

Research Article

Evaluation of Antidiabetic Activity from the Stem of *Lasia spinosa* in Dexamethasone Induced Diabetic Albino Rats.

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ABSTRACT

Diabetes mellitus is a chronic metabolic disease. It causes number of complications, like retinopathy, neuropathy and peripheral vascular insufficiencies. The worldwide prevalence of diabetes is expected to be more than 240 million by the year 2010. In India more than 30 million people are with diabetes mellitus. There are lots of synthetic agents available to treat Diabetes, but they have some undesirable side effects. Plant-based medicinal products have been known since ancient times and various medicinal plants and their products have been used to manage diabetes mellitus in the traditional medicinal systems of many countries in the world. Moreover, during the past few years many phyto-constituents which are responsible for antidiabetic activity have been isolated from the plant species. In the present study, an attempt was made to investigate the anti-diabetic activity of *Lasia spinosa* stem extracts (Hydroalcoholic extract) in different dosages (200 and 400 mg/kg b.w.) in dexamethasone induced diabetic albino rats and it shows potent antidiabetic activity against standard.

Key words: Diabetes mellitus (DM), Dexamethasone, Hydroalcoholic extract Non-insulin dependent Diabetes mellitus (NIDDM), Hypoglycemia.

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INTRODUCTION

Assam is rich in flora and diverse in its vegetation types. This coincides with the variability of physical features, climate, soil, etc. Nature always stands as a golden mark to exemplify the outstanding phenomenon of symbiosis. It has provided a complete storehouse of remedies to cure all ailments of mankind. The history of herbal medicine is as old as human civilization. Herbal medicines are extracted from plants for use in the treatment of various diseases. They are the world most ancient form of medicine. Many conventional drugs that are available today also originate from plant sources [1].

Lasia spinosa(L.)Thwaites (Araceae) is a perennial herb that is mostly distributed in Southern Asia. It is a large herb which can grow up to 2 m tall. It occurs in swamps, rivers banks, ditches, moist place in topical and subtropical forest, and its shoots are consumed as traditional food in many communities of southern Asia. *Lasia spinosa* is a spinous perennial herb. The stem is upto 4cm thick, creeping and upturning. The petioles measures up to 1m, with persistent sheath up to 20cm, aculeate. The blade is sagittate, entire or pinnatifid, with aculei long veins on the lower surface. The fruit leathery, warty on top[2, 3, 4].

Diabetes is a chronic disorder of carbohydrate, fat and protein metabolism characterized by increased fasting and post prandial blood sugar levels. The global prevalence of diabetes is estimated to increase, from 4% in 1995 to 5.4% by the year 2025. WHO has predicted that the major burden will occur in developing countries. Medicinal plants are being looked up once again for the treatment of diabetes. Many conventional drugs have been derived from prototypic molecules in medicinal plants. The hypoglycemic effect of some herbal extracts has been confirmed in human and animal models of type 2 diabetes.

The World Health Organization Expert Committee on diabetes has recommended that traditional medicinal herbs be further investigated.

The current review focuses on herbal drug preparations and plants used in the treatment of diabetes mellitus, a major crippling disease in the world leading to huge economic losses [5, 6]

MATERIALS AND METHODS

Plant Material

The stems of *Lasia spinosa* were collected from the swamp of Assam. The plant material was authenticated by an acknowledged Botanist, Curator and Research Guide Dr. Gajen Chandra Sarma of the Department of Botany, Gauhati University, Assam.

Extraction of Crude Drugs and Phytochemical Analysis

The stem of *Lasia spinosa* were dried at room temperature and reduced to a coarse powder. The powdered material was subjected to preliminary phytochemical screening for the identification of various phyto-constituents and ash value (Table 1 and 2). 100 gm of stem powder was macerated with 790 ml of solvent which contains water and ethanol in the ratio 490:300 in a round bottom flask. It was closed with a stopper and allowed stand for 7 days with constant stirring (2-3 times in a day). After 7 days the cork was removed and was filtered. The filtered filtrate was subjected for distillation to recover the solvent (ethanol) and dried on a water bath to get a concentrated product and was used for different qualitative chemical analysis [7].

