to the lower wealth index in the country. The average annual expenditure on type 2 diabetes care amounts to roughly 14 thousand Indian rupees and over 350 thousand Indian rupees in a lifetime. Further, the economic burden on the Indian healthcare system could be profound, impacting households and, consequently, key macroeconomic indicator. This condition can be due to failure of insulin or liberation or action. Insulin is produced by the  $\beta$  cells of the islets of Langerhans of pancreases, any decrease in the number of functioning cells will decrease the amount of insulin that can be synthesized. Many diabetics can produce sufficient insulin but some stimulus to the islets tissue is needed.

MO plant has been used in folklore medicine for the treatment of diabetes and other diseases. Many indigenous plants such as Vernonia amygdalina (VA), Garcinia kola, contain alkaloid, flavonoids, terpenoids, glycosides and carotenoids which have all been shown to contain anti-diabetic activities. Ayurvedic medicine uses natural plants to promote self-healing, attain good health and longevity. Researchers have indicated that Moringa oleifera can offer the nutrients and therapeutic ingredients to prevent, mitigate or treat many diseases or conditions. This plant has been reported to possess antidiabetic, antioxidant and other medicinal properties which may be helpful in managing diabetes and its associated complications, and could possibly act as an effective remedy for the management of diabetes especially in low-income African communities

**NEED OF THE STUDY.**

Currently available therapies for diabetes include insulin and various oral anti-diabetic agents such as sulfonylureas, biguanides, thiazolidinediones and glinides. Many of these drugs have some serious adverse effects. Therefore, there is a need to consider possible and safe hypoglycemic agents such as MO in the treatment and management of diabetes mellitus. A major mechanism in forestalling damage by oxidative stress is the balance of ROS and antioxidants, thus requiring the utilization of dietary supplementation of antioxidant-rich plants such as MO which could be a promising approach in the treatment of diabetes. Its beneficial effects in various pathological conditions through its anti-oxidative and anti-inflammatory properties have been researched on, hence the need to explore its potentials in diabetic conditions. MO extract is reported to cause a reduction in the serum level of glucose and glycosylated protein in diabetic conditions while showing observable improvements in impaired glucose metabolism

**OBJECTIVES:**

- To assess the dietary pattern of the diabetic patients.
- To evaluate the safety of moringa leaves for human consumption.
- To study the anti-hyperglycemic effect or anti-diabetic effect of moringa leaves on diabetic patients.
- To assess the effect of moringa leaves chutney as a complementary therapy for the diabetic patient.
- To analyze the effect of moringa leaves in regulating the blood glucose levels.

**3.1 Population and Sample**

The population of the test sample were selected based on their uncontrolled diabetes mellitus, the test sample size was 5 human sample with uncontrolled diabetes mellitus.

**3.2 Data and Sources of Data**

For this study primary & secondary data has been collected The test sample were given moringa leaves chutney daily, the dose of 5 grams before meal and at bed time to consume and were tested with their pre and post meal blood glucose values by glucometer. The value of pre and post meal were documented. The content questionnaire contains questions related to general information, awareness questions, dietary information and medical information. It was collected to get the following details like personal information of respondents via name, age, sex, gender, occupation. Dietary assessment method is used to find dietary intake of food habits. The effect of lifestyle and dietary practices were included in questionnaire to assess the dietary pattern of the subjects. Each subject was interviewed about dietary pattern and asked to fill up the sheet.

**3.3 Theoretical framework**

Variables of the study contains dependent and independent variable. The study used diabetes mellitus for the selection of variables. The study used the daily blood glucose values as dependent variable. From the pre & post blood glucose levels the values for up to 10 days were the documented.

**RESEARCH METHODOLOGY**

The following methodology is planned keeping the framed in mind the components of the study are

1. Product development
2. Effect of the product in lowering the blood glucose levels.
3. Awareness of moringa leaves and diabetes.

**METHODOLOGY**

**4.1 Research plan-** Analytical study

**4.2 Sample size-** 5 samples

**4.3 Research Instruments-** Daily dose of chutney, Glucometer and Questionnaire

**4.4 Area of research-** Hyderabad

**4.5 Selection of sample-** Five human samples with uncontrolled diabetes Mellitus

**4.6 Collection of data -**

**PRIMARY COLLECTION OF DATA:** The test sample were given moringa leaves chutney daily, the dose of 5 grams before meal and at bed time to consume and were tested with their pre and post meal blood glucose values by glucometer. The value of pre and post meal were documented.

**QUESTIONNAIRE:** The Questionnaire contains both open and end questions. The questionnaire includes different sections related to general information, anthropometric information, medical history, knowledge about symptoms of low and high blood sugar levels. How to monitor glucose levels, lifestyle, dietary history and awareness on moringa leaves. The questions framed are in sync with the objective of the study.

