Blood sugar lowering effects of *Moringa oleifera* extracts on Normal and Hyperglycemic Patients

Abhishek Singhai¹, Anand Baharani²*

¹Associate Professor, ²Postgraduate Student, Department of Medicine, Sri Aurobindo Medical College, Indore, India.

ABSTRACT

**Background:** *Moringa oleifera* (M. oleifera) is the most widely cultivated species of the genus Moringa. An antidiabetic property is included among the medicinal benefits of M. oleifera. **Aim:** This study was designed to evaluate the efficacy of the M. oleifera leaf extract in lowering the blood sugar levels for two groups categorized as being normal and hyperglycemic. **Methods:** Total 50 subjects were derived into two groups based on fasting blood sugar levels. They were classified either as normal or hyperglycaemic. Normal fasting blood sugar levels were considered as those with levels of 70-110 mg/dl, while hyperglycaemia was if blood sugar levels more than 110 mg/dl. Of the 50 subjects, 25 were normal and 25 were hyperglycaemic. Fasting blood sugar estimation was done from venous blood. Each subject was asked to swallow commercially available M. oleifera leaf extract in the dose of 500 mg along with regular breakfast. Two hours after taking the M. oleifera capsule, the blood sugar levels were measured again. Statistical significance of the change in blood sugar readings was determined using paired-samples t-test. **Results:** Mean (SD) FBS was 83.84 (2.4) mg/dl among normal subjects. Mean (SD) FBS was 140.28 (3.1) mg/dl among hyperglycemic subjects. Overall, there was a mean change of +14.12 for the normal group and -17.96 for the hyperglycemia group. Both values were statistically significant. (p<0.001). **Conclusion:** Our study shows that M.oleifera leaf extract has blood sugar lowering effects in hyperglycemic individuals, while in normal subjects blood sugar increased after breakfast as a normal phenomenon.

KEYWORDS: Moringa oleifera, antidiabetic, hyperglycemia, polyphenols.

INTRODUCTION

*Moringa oleifera* (M. oleifera) is the most widely cultivated species of the genus Moringa, which is the only genus in the family Moringaceae. English common names include: moringa, drumstick tree (from the appearance of the long, slender, triangular seed-pods), horseradish tree (from the taste of the roots, which resembles horseradish), ben oil tree, orbenzoil tree (from the oil which is derived from the seeds). It is a fast-growing, drought-resistant tree, native to the southern foothills of the Himalayas in north western India, and widely cultivated in tropical and subtropical areas where its young seed pods and leaves are used as vegetables. It can also be used for water purification and hand washing, and is sometimes used in herbal medicine. A study conducted by Guevarra et al [1] namely, niazimicin, has an antitumor promoter as it inhibits carcinogenesis when tested against mouse skin. M. oleifera could also significantly reduce the lipid levels in blood,[2,3] the juice from the leaves and stem bark of M. oleifera was found to inhibit staphylococcus aureus[2] and dermatophytes.[4] it is also suggested that low concentration of the M. oleifera plant extract can be used for the regulation of thyroid hormone metabolism.[5] An antidiabetic property is also included among the medicinal benefits of M. oleifera.[6]

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease.[7,8] In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively. According to Wild et al[9] the
prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.[9,10] India currently faces an uncertain future in relation to the potential burden that diabetes may impose upon the country

This study was designed to evaluate the efficacy of the M. oleifera leaf extract in lowering the blood sugar levels for two groups categorized as being normal and hyperglycemic.

MATERIALS AND METHODS

Study Design: Cross sectional non-randomized study was conducted. Participants were selected from outdoor and indoor medicine department of Sri Aurobindo Medical College, Indore, India.

The Participants: A total of 50 participated in the study. Subjects were selected randomly from outdoor medicine department and divided in two groups (normal and hyperglycemics group) depending on blood sugar values. The age of normal subjects ranged from 32 to 68 years and age of hyperglycemic subjects ranged from 29 to 70 years. There were 10 females and 15 males among normal subjects. There were 11 females and 14 males among hyperglycemic subjects. Written informed consent was taken from all subjects. Those patients who were already on oral hypoglycaemic drugs were excluded from study. This study was approved by Institutional Ethical Committee.(No.15/702)

Data Collection: Fasting blood sugar (FBS) estimation was done from venous blood using glucose oxidase method. Each subject was asked to swallow commercially available M. oleifera leaf extract in the dose of 500 mg along with regular breakfast . Two hours after taking the M. oleifera capsule, the blood sugar levels were measured again.