Determination of moisture content:

About 2gm of air dried crude drug was accurately weighed in a watch glass. The drug was kept in hot air oven at 105°C and dry for a period until

constant weight obtained. The difference in weight gives the moisture content of the drug [7].

Acute toxicity study:

There was no mortality or any signs of behavioural changes or toxicity observed after oral administration of methanolic extract of leaf and pitcher up to the dose level of 3000 mg/kg b.w in rats.

Dexamethasone induced insulin resistance in rats:

Animals were divided into 5 groups, each consisting of six rats. Rats in the first group received vehicle and served as control group, while the second group of rats received vehicle plus dexamethasone (10 mg/kg s.c.) and served as positive control group. Rats in experimental groups 4 and 5 were treated with extract of stem of *Lasia spinosa* (200 & 400 mg/kg) plus dexamethasone, whereas rats in the 3rd group were treated with standard drug (500 µg/mg). All the animals received their respective assigned treatment daily for a period of 12 days. Rats of group 2-5 were daily fasted overnight before dexamethasone treatment. On day 4th, 8th blood were collected from tail and measure the blood sugar level and on 12th day the animals were anesthetized with ether and blood was collected from retro-orbital plexus. Serum was then separated for the estimation of glucose by using respective kits.

Hydroalcoholic extract of stem at a dose level of 400 mg/kg produced lower effect in serum glucose

($P < 0.001$) level when compared with other extract treated group in low dose (200mg/kg). The standard and extracts treated group significantly ($P < 0.001$) decreased the blood glucose level when compared with positive control group (Diabetic control) [8].

Statistics

All the results were expressed as Mean \pm SEM and the data were analysed using one-way ANOVA followed by Student-newman-keuls post-test using GraphPad Prism software. $P < 0.05$ was considered significant.

RESULTS

Table 1 and 2 represents the results of preliminary phytochemical screening and moisture content analysis.

There was no mortality or any signs of behavioural changes or toxicity observed after oral administration of methanolic extract of stem up to the dose level of 3000 mg/kg bw in rats.

Hydroalcoholic extract of stem of *Lasia spinosa* at a dose level of 400 mg/kg produced lower effect in serum glucose ($P < 0.001$) level when compared with other extract treated group in low dose (200mg/kg). The standard and extracts treated group significantly ($P < 0.001$) decreased the blood glucose level when compared with positive control group (Diabetic control). Table 3 and Figure 1 shows the results of dexamethasone induced insulin resistance in rats.

Table 1. Preliminary Phytochemical Screening of *Lasia spinosa* Stem Extract

| Sl.No. | NAME OF THE TEST | RESULT |
|--------|------------------|--------|
| 1. | ALKALOIDS | + |
| 2. | GLYCOSIDES | - |
| 3. | AMINO ACID | - |
| 4. | TERPINOIDS | - |
| 5. | FLAVANOIDS | + |
| 6. | CARBOHYDRATES | + |
| 7. | PROTEINS | - |
| 8. | TANNINS | - |
| 9. | LIGNINS | - |
| 10. | SAPONINS | + |
| 11. | STARCH | + |

+ Active constituent is present.

- Absence of active constituent.

Table 2. Moisture content of stem of *Lasia spinosa*.

| Wt. of drug | Initial wt. of drug+pet dish (gm) | Constant wt. After drying (gm) | Loss on drying (gm) | Moisture content |
|-------------|-----------------------------------|--------------------------------|---------------------|------------------|
| 2 gm | 25.04 | 24.76 | 0.28 | 14.0% |

Table 3. Dexamethasone induced insulin resistance in rats:

| Sl.No. | Group | Serum Glucose mg/dl | | |
|--------|------------------|---------------------|---------------------|----------------------|
| | | 4 th day | 8 th day | 12 th day |
| 1. | Control | 75.5 ± 2.33 | 76.3 ± 3.12 | 75.3 ± 4.15 |
| 2. | Diabetic control | 155.3 ± 2.12 | 162.5 ± 3.62 | 170.2 ± 3.02 |
| 3. | Standard | 92.5 ± 2.05 | 88.3 ± 3.75 | 84.3 ± 4.62 |
| 4. | L200 | 110.5 ± 2.72 | 108.3 ± 1.91 | 102.2 ± 4.75 |
| 5. | L400 | 104.3 ± 3.72 | 99.4 ± 2.06 | 93.4 ± 3.75 |

