

Clinical Study of Lotus (*Nelumbonuciferagaertn*) Rhizome as a Hypoglycemic agent in the Management of Type-2 Diabetes mellitus

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Abstract

Diabetes mellitus is a condition of impaired insulin secretion and variable degree of peripheral insulin resistance leading to hyperglycemia. According to data from recent research, that is corroborated by World Health Organization report – diabetes related complications are more common in Indians as compared with the other populations. The complications include retinopathy, nephropathy, peripheral neuropathy, increased risk of cardiovascular disease and stroke. Therefore, there is a strong need for safe and effective oral hypoglycemic agent for the prevention of diabetes mellitus. In Ayurveda and other Indian literature we find mentions of the use of plants in treatment of various ailments. India has about 45,000 plant species of which several thousands have been claimed to possess medicinal properties. One such plant is the Lotus plant (*Nilumbonucifera*) which includes flavonoids, penolics, alkaloids, triterpenoids, polysaccharides, superoxide dismutase (SOD), fibre and volatile oils. The medicinal use of lotus rhizome has been mentioned by ancient Ayurvedic scholars like Charak, Susruta and Vagbhatta etc. in the treatment of diabetes mellitus. For the treatment of diabetes mellitus a clinical trial was done at Govt. Ayurvedic College & Hospital, Guwahati, Assam by using the powdered form of lotus rhizome. The study was undertaken for evaluating the hypoglycaemic effect of lotus rhizome in type-2 diabetic patients. The drug (Powdered form of lotus rhizome) was given 3mg twice daily orally and the result was taken after 30 days of treatment for total of 90 days (i.e.3 follow-ups) and so far yielding a good result.

Keywords

Hypoglycemic, lotus rhizome, flavonoids, triterpenoid



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INTRODUCTION

Diabetes Mellitus is a condition where there is impaired insulin secretion and variable degree of peripheral insulin resistance leading to Hyperglycemia. According to Ayurveda there is a triangular approach to treat diabetes mellitus i.e. diet, drugs and exercise.

Type-2 diabetes mellitus is a heterogeneous group of disorders usually characterized by variable degree of insulin resistance, impaired insulin secretion and increased glucose production. Distinct genetic and metabolic defects in insulin action and / or secretion give rise to the common phenotype of hyperglycemia in Type - 2 diabetes mellitus.

Diabetes mellitus is a chronic condition in which patients may turn to alternative remedies that are, purported to improve glycemic control. The disease is characterized by symptomatic glucose intolerances as well as alterations in lipid and protein metabolism. The long term complications of untreated or effectively treated diabetes include retinopathy, nephropathy and peripheral neuropathy. In addition, diabetic patients have an increased risk of cardiovascular disease and stroke. Therefore there is a strong need for safe and effective oral hypoglycemic agents that provide the

clinician with a wider range of options for preventing, treating and managing diabetes.

Ayurveda, the holistic system of medicine provides a good support to the diabetic people. There are lots of medicinal plants which are used as an anti-diabetic. They help to minimize the various signs and symptoms along with their complications.

Since ancient time, plants have been an exemplary source of medicine. Ayurveda and other Indian literature mention the use of plants in treatment of various human ailments. India has about 45,000 plants species and among them several thousands have been claimed to possess medicinal properties. Research conducted in last few decades on plants mentioned in ancient literature or used traditionally for diabetes have shown anti-diabetic property. The present paper reviews one of such plant that has been mentioned in classic text of Ayurveda i.e. the Samhita of Charaka (Cha/Chi/6/31-32)², Sushruta (Su/Chi/11/9-10)³ and Vagbhata (A.S.Chi/14/20)⁴.

Here, in this work the medicinal plant which has been selected is a good hypoglycemic as well as hypolipidemic in action is Lotus (*NelumboNuciferaGaertn*).

A plant *NelumboNucifera* belongs to the family of *Nelumbonaceae*, which has several common names (e.g Indian lotus, Chinese Water lily and sacred lotus) and synonyms (*NeelumbiumNelumbo*, *N. Spaceciosa*, *N. speciosum* and *nymphaeaNelumbo*). Lotus perennial large and rhizomatous aquatic herb with slender, elongated branched, creeping stem consisting of nodal roots. The discovered medicinal composition of lotus mainly include eight categories: flavonoids, penolics, alkaloids, triterpenoids, polysaccharides, superoxide dismutase (SOD), fiber and volatile oils¹.

The rhizome extract has anti diabetic (Mukharjee at al 1997 a)⁵ and anti inflammatory properties due to presence of asterolaltriterpenoid. Rhizomes are used for pharyngopathy, pectoralgi, spermatoria, leucoderma, small pox, diarrhoea, dysentery and cough. Oral administration of the ethanolic extract of lotus rhizomes markedly reduced the blood sugar level of normal glucose fed hyperglycemic and streptozotocin induced diabetic rats⁵.