**4.7 METHOD OF PREPARATION****Selecting Of Healthy Leaves**

Fungi like Cercosporasp and Septorialycopersic causing brown spot in the leaves and further turning the leaves yellow and killing them. Apart from fungi the most common pests on the leaves are grasshoppers, crickets and caterpillars. Therefore diseased and damaged leaves are discarded manually just after the collection of fresh leaves.

**Washing**

Collected leaves are washed in running tap water till the removal of dirt. After this leaves are soaked in 1% saline solution (NaCl) for 5 minutes to remove microbes. This step plays a substantial role in removal of dust, pathogens as well as microbes present on the leave surface

**Draining**

The excess water can be removed by spreading the leaves in sunlight for a brief period till the removal of water present on the leaf surface.

**Drying**

The moringa leaves are dried by Spreading the leaflets on the tray. The leaves are first shade dry. The MO leaves are then dried by dry roasting on low flame

**Dry Roasting of All Ingredients**

The ingredients used in the product are 50 grams moringa leaves, 10 grams bengal gram, 10 grams urad dal, 5 grams peanut, 5 grams sesame seeds, red chilies and garlic. These are dry roasted.

**Grinding**

In small scale dried leaves can be grinded by mortar and pestles or pulmunizer machine can be used for fine grinding.

**4.8 ANALYSIS OF PRODUCT****PHYSICAL APPEARANCE**

table - 4.1

OPTIONS	COLOUR	TEXTURE	APPERANCES
GOOD	3	2	1
BAD	1	0	1
SATISFACTORY	1	3	2

**SENSORY EVALUATION**

table - 4.2

OPTIONS	TASTE	FLOVOR	AROMA	OVER ALL ACCEPTANCE
GOOD	3	2	1	4
BAD	1	0	1	0
SATISFACTORY	1	3	2	1

**CHEMICAL EVALUATION**

Quality of product- Good

Shelf life - 3 months

**4.9 PACKING**

The packaging of the product is done in the sterile plastic packets. The product was packed with the dosage of 5 grams in every packet.

**4.10 FEASIBILITY STUDY ON PRODUCT**

The product was given to the 5 human sample with the condition of diabeties milletus. The product was given twice a day. The test samples were instructed to consume the product before meal and at bed time while recording the pre and post meal blood glucose values. The study was conducted for continues 10 days.

**RESULTS AND DISCUSSION**

The study was conducted to assess the significant association of consumption of the moringa leaves chutney and lowering of blood glucose levels in diabetic patients. An analytical study was carried out on 5 test sample. The test samples were selected by non-random selection, the selection was based on their blood glucose levels. The test sample were given moringa leaves chutney daily, the dose of 5 grams before meal and at bed time to consume and were tested with their pre and post meal blood glucose values by glucometer. A well-structured questionnaire were framed to gather information. The samples were face to face interviewed and their demographic information, Anthropometric measurements were asked. Questions related to the knowledge of diabetes, family history of diabetes and their treatment were enquired. Their knowledge about diabetic symptoms, monitoring of blood glucose levels and awareness about moringa leaves were documented. Their lifestyle pattern was enquired and dietary habits were also recorded using food frequency questionnaire. The collected data depicts the following results-

**The first objective of the study was to assess the dietary pattern of diabetic patients-** The study concluded that 80% of diabetic patients consume wheat flour and white rice daily while 20% eat brown rice. All the test samples are non-vegetarian.20% follow a diabetic diet and 20% use millets in daily life while 20% consumes alternately. fried foods are consumed alternately by 60%. 20% drinks cold drinks weekly. 80% drinks tea/coffee on daily basis.20% of test samples consume bitter gourd 60% use fenugreek seeds while 20% use Himalaya herbal neem supplements to reduce the blood glucose levels.

**The second objective was to evaluate the safety of moringa leaves for human consumption-**The study concluded that 100% test sample had no G.I problem due to consumption of moringa leaves.

**The next objective of the study was to study the anti-hyperglycemic or anti-diabetic effect of moringa leaves on diabetic patients-**The study concluded that about 40% of test samples observed significant change in their blood glucose levels. 40% sometimes noticed lowering while 20% does not documented any changes.

**The objective of the study was to assess the effect of moringa leaf chutney as a complementary therapy for diabetic patients.-** The study concluded that the moringa leave chutney consumed by the test samples shows a significant change in lowering of the pre and post blood glucose levels.

**The last objective of the study was to analyze the effect of moringa leaves in regulating the blood glucose levels-** The study concluded that there is a significant association between consumption of moringa leaves and lowering of the blood glucose levels in diabetic patients.

**RESULT-**The above study concludes that there is an association between consumption of Moringa leaves and Diabetes. Moringa leaves are found to be safe for human consumption and Anti- hyperglycemic effect also exist in it. The test samples has shown effective lowering of blood glucose levels with the consumption of Moringa leaves.

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