

A review on antidiabetic plants

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Abstract

Various efforts have been made in the recent past to control or check diabetes with the help of oral hypoglycemic drugs in addition to insulin. However, due to unwanted side effects the efficacies of these compounds are debatable. So, there is an increasing demand for new anti diabetic agents. Plant based products have been used for the treatment of diabetes since ages. The literature pertaining to anti diabetic herbs is scattered. The present article is a conglomeration of available recent literature. It presents important plants used in diabetes, and the future of hypoglycemic herbal drugs.

Key Word: Antidiabetic plants, Diabetes mellitus

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	Accessed Date: 26 March 2018

INTRODUCTION

Diabetes mellitus is a genetically determined disorder of the metabolism of carbohydrate, protein and fats associated with a relative or absolute insufficiency of insulin secretion and with various degrees of insulin resistance, in which the level of blood glucose is persistently raised above the normal range. This disease is heterogeneous in nature. Differences between various forms of the disease are expressed in terms of etiology and pathogenesis (genetic, environmental and immune factors), natural history and response to treatment. Diabetes therefore is not a single disease but a syndrome. Diabetes is still posing a serious threat to the presently available management techniques. A currently available therapy for diabetes suffers from a number of serious adverse effects. Therefore, there is a continuous requirement to develop new anti diabetic drugs. Plant based products have played a major role in the introduction of new therapeutic agents. According to WHO, over 80% of world population relies on traditional forms of medicine largely plant based to meet primary health care needs (Mazid *et. al.*, 2012). India is very rich in having reserves of natural resources and history of

traditional medicine (Grover and Vats, 2001). According to Kim *et. al.*, (2008) more than 400 plant species having antidiabetic and anti-hyperlipidemic activities are available in literature. The herbal drugs with antidiabetic activity are yet to be commercially formulated as modern medicine even though they have been acclaimed for their therapeutic properties in the traditional system of medicine (Wadkar *et. al.*2008). Many plants and plant derived compounds have been used in the treatment of diabetes as they provide potential source of hypoglycemic drugs. The active principles present in the medicinal plants have been reported to possess pancreatic beta cell regenerating, insulin releasing and fighting the problem of insulin resistance (Welihinda *et.al.*1982). Hypoglycemia is involved in the etiology of development of diabetic complications. Hypoglycemic herbs increase insulin secretion, enhance glucose uptake by adipose or muscle tissues and inhibit glucose absorption from intestine and glucose production from liver. (Hongxiang *et.al.*2009). The literature pertaining to antidiabetic plants is scattered. This review has been undertaken to collect scattered information on herbs of antidiabetic activity.

2. ANTIDIABETIC PLANTS WITH RELATED BENEFICIAL PROPERTIES

2.1 *Acacia tortilis* (family-Fabaceae)

It is an Indigenous plant. *Acacia* is a genus of shrubs and trees belonging to the subfamily Mimosidae of the family Fabaceae). Hypoglycemic and antihyperglycemic effect of seed extract of *Acacia tortilis* was evaluated in normoglycaemic and alloxan-induced (135 mg/kg body weight, i.p) diabetic rats. (Agarwal and Gupta, 2013). The extract (200mg/kg body weight) significantly lowered the blood glucose level to an extent comparable to that produced by standard Oral hypoglycemic drug (Gliclazide 22 mg/kg body weight) in both normal and

diabetic rats. The results suggest that seed extract of *Acacia tortilis* possess significant antidiabetic activity.

2.2 *Calamus erectus* (family-Arecaceae)

Ghoshal and Mandal (2013) investigated CE fruit for its antidiabetic and hypolipidemic activities in streptozotocin induced rat model and compared the same with glibenclamide, a standard hypoglycemic drug. Daily oral treatment with 400 mg per kilogram fruit extract of CE for 14 days resulted in 73.68, 20.46, 36 and 43.9 percent reduction of blood glucose, serum cholesterol, triglycerides and LDL (low density lipoprotein) respectively. Whereas HDL (high density lipoprotein) cholesterol was found to be improved 12.7% when compared with streptozotocin treated rats.

2.3 *Cordia sebestena* (family-Boraginaceae)

It is commonly known as Geiger tree. The plant can grow up to 25 feet tall in tropical and sub tropical areas where it is widely distributed due to its use in landscaping. The effects of alcoholic extract of *Cordia sebestena* on blood glucose and liver glycogen were studied in the diabetic rats. (Sarathchandiran and Gnanavel, 2013) This study showed prominent decrease in blood glucose, triglycerides cholesterol, LDL and glycogen levels of diabetic rats treated with *Cordia sebestena* plant extract.

