



Antidiabetic Activity of some Medicinal Plants found in various region of assam

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Assam is the homeland of a number of Herbal medicinal plants. A wide variety of herbs and plants of commercial value are widely available and they are use rationally. Currently available therapeutic options for non-insulin-dependent diabetes mellitus, such as dietary modification, oral hypoglycemics, and insulin, have limitations of their own. Many natural products and herbal medicines have been recommended for the treatment of diabetes. The present paper reviews medicinal plants that have shown experimental or clinical antidiabetic activity and that have been used in traditional systems of medicine. The medicinal plants, besides having natural therapeutic values against various diseases and considerable works have been done on these plants to treat diabetes mellitus, describes that the antidiabetic activity of medicinal plants is due to the presence of phenolic compounds, favonoids, terpenoids, coumarins and other constituents which show reduction in blood glucose levels. Some of these herbal plants and their active chemical constituents which have a role in the management of diabetes mellitus are compiled here and discussed in this review on the following drugs like Accacia catechu, Vitex negundo, Murraya koenigii.

Keyword: Ant-diabetic, Acacia catechu, Vitex negundo, Murraya koenigii

Introduction

Assam is very rich in biodiversity because of the favourable geographical location, diversified topography and ideal climatic conditions. There are over 1500 species of medicinal plants reported so far from India and more than 350 species from Assam. They can not only cure our ailments but can also be a potential source of economic development. The demand for medicinal plants is ever increasing, as people are more and more fascinated towards herbals. Some medicinal plants are much sought after by pharmaceutical companies.

The Diabetes can be defined as a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both^{1,3}. Most cases of diabetes mellitus fall into the three broad categories namely Type 1, Type 2, and Gestational diabetes. The cause of diabetes is a mystery, although both genetic and environmental factors such as obesity, sedentary Lifestyle and lack of exercise appear to play a role. According to WHO the diabetic population is likely to increase to 300 million or more by the year 2025.

Treatment^{1,3,7}:

Treatment For Type I Diabetes

People with type I diabetes no longer produce insulin, and they must have insulin injections to use the glucose they obtain from eating. People with type I diabetes must give themselves insulin every day. Either insulin can be injected, which involves the use of a needle and syringe, or an external or internal insulin pump, insulin pen, jet injector, or insulin patch can give it. Extra amounts of insulin may be taken before meals, depending on the blood glucose level and food to be eaten. Insulin cannot be taken as a pill. Because it is a protein, it would be broken down during digestion just like the protein in food. It must be injected into the fat under the skin for insulin to get into the blood. The amount of insulin needed depends on height, weight, age, food intake, and activity level. Insulin doses must be balanced with meal times and activities, and dosage levels can be affected by illness, stress, or unexpected events.

Treatment For Type II Diabetes

People with type II diabetes make insulin, but their bodies do not correctly use it. Some people with type II diabetes need diabetes medication or extra insulin to help their bodies use their own insulin better.

Treatment For Gestational Diabetes During Pregnancy Includes

Treatment of gestational diabetes involves eating a balanced diet and getting regular exercise to keep blood sugar (glucose) levels within an acceptable range. The goal is to reduce the risk of complications for mother and baby during pregnancy and after birth. If mother's blood sugar level and the fetus's weight remain normal, the risk of complications is quit less.

This presentation reviews some medicinal plants that have shown experimental or clinical antidiabetic activity and that have been used in traditional systems of medicine. The medicinal plants, besides having natural therapeutic values against various diseases and considerable works have been done on these plants to treat diabetes mellitus, describes that the antidiabetic activity of medicinal plants is due to the presence of phenolic compounds, flavonoids, terpenoids, coumarins and other constituents which show reduction in blood glucose levels.

ACACIA CATECHU^{4,5}:

Botanical name: *Acacia catechu* Wild.

Family: *Mimosaceae*

Other Names

English: Cutch tree

Hindi: Khair, Khaira

Assamese: Kher

Medium sized tree grows up to 13 meters in height. Leaves bipinnately compound, leaflets 30-50 paired. Flowers pale yellow, found in axillary spikes. Fruits flat brown pods. The gummy extract of the wood is called kath or cutch.