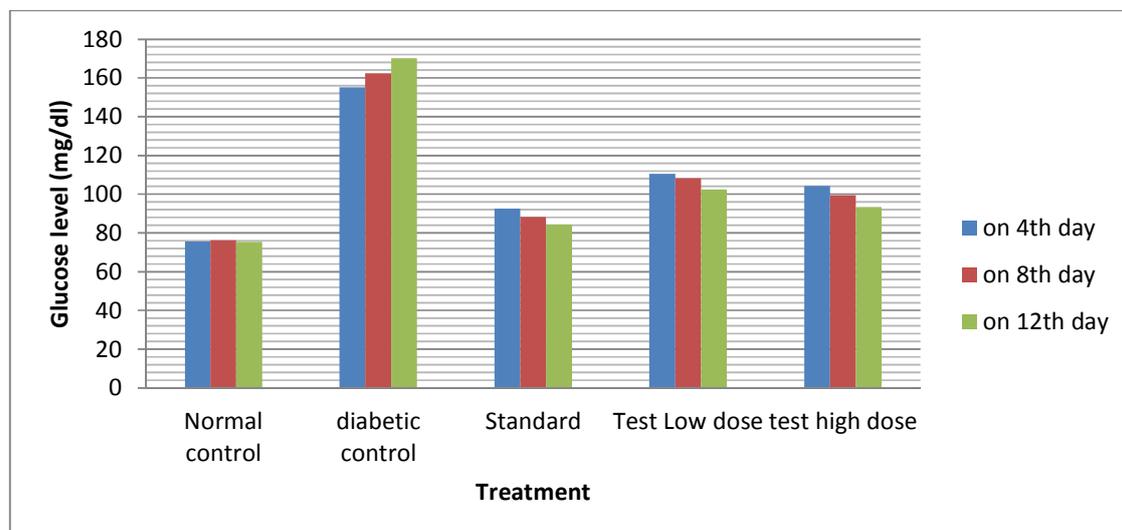
All value expressed in Mean ± SEM

One-way ANOVA followed by Student Newman Keuls Method

P<0.001 (diabetic control vs std.)

P<0.001 (Diabetic control vs low dose)

P<0.001 (Diabetic control vs high dose)

Fig.1 Treatment graph

DISCUSSION

In the present study it has been found that the elevation of serum glucose in dexamethasone treated rats indicating the hyperglycemia by this drug. Previous reports also show the same findings in this model [9]. Dexamethasone increases triglyceride levels, causing an imbalance in lipid metabolism leading to hyperlipidemia and an increase in glucose levels leading to hyperglycemia. Pharmacological doses of glucocorticoids induce gene expression in rat adipocyte tissue within 24 h. this is followed by complex metabolic changes resulting in decrease in food consumption, reduction in body weight, profound obesity often accompanied by diabetes and development of insulin resistance with enhanced blood glucose and triglyceride levels [10, 11]. Hydroalcoholic extract of stem at the dose level of 200 & 400 mg/kg prevented the rise in glucose caused by dexamethasone. The hydroalcoholic extract of stem ameliorating hyperglycemia is likely to have greater therapeutic potential as they may also exert beneficial effects on the clinical course of NIDDM, hypertension and coronary artery disease conditions.

CONCLUSION

Preliminary Phytochemical screening of powdered stem of *Lasia spinosa* indicates the presence of active constituents in hydroalcoholic solvents used. Based on this, solvent selection was made for stem and extraction was performed in Round bottom flask (maceration) using solvent. Three pure components of hydroalcoholic extracts were selected specifically and further tested for antidiabetic activity using the Dexamethasone induced diabetic rat method.

Hence after performing the experiment, *Lasia spinosa* has shown potent antidiabetic activity against Dexamethasone induced diabetic in rats.

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