A REVIEW OF SOME MEDICAL PLANT SPECIES WITH ANTI-DIABETIC PROPERTIES

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ABSTRACT
Due to their natural origins and lack of side effects, herbal medicines have seen an exponential surge in popularity over the last several years in both developed and developing nations. Many of the ancient medicines still in use today are made from organic material, minerals, and medicinal plants.The 21,000 plants that are used as medicines worldwide are recorded by the World Health Organization (WHO). Out of these 2500 species, 150 species are utilized economically on a sizable basis in India. India, which is known as the world's botanical garden, is the country that produces the most medicinal plants.The present study focuses on plants and herbal medication formulations used globally to treat various chronic diseases. In many parts of the globe, the use of Ayurvedic medications is becoming more widespread among both adults and children. This essay will go through the advantages of using herbal remedies to treat diabetes.

Keywords: *Medicinal plant, Antidiabetic activity, Diabetes mellitus*

INTRODUCTION

Diabetes mellitus (DM), the most common endocrine disease, affects over 100 million people worldwide and is growing due to population growth, age, obesity, and inactivity. 1-2. India, the second-most populous nation, has the greatest prevalence of type 2 diabetes, impacting people of all ages and genders. Current projections forecast 438 million individuals, or 7.8% of the population, will get diabetes by 20305. Stress, rapid urbanization, rising spending power, a simpler lifestyle, and metro living all negatively effect health and increase the number of people with specific disorders. 6. Diabetes costs approximately $100 billion each year, yet well-controlled blood sugar levels reduce complications7.Traditional and alternative diabetic treatments are needed since manufactured drugs are expensive and have adverse effects. Herbal therapy depends on more than 400 plant species with antidiabetic properties8.

MEDICINAL PLANTS WITH ANTIDIABETIC ACTIVITY

Various medicinal plants have been reported for their antidiabetic which is categorized on the basis of plant's part as follows.

LEAVES

Aframomum melegueta

Current pain and inflammation treatments include corticosteroids and aspirin. These medicines may cause renal failure, allergic reactions, hearing loss, or bleeding through altering platelet function. Many plant-based medications have been used safely for centuries.

Thus, new medicinal plants must be introduced to generate cheaper, more effective medications. Plants contain several chemicals that might lead to new medications.In this analysis, antidiabetic and analgesic medicinal plants that benefit humans are summarized.

West Africans use Aframomum melegueta (Zingiberaceae) leaf extract for diabetes. Crude leaf extract was tested for

hypoglycaemic effects on alloxan-induced diabetic male rats and controls. Oral leaf extract at 50, 100, and 200 mg/kg lowers blood glucose.

Aloe barbidensis (Southakathalai, Ghikanvar)

A cactus-like plant known as aloe vera (Liliaceae) has green, dagger-shaped leaves that are thick, tapering, spiky, and packed with sticky gel. The hypoglycemic effect of aloe vera's aqueous extract was administered orally at a dosage of 150 mg/kg of body weight. The male albino rats that had been given alloxan were used throughout the whole investigation.

Azadiechta indica

An indigenous herb called Azadirachta indica (Meliaceae) is commonly accessible in India and Burma. To clarify the potential mechanism of the antihyperglycemic action, the impact of Azadirachta indica leaf extract on serotonin inhibition in glucose driven insulin release in rat pancreas was examined in vitro.

It was shown in a different investigation that the hydro ethanol extract of this plant had antihyperglycemic action in streptozotocin-treated rats. This effect is due to an increase in glucose absorption and glycogen deposition in an isolated rat hemi diaphragm. Additionally, this plant possesses hepatoprotective, antioxidant, antibacterial, antimalarial, antifertility, and properties.

Aegle marmelos (Bael leaves)

The Rutaceae family includes the medium-sized, armed, deciduous tree known as Beal. It demonstrated the most potent antidiabetic impact in conjunction with oral hypoglycemic medication. In individuals whose diabetes is not under control with these medicines or in people in whom these treatments have side effects on dosage increases, beal leaves may be taken in large doses with oral hypoglycemic agents to bring the blood glucose to normal levels.

Anacardium occidentale (Cashew plant)

In streptozotocin-induced diabetic rats, methanolic leaf extract of Anacardium occidentale (Anacardiaceae) was studied. When given orally to diabetic rats, methanolic extracts at dosages of 35, 175 and 250 mg/kg substantially lower blood glucose levels. It was observed that methanolic stem bark extract of the cashew plant exhibits antidiabetic activity in fructose-fed (diabetic) mice. Hexane and ethyl acetate fractions exhibited the most notable effects indicating the existence of non polar and polar studies.