Statistical Analysis: The subjects were derived into two groups based on fasting blood sugar levels. They were classified either as normal or hyperglycaemic. Statistical significance of the change in blood sugar readings was determined using paired-samples t-test.

RESULTS

Fasting blood sugar level varies from 68-99 mg/dl among normal subjects. Mean (SD) FBS was 83.84+ 2.4 mg/dl among normal subjects. Among hyperglycemic subjects, FBS varied from 132-160 mg/dl. Mean (SD) FBS was 140.28+ 3.1 mg/dl among hyperglycemic subjects. After taking breakfast the blood sugar levels changed for both groups. Blood glucose levels varied from 79-110 mg/dl among normal subjects and 110-140 mg/dl among hyperglycemic subjects. Differences in values of blood sugar levels for the normal and hyperglycemic subjects are shown in Table1. In normal individuals, blood sugar increased after taking breakfast along with M.Oliefera capsules as a normal phenomenon. While in hyperglycemic individuals, blood sugar decreased significantly after taking breakfast with M.Oliefera capsule.

<table>
<thead>
<tr>
<th></th>
<th>Fasting blood sugar (mg/dl)</th>
<th>Blood sugar 2 hours after breakfast (mg/dl)</th>
<th>Mean change</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>83.84+ 2.4</td>
<td>97.96+ 2.7</td>
<td>14.12 (blood sugar increased)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Hyperglycemics</td>
<td>140.28+ 3.1</td>
<td>122.32 +2.1</td>
<td>- 17.96 (blood sugar decreased)</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

DISCUSSION

Our data shows change in values of blood sugar for both group. Overall, there was a mean change of +14.12 for the normal group and -17.96 for the hyperglycemia group. In a similar study by Ples M [11], there was a mean change of +4.33 for the normal group and -28.15 for the hyperglycemic group. This study results showed that taking M. oleifera tea had no significant effect on the blood sugar levels 2 hours after intake for people with initial blood sugar levels that are between 60-120 mg/dl. However, when the tea is used by hyperglycemic patients, the blood sugar levels significantly decreased 2 h after intake. The mean drop in sugar levels was 28.15 mg/dl.

Moringa leaves significantly decrease blood glucose concentration in Wistar rats and Goto-Kakizaki (GK) rats, modeled type 2 diabetes.[12] Another study indicated that the extract from moringa leaf is effective in lowering blood sugar levels within 3 h after ingestion.[13] As a mechanistic model for antidiabetic activity of moringa, it has been indicated that dark chocolate polyphenols[14] and other polyphenols[15] are responsible for hypoglycemic activity. The dark chocolate polyphenols and some other polyphenols were described as hypoglycemic agents due to alpha glucosidase inhibitor activity. Moringa leaves are potent source of polyphenols, including quercetin-3- glycoside, rutin, kaempferol glycosides, and other polyphenols.[12]

Thus, potential anti- diabetic activity of moringa can be commercialized through the development of suitable technology with achieving anti-diabetic activity up to
conventional drugs. As shown in previous studies and also in this study, differential action of moringa leaves in normal and diabetic patients seems to be blood sugar level dependent. There are no side effects of moringa leaves reported yet.

**CONCLUSION**

This study showed that M. oleifera had significant effect on the blood sugar levels 2 hours after intake among hyperglycemic individuals. In normal individuals, blood sugar increased after taking breakfast and M.Oliefera capsules. While in hyperglycemic individuals, blood sugar decreased significantly after taking breakfast with M.Oliefera capsule. This effect on the blood sugar levels of hyperglycemic individuals points to the potential use of M. oleifera leaf extract in the management of diabetes mellitus. Further studies are needed to delineate the safety and efficacy of M. oleifera leaf extract.

**REFERENCES**


*Corresponding author: Dr. Anand Baharani
E-Mail: aabaharani@gmail.com