This herb is used in North East Region of India especially in Monipur as a diet and local remedy of diabetes since long back.

AIMS AND OBJECTIVES

To see the efficacy of *NelumboNucifera* Rhizome as a Hypoglycemic agent in type-2 diabetes mellitus.

MATERIALS AND METHODS

Ethical clearance no. No.IE/10/1 dated 03-10-2011, Institutional Ethical Committee, Govt. Ayurvedic College & Hospital, Jalukbari, Guwahati 14, Assam

A total of 120 newly diagnosed type-2 diabetes mellitus patients were randomly screened from Govt. Ayurvedic College and Hospital, Guwahati, Assam, and Capital State Dispensary, Dispur, Assam. The patients are in the age group of 30-70 years irrespective of sex, socioeconomic status, habitats, education, food habits, physical activities, BMI and family history. The trial methodology adopted for the study was open trial in one group and treated with preparation of Lotus Rhizome powder in the dose of 3gm twice daily before meal for total of 90 days. The patients were advised to take the trial drug along with diet control (with specific diet chart). All cases had been assessed in each follow-up (i.e. an interval of 30 days) till completion of study (i.e. 3 months).

Preparation of Trial Drug:

The unwanted portion of lotus rhizome was removed and was washed several

times to clean properly. Then it was cut to pieces and dried in shed so as to become dried enough to make powdered form using grinding machine. The powder was packed in an air tight container. No preservative or colouring agents was used in the preparation of trial drug.

OBSERVATION AND RESULTS

Statistical evaluation was done in laboratorial parameters after calculating mean, SD, SE, Z and P values. Effect of

the drugs was observed by calculating the Z value of mean values of FBS, PPBS and HbA1c before and after treatment.

Table -1, shows the effect of treatment on fasting blood sugar (FBS). FBS values before treatment i.e., Mean \pm SD is 164 ± 30.4 and values after treatment are Mean \pm SD is 141 ± 15.7 , SE value is 3.76 and Z value is 6.1 which is highly significant ($P < 0.01$).

Table 1 Effect of treatment on FBS in 120 cases of Type-2 Diabetes Mellitus

	Mean	SD	SE	Z value	Result
Before Treatment	164	30.4			
After Treatment	141	15.7	3.76	6.1	$P < 0.01$

Table -2, shows the effect of treatment on Post Prandial Blood Sugar (PPBS). PPBS values before treatment i.e. Mean \pm SD is 221 ± 28.6 and values after treatment are

:Mean \pm SD is 193 ± 18.8 , SE value is 3.9 and Z value is 7.1 which is highly significant ($P < 0.01$).

Table 2 Effect of treatment on PPBS in 120 cases of Type-2 Diabetes Mellitus.

	Mean	SD	SE	Z value	Result
Before Treatment	221	28.6			
After Treatment	193	18.8	3.90	7.1	$P < 0.01$

Table - 3 shows the effect of treatment on HbA_{1c} (Glycosylated Hemoglobin). Before treatment : Mean \pm SD is 7.7 ± 0.8

and after treatment : Mean \pm SD is 6.8 ± 0.40 , SE value is 0.11 and Z Value is 8.1 which is also very highly significant ($P < 0.01$).

Table 3 Effect of treatment on HbA_{1c} in 120 cases of Type-2 Diabetes Mellitus.

	Mean	SD	SE	Z value	Result
Before Treatment	7.7	0.8			
After Treatment	6.8	0.4	0.11	8.1	$P < 0.01$

DISCUSSION

From the above observation, regarding effect of treatment on FBS and PPBS, it can be inferred that decrement of blood sugar is more in PPBS as compared to that of FBS. Therefore, we can conclude that the effect of drug is more in PPBS not only in terms of increased peripheral glucose utilization but also some role in insulin secretion and by decreasing glucose absorption from the GIT. As it also decreases the FBS significantly, so it has also effect on Hepatic Glucose Metabolism, like enhancing glycogen formation and storage and reducing glycogenolysis and gluconeogenesis.

CONCLUSION

The results of the therapeutic trial showed that the trail of *NelumboNucifera* was very effective in controlling the blood sugar level. The level of fasting blood sugar and post prandial blood sugar was significantly reduced upon treatment with the trial drug of *NelumboNucifera*. The level of Glycosylated hemoglobin was significantly reduced showing good glycemic control. The folkloric use of *NelumboNucifera* for management of Diabetes mellitus is thus found to be very effective.

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