Basella rubra

Malabar spinach (Basellaceae) or cyclone spinach are two names for Basella rubra. On STZ-induced diabetic rats, the leaf pulp's antihyperglycemic activity has been tested. It was discovered that fasting blood glucose levels were considerably decreased to normal after intake, while liver glycogen content was noticeably raised.

Bougainvillea glabra (B.G.)

Glorey of the Garden is Bougainvillea glabra, a Nyctaginaceae. Florida and California love this South American shrub. Aqueous and methanolic leaf extracts were tested on alloxan-induced diabetes in male albino rats. Phytochemical screening revealed cardiac glycoside, alkaloids, flavonoids, and saponin.

B.G. extract at 100 and 400 mg/kg significantly decreased diabetic rats' blood glucose20.

Pigeon pea, or Cajanus cajan, is Fabaceae. The methanolic leaves extract of Cajanus cajan was antidiabetic in rats with oral glucose loading and alloxan-induced

diabetes. The extract (400 and 600 mg/kg) significantly lowered fasting blood sugar levels in alloxan-induced diabetic rats in a dose-dependent manner, with the greatest hypoglycemic effect at 4-6 hours. In normal rats, the extract lowered peak postprandial blood glucose by 101.8 and 57.40%.

Coccinia indica

Bengal has several wild Coccinia indica (Cucurbitaceae) creepers. Ayurveda has utilized the herb to cure diabetes since ancient times. Oral treatment of an aqueous solution of ethanolic leaf extract to 18-hr-fasted rats reduced blood glucose levels in both normal and streptozotocin-diabetic rats and decreased liver gluconeogenic enzyme glucose-6-phosphatase activity.

Cassia occidentalis

Numerous ailments are treated using Cassia occidentalis (Caesalpiniaceae) in traditional and indigenous medical practices. The leaf's methanolic fraction was tested on diabetic rats created by streptozotocin. In diabetic and normal rats, treatment with this plant's extracts at various dosages and intervals thereafter substantially lowered blood glucose levels to normal. A histopathological analysis revealed that methanolic extract shields the pancreatic tissue from damage brought on by STZ.

BARK

Ficus recimosa

In the traditional system of medicine, Ficus racemosa (Moraceae) is used to cure a variety of ailments, including diabetes mellitus. In alloxan-induced diabetic rats, bark ethanol extract shown antihyperglycemic and hypolipidemic effects. A dosage of 100–500 mg/kg of the extract considerably reduced blood pressure.

Thespesia populnea

Thespesia populnea, sometimes known as the Indian tulip tree, is a well-known evergreen tree in the Malvaceae family. The plant is found in India's coastal forests and tropical areas. The hypoglycemic action of the plant's bark and leaves was tested against streptozotocin (STZ)-induced diabetic rats, and it was compared to the conventional medication glibenclamide. It was thought that the extract's glucose content prevented the production of free radicals.

Adansonnia digitata (Bombacaceae) methanolic stem bark extract was tested for its anti-diabetic ability in streptozotocin-induced diabetic wistar rats. The rats received doses of 100, 200, and 400 mg/kg of the plant extract intraperitoneally. Results indicate that bark extract significantly decreased hyperglycemia.

Afzelia africana

On streptozotocin-induced diabetic rats, the aqueous extract of the stem bark of Afzelia africana (leguminosae) was shown to have anti-diabetic effects and to have a positive impact on hematological parameters. At a dosage of 200 mg/kg, the extract dramatically lowered blood glucose levels. In addition to preventing hyperglycemia, it also stops different diabetic complications.

Berberis aristata

Indian traditional medicine uses Berberis aristata (Berberidaceae) to treat diabetes mellitus. This plant's methanolic extract has been shown to have anti-diabetic properties when used to treat adult male wistar rats with streptozotocin-induced diabetes. In contrast to anti-diabetics, it is also used to treat bacterial, period, diarrheal, ophthalmic, skin, and other illnesses.

Elaeodendron glaucum

A medium-sized tree belonging to the Celastraceae family, Elaeodendron glaucum is found in tropical Asia, Australia, America, and South Africa. Inbred adult male Charles-Foster (CF) albino rats, both normal and alloxan-induced, have antidiabetic action in response to this plant's methanolic extract.

Terminalia arjuna

On rats with diabetes caused by alloxan, the stem bark of Terminalia arjuna was shown to have antidiabetic action. Glucose-6-phosphatase, fructose-1, 6-disphosphatase, and aldolase activities all considerably decreased after receiving ethanol extract of bark at doses of 250 and 500 mg/kg, but phosphoglucoisomerase and hexokinase activities increased in the tissues.

Ougeinia oojeinensis

On alloxan-induced diabetic rats, the bark of Ougeinia oojeinensis (Leguminosae) was discovered to exhibit hypoglycemic and hypolipidemic properties. 200 mg/kg of bark extract was administered orally for its hypoglycemic effects. Additionally, extract lowers high levels of triglycerides, low density lipoprotein, total cholesterol, etc.