2.4 *Cyanodon dactylon* (family-poaceae)

It is commonly known as 'Doob' in India, is a weed and possesses various medicinal properties. It possesses many therapeutic and decorative values. The aqueous plant extract is used as anti-inflammatory, diuretic, antiemetic and purifying agent (Ahmad *et. al.* 2000). *Cyanodon dactylon* has been used as an antidiabetic agent in traditional system of medicine in India (Kirtikar and Basu, 1980). Antidiabetic activity of various solvent extracts of leaves of *Cyanodon dactylon* was assessed in alloxan induced diabetic rats by Ramaya *et. al.* (2014). Alloxan induced diabetic rats were treated with various solvents and aqueous extract of *Cyanodon dactylon* extract at dose level of 450 mg/kg body weight daily for 21 days. When methanolic extract of *Cyanodon dactylon* was given to experimental animals, there was steep decline in blood glucose level, cholesterol and triglycerides levels as compared to negative control. Petroleum ether and chloroform extracts also reduced the elevated cholesterol and urea level in diabetic rats.

2.5 *Ficus bengalensis* (family-Urticaceae)

It is commonly known as Banyan tree or Bargad tree. It is very large tree sending down many aerial roots from the main trunk and large branches which descend to the soil. In modern times its antidiabetic properties have been investigated by Chopra and Chopra (1955), Aiman *et al* (1958), Shrotri and Aiman (1960), Deshmukh (1960), Joglekar *et al* (1962), Brahmchari and Augsti (1961, 1964), investigated the effect of alcoholic extract of

Ficus bengalensis stem bark on pancreatic islets of alloxan induced diabetic albino rats. The extract lowered the blood sugar by 18 to 71% after 8 to 30 day treatment. With decrease in blood sugar level cell of islet of Langerhans also showed granulation and improvement. The β cell granulation remained unaffected even after discontinuation of extract feeding. The blood glucose once lowered by the treatment remained static even after discontinuation of drug for 15 days.

3. synthetic drugs versus herbal medicine

Oral hypoglycemic drugs are used only in the treatment of type 2 diabetes which is a disorder involving resistance to secreted insulin. Type 1 diabetes involves lack of insulin and requires insulin for treatment. There are now four classes of hypoglycemic drugs: These drugs are approved for use only in patients with type 2 diabetes and are used in patients who have not responded to diet, weight reduction, and exercise. They are not approved for the treatment of women who are pregnant with diabetes. Herbs have been used for healing purposes and to promote wellness since from the ancient times and are not categorized as medicines but treated as food since they are natural products. Nowadays, herbal medicines, health and dietary supplements are flooding the markets. The use in the right way provides effective and safe treatment for many ailments and the effectiveness is mostly subjective to the patient. The potency varies based on the genetic variation, growing conditions, timing and method of harvesting, exposure to air, light, moisture, and type of preservation of the herbs.

Herbal medicines can be used for healing purposes and to promote wellness and are not addictive or habit forming, but are powerful nutritional agents that support the body naturally. They promote health and serve as excellent healing agents without side effects. Chinese herbs are taken as tonics to enhance physical and mental well-being and can nourish the body's deepest and most basic elements. They are also safe and effective for health, healing, weight loss/gain/maintenance. Herbal medicines are great body balancers that help regulate body functions, can be used to support balance process of our body and offer the nutrients that the body fails to receive due to poor diet or environmental deficiencies in the soil and air. They can be used to treat many diseases such as diabetes, asthma, eczema, premenstrual syndrome, rheumatoid arthritis, migraine, menopausal symptoms, chronic fatigue, and irritable bowel syndrome, etc., and can be used for maintaining general health. Herbal preparations are best when taken under the guidance of a trained professional. When used correctly, herbal medicines are considered safer than conventional medications. People are greatly concerned about the efficacy and side effects of many synthetic drugs, and hence choose herbal medicines for

providing a safe and natural alternative treatment for many health problems. The use is widespread and growing, In fact, herbs are always the alternative medicine and primary source. The advantages of using herbal medicines are numerous. They tend to be more effective for long-standing health complaints that don't respond well to traditional medicine. Herbs typically have fewer side effects, and may be safer to use over time.

CONCLUSION

Diabetes is a serious metabolic disorder. Differences in social structure, psychic stress, obesity, hormonal imbalance and heredity are optimizing the growth of pandemic. At present, the treatment of diabetes mainly involves a sustained reduction in hyperglycemia by the use of biguanides, thiazolidinediones, sulphonylureas, D-phenylalanine derivatives, meglitinides and α -glucosidase inhibitors in addition to insulin. However, due to unwanted side effects the efficacies of these compounds are debatable and there is a demand for new compounds for the treatment of diabetes (Moller, 2001). Hence, plants have been suggested as a rich, as yet unexplored source of potentially useful antidiabetic drugs. However, only a few have been subjected to detailed scientific investigation due to a lack of mechanism-based available in vitro assays (Oubre *et al*, 1997, Habeck, 2003). These efforts may provide treatment for all and justify the role of novel traditional medicinal plants having anti-diabetic potentials. Undoubtedly plants have many molecules, which have yet to be discovered. From the beginning of the 20th century, the subject had developed mainly on botanical side being concerned with history, identification, collection and evaluation of medicinal plants. This has open many research opportunities to biotechnologists and pharmacognosists ranging from characterizing biologically active principles, designing suitable analytical methods for quality control and standardization of plant based anti-diabetic drugs.

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Source of Support: None Declared
Conflict of Interest: None Declared