Ray D. et al. evaluate the antipyretic, antidiarrhoeal, *hypoglycaemic* and hepatoprotective effects of the ethyl acetate extract of *Acacia catechu* in experimental animal models. They reported a significant reduction of blood glucose level in diabetic rats at doses of 250 and 500 mg/kg ($P < 0.001$). Edwin J. et al. evaluated the ethanolic extract of *Acacia catechu* Wild for antihyperglycaemic activity in glucose-loaded hyperglycaemic rats. The effective extract were subjected to antidiabetic study in alloxan-induced diabetic rats at two dose levels, 200 and 400 mg/kg. Biochemical parameters, including glucose, urea, creatinine, serum cholesterol, serum triglyceride, HDL, LDL, haemoglobin and glycosylated haemoglobin were also assessed.

VITEX NEGUNDO⁴:

Botanical name: *Vitex negundo* Linn.

Family: *Verbenaceae*

Other Names

English: Five leaved chaste tree

Hindi: Nirgundi; Nisinda;

Assamese: Pachatia

It is a large aromatic large shrub or small tree of about 3 meters in height with quadrangular branches; leaves opposite. The leaves are tri-or pentafoliate with entire, lanceolate, terminal leaflets of 5-10 cm length and

1.6-3.2 cm width. Lateral leaves are smaller and nearly glabrous. Leaves are dull greyish green on the upper surface and greyish below. The leaves possess aromatic odour. The flowers are bluish purple and small in peduncle cymes forming large terminal pyramidal panicles.

Pappu S. et al. studied the medicinal properties of *Vitex negundo* and one of its compounds, 1, 2 disubstituted idopyranose ($C_{23}H_{28}O_{12}$) was checked against diabetes mellitus by molecular docking. The inhibitor, 1, 2 disubstituted idopyranose was found to be increased insulin sensitivity and normalize blood glucose level by binding in the active sites of the protein and thus useful therapeutic agent for the herbal therapy of diabetes. Zaware B. et al. reviewed *Vitex negundo* which is traditionally very important herb having many important pharmacological activities like analgesic, antidiabetic, anti-inflammatory antifungal, antimicrobial, defibrinogenating, antiasthmatics and antioxidant property.

MURRAYA KOENIGII^{6,8}:

Botanical name: *Murraya koenigii*.

Family: *Rutaceae*

Other Names:

English : Curry leaf tree

Hindi : Mithanim, Katnim

Assamese: Narasingha, bishahari

A small aromatic tree with dark grey bark. Leaflets are alternate, obliquely ovate, gland dotted and aromatic; flowers white in terminal, fragrant; fruits subglobose berries dark purple when ripe. 2 seeded.

Arulselvan P. et al. evaluate the anti-hyperglycemic efficacy of *Murraya koenigii* in STZ-induced diabetic rats. Oral administration of ethanolic extract of *M. koenigii* at a dose of 200 mg/kg/b.w./day for a period of 30 days significantly decreased the levels of blood glucose, urea, uric acid and creatinine in diabetic treated group of animals. The results suggest that *M. koenigii* possesses statistically significant hypoglycemic potential in STZ-induced diabetic rats. The *M. koenigii* extract appeared to be more effective than Glibenclamide, a known antidiabetic drug. Temburne, SV. Et al. studied the Hypoglycaemic effects of fruit juice of *Murraya koenigii* in alloxan induced diabetic mice. Evaluation was done at a dose level of 2.5 and 5.0 ml/kg. The result of antidiabetic study revealed that the juice decreases blood glucose level significantly at 10 and 15 day of administration.

BACOPA MONNIERI (LINN.) PENN.^{9,10}:

Botanical name: *Bacopa monnieri* (Linn.) Penn.

Family: *Scrophulariaceae*

Other Names:

English: Bacopa, Herb-of-grace, thyme-leaved graticula

Hindi: Baam, brahmi, jalbuti,

Assamese: Brahmi

A prostrate or creeping, juicy, succulent, glabrous annual herb rooting at the nodes with numerous ascending branches; leaves. simple, opposite, decussate, sessile, obovate-oblong or spatulate, entire, fleshy, obscurely veined, punctate: flowers pale blue or whitish, axillary, solitary, on long slender pedicles; fruits ovoid, acute, 2-celled, 2-valved capsules, tipped with style base; seeds minute, numerous.