ROOT

Ipomoia digitata

On rats with diabetes caused by alloxan, the antidiabetic effects of different fractions of Ipomoia digitata were examined. 100 mg/kg, 200 mg/kg, and 400 mg/kg of extract were utilized as dosages for body weight. As a standard reference, glibenclamide (10 mg/kg body weight) was used.

Tectona grandis

On alloxan-induced diabetic albino rats, Tectona grandis (Verbenaceae) roots were shown to have antidiabetic action. Its hypoglycemic impact was compared to that of glibenclamide, and at a dosage of 500 mg/kg, hypoglycemic activity has been shown.

Pseudarthria viscida

Pseudarthria viscida (Fabaceae) root ethanolic extract was tested for anti-diabetic efficacy against alloxan induced diabetes in albino rats. In comparison to normal glibenclamide, the ethanolic extracts demonstrated notable activity.

Ginseng

The safe and effective antidiabetic effects of a methanol extract of the root of the Oleaceae plant Nyctanthes arbortristis were tested in diabetic rats induced with alloxan. The anti-diabetic activity was compared to that of glibenclamide, a widely used medication. It was discovered that the methanolic extract shown considerable hypoglycemic effect at a dosage level of 500 mg/kg.

A well-known medicinal plant used in conventional eastern medicine is ginseng (Araliaceae). In the United States, ginseng root has become more well-liked as a nutritional supplement in recent years. It has also often been used to treat problems similar to diabetes in medicine. Ginseng is said to enhance the release of insulin from pancreatic beta cells; this activity is thought to be mediated through increased insulin production and beta cell stimulation.

Anthocephalus indicus

In rats with diabetes produced by alloxan, root extract from Anthocephalus indicus (Rubiaceae) has been shown to have hypoglycemic, lipid-lowering, and antioxidant effects. The levels of blood glucose, triglycerides, total cholesterol, phospholipids, and free fatty acids were all dramatically reduced after receiving an oral dosage of an ethanol extract of the

root for 21 days (500 mg/kg body weight).

Ceiba pentandra

Pentandra Ceiba In both healthy and streptozotocin-induced diabetic rats, the root and bark extract of Ceiba pentandra (Bombacaceae) has been shown to have a hypoglycemic effect. In the fasting normal and diabetic groups, doses of 40, 75, 150, and 300 mg/kg of the extract were used. According to reports, a little dosage produces a hypoglycemic effect rather than a large amount.

Annona squamosa

In Streptozotocin (STZ)-induced hyperglycemic rats, the aqueous extract of the roots of Annona squamosa (Annonaceae) was shown to have anti-diabetic efficacy at doses of 250 mg/kg and 500 mg/kg body weight, respectively. It lowers blood sugar levels and has similar effects as glibenclamide.

SEED

Abrus precatorius

In alloxan-induced diabetic rabbits, the anti-diabetic effects of the Abrus precatorious (Leguminosae) seed extract were investigated. In STZ-induced diabetic mice, its antidiabetic properties were shown to be comparable to those of Opuntia dillenii, a haw fruit that has been utilized in folk medicine as an antidiabetic drug. In addition to the minerals, it is a good source of fiber, carbs, and the vitamins B1, B2, and C. O. dillenii juice was given orally to diabetic rats to lower MDA and blood glucose levels. Additionally, it could help -cells' insulin receptors.

Phylanthus emblica

In Asia and Africa, Phyllanthus emblica, sometimes known as amla, is extensively spread. Alanine transaminase (ALT), a liver-specific enzyme, type II diabetes, and triglycerides were all affected by the aqueous fruit extract of Phyllanthus emblica. A 200mg/kg body weight dosage of aqueous fruit extract was proven to dramatically lower blood glucose levels after being administered intraperitoneally to diabetic rats caused by alloxan. In diabetic rats, the aqueous extract also caused hypotriglyceridemia by lowering TG levels. The activity of the liver-specific enzyme alanine transaminase (ALT) was shown to be normalized by the extract, which was also found to enhance liver function.

FRUIT

Opuntia dillenii

Blighia sapida (Sapindaceae) fruit intravenously injected in rabbits, monkeys, rats, and mice causes hypoglycemia. A is stronger than B. Oral hypoglycin A works in rats. Hypoglycin A lowers blood sugar in alloxanized rats.

Lycium barbarum

The fruit of Lycium barbarum, a member of the Solanaceae family, is well-known in traditional Chinese herbal medicine and is now frequently used as a functional food. It has a wide range of positive effects, including anti-aging, immuno-modulating, anticancer, anti-fatigue, and facilitating male fertility. Through carefully planned sequential trials and blood glucose level monitoring, the hypoglycemic effects of Lycium barbarum fruit, crude polysaccharide extracts, and refined polysaccharide fractions were examined in alloxan-induced diabetic rabbits.

WHOLE PLANT /BULB/ AERIAL PART

Catharanthus rosius

The Apocynaceae family, which is known by many different names in India and around the globe, includes Catharanthus roseus. On streptozotocin (STZ)-induced diabetic rats, a dichloromethane: methanol

extract (1:1) of leaves and twigs had a hypoglycemic effect. For its hypoglycemic effects, this extract was administered orally to the animal at a dosage of 500 mg/kg. The livers of diabetic animals have lower enzyme activity than usual for glycogen synthase, glucose 6-phosphate-dehydrogenase, succinate dehydrogenase, and malate dehydrogenase.

Allium cepa

The Liliaceae family, of which Allium cepa is a member, is extensively grown across the globe. It is most likely native to South West Asia. It is also referred to as onion, pyaz, etc. It is a biennial herbaceous plant with a palatable bulb. For its medicinal effect, either the bulb or the whole plant is employed. Its ethenolic extract had a hypoglycemic impact when tested on male albino rats that had been given alloxan. At 300 mg/kg, the greatest percentage decrease in blood glucose, total serum lipids, and cholesterol is seen.

Allium sativum

The onion species Allium sativum, sometimes referred to as garlic, belongs to the Liliaceae family. The diabetic rats who received STZ treatment underwent a hypoglycemic trial. Significant anti-diabetic action may be shown in simple garlic extract and ethanolic extract. In addition to lowering blood sugar, cholesterol, and triglycerides in diabetic rats, raw garlic has the potential to be helpful in correcting proteinuria. Another research found that a part of the methanolic extract in petroleum ether, ethyl acetate, and chloroform had an anti-hyperglycemic effect on rats that had been given alloxan to make them diabetic.

Phyllanthus niruri

The aerial portions of Phyllanthus niruri (Euphorbiaceae) have an anti-diabetic effect when extracted in methanol (ME). It was examined in both healthy and diabetic rats given alloxan. In normoglycaemic rats, it was shown that ME considerably slowed the postprandial increase in blood glucose after a high-glucose meal and decreased fasting blood sugar in a dose-related manner. In diabetic and normoglycemic rats, chronic oral treatment of ME significantly reduced blood glucose levels as well as total cholesterol and triglyceride levels in a dose-related manner.

Salacia oblonga

The antidiabetic properties of Salacia oblonga, a member of the Celastraceae family, were examined in L6.C11 rat skeletal muscle myoblast cell culture. Plant extracts affect glucose transport in muscle and fat cells as well as through blocking intestinal glycosidases. In myotubes and adipocytes, extract improved 2-deoxy-D-glucose absorption by 50%. The bioactive ingredient mangiferin and the extract may increase GLUT4 expression and translocation in muscle cells to provide their anti-diabetic effects. These effects are likely mediated by two distinct mechanisms connected to PPAR- and 50-AMP-activated protein kinase.

FRUIT JUICE

Momordica charantia (Bitter Gourd, Karela)

Momordica charantia is a member of the Cacurbitaceae family. Plant is often utilized in South Asia and is extensively grown in many tropical and subtropical parts of the globe. It has been observed that extracts from several parts of this plant have hypoglycaemic effects in diabetic rats produced by streptozotocin (STZ). It has been suggested that oral administration of fruit juice may contribute to the regeneration of cells in

STZ diabetic rats or, alternatively, may enable the recovery of cells that have been partly damaged.

Ganoderma lucidum

In alloxan-induced diabetic wistar rats, anti-diabetic and some haematological benefits of the Ganoderma lucidum aqueous extract have been described. For testing purposes, an intraperitoneal dosage of 50 mg/kg of the G. lucidum aqueous extract's Ethylacetate and n-Butanol fraction was administered.

DISCUSSION

In this review, we will discuss how to cure diabetes mellitus using the medicinal herbs mentioned above. Because there are so many medicinal plants to choose from in rural locations, several of them are primarily utilized there. Therefore, it looks extremely appealing to treat diabetes mellitus using chemicals derived from plants that are available and do not need time-consuming pharmaceutical manufacturing. An effort has been made to research antidiabetic medicinal plants in the current review, which may be helpful to health professionals, researchers, and academics working in the fields of pharmacology and therapeutics to produce antidiabetic medications.

CONCLUSION

Diabetes mellitus is a metabolic imbalance that results from a materialistic worldview. The spread of the pandemic is being accelerated by differences in social structure, psychological stress, obesity, hormonal imbalance, and inheritance. Effective treatment is urgently needed due to the growing diabetic population.

These initiatives might provide therapy to everyone and support the use of unique traditional medicinal herbs that have anti-diabetic properties.

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