Tirtha G. et al. evaluated that bacosine, a triterpene isolated from *Bacopa monnieri*, possesses significant antihyperglycemic activity against alloxan-induced diabetic rats, although it did not show any activity on normal rats. The above mentioned activity might be attributed to the protective action of bacosine on lipid peroxidation and at the same time to the enhancing effects on cellular antioxidant defense contributing to the protect ion against oxidative damage in alloxanized diabetes leading to an improvement of tissues and a subsequent increase in uptake and utilization of blood glucose.

ABELMOSCHUS ESCULENTUS^{11,12}:

Botanical name: *Abelmoschus Esculentus*

Family: *Malvaceae*

Other Names:

English: Ladys-finger, okra

Hindi: Bendi, bhindi

Assamese: Bhendi

Abelmoschus esculentus is cultivated throughout the tropical and warm temperate regions of the Assam for its fibrous fruits or pods containing round, white seeds. The species is an annual or perennial, growing to 2 m tall. The leaves are 10–20 cm long and broad, palmately lobed with 5–7 lobes. The flowers are 4–8 cm in diameter, with five white to yellow petals, often with a red or purple spot at the base of each petal. The fruit is a capsule up to 18 cm long, containing numerous seeds.

Subrahmanyam G. et al. investigated the anti diabetic activity of *Abelmoschus Esculentus* (ladiesfinger) fruit extract in rabbits (2.5 kgs). Artificial Diabetic nature was induced in rabbits by injecting ALOXAN. They used standard drug METFORMINE 1mg/ml and ABELMOSCHUS ESCULENTUS 1 mg/ml as the plant extract for the evaluation of antidiabetic activity.

DALBERGIA SISSOO L.¹³⁻¹⁵:

Botanical name: *Dalbergia Sissoo L.*

Family: *Fabaceae*

Other Names:

English: Indian Rosewood

Hindi: Shisham, sisam

Assamese: Sisu, Sishoo kath

The pods of Sissoo when ripe contain 1 -3 seed, indiscent, reniform flat, light brown, with delicate papery testa. Fruit is 5-7 x 0.08 x 1.2 cm, strap-shaped, pale brown, mostly 1-seeded, less often 3-seeded. Pods are 4.5-10 x 0.07 x 1.5 cm, linear-oblong, indecent, stipulate, glabrous, apex acute to obtuse, conspicuously reticulated against the seeds, usually 1-4 seeded.

Pankaj SN et al. studied the hypoglycemic effect of ethanolic extract of *Dalbergia sissoo L.* in rats. The ethanolic extract of leaves was administered orally at different doses (250 and 500 mg/kg) to rats. The dose of 500 mg/kg was found to be more effective dose in oral route and it decreases Blood Glucose Level (BGL) by 38.2% in normal healthy rats after one day.

DILLENIA INDICA LINN.^{16,17}:

Botanical name: *Dillenia indica Linn.*

Family: *Dilleniaceae*

Other Names:

English: Elephant apple

Hindi: Chulta

Assamese: Outenga

It is an evergreen tree, 30–80 ft. in height, which bears large and hard fruit 3-5 in. in diameter and grows in moist and evergreen forests of India. The fruit is usually round with a few odd bumps, a little bit like an elephant's toe. It is greenish-yellow with a hard and very thick leathery husk.

Sunil K. et al., have studied the leaves extract of the plant for the evaluation of antibacterial activity. In the study they evaluated antidiabetic and antihyperlipidemic effects of *Dillenia indica* methanolic leaves extracts in streptozotocin induced diabetic Wistar rats by administering graded oral doses (250 and 500 mg/kg body weight) for 21 days.

CONCLUSION:

All the drugs discussed in this review have exhibited significant clinical & pharmacological activity. The potency of herbal drugs is significant & they have negligible side effects than the synthetic antidiabetic drugs. There is increasing demand by patients to use the natural products with antidiabetic activity. In recent times there has been renewed interest in the plant remedies. Plants hold definite promises in the management of Diabetes mellitus.

Isolation & identification of active constituents from these plants, preparation of standardized dose & dosage regimen can play a significant role in improving the hypoglycaemic action.

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