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A REVIEW ON THE DIABETES AND ANTI-DIABETIC PLANTS

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Abstract

Diabetes mellitus (DM), both insulin-dependent (IDDM) and non-insulin-dependent (NIDDM) DM, is a globally widespread and extreme metabolic condition. Orthodox plant therapies have been used for the treatment of diabetes mellitus in the world. Several herbs have been recognized to treat and regulate diabetes, among many drugs and other alternative medicines; they also have no side effects. This paper is an attempt to list plants originating from various parts of the world with anti-diabetic and associated beneficial effects. History has shown that medicinal plants have long been used in traditional medicine around the world to treat diabetes; this is because, as stated in scientific literature, certain herbal plants have hypoglycemic properties and other beneficial properties. This analysis identifies 136 such plants, clearly showing the value of herbal plants in the treatment of diabetes mellitus. The effects of these plants will delay the development of diabetic complications and provide a rich source of antioxidants that are known to prevent or delay various states of disease.

Keywords: *Diabetes, Blood sugar, Orthodox plant, Herbal plants, Metabolic disorder.*

I. INTRODUCTION

Diabetes mellitus is a common and very prevalent illness that affects both developed and developing countries' people. 25 percent of the global population is estimated to be affected by this disease. Diabetes mellitus is caused by a carbohydrate metabolism abnormality associated with a low level of blood insulin or insensitivity of the target organs to insulin [1]. Despite substantial success in the treatment of diabetes with oral hypoglycemic agents, the quest for newer medications continues since there are many drawbacks to current synthetic drugs. Herbal drugs with antidiabetic efficacy, although they have been recognized for their therapeutic properties in the conventional systems of medicine [2], have not yet been commercially developed as modern medicines. As several plants and plant-derived substances have been used in the treatment of diabetes, plants provide a possible source of hypoglycemic drugs.

For their beneficial use in various forms of diabetes, several Indian plants have been studied and reports are published in numerous scientific journals. A variety of plants used as herbal

medicines are listed in Ayurveda and other traditional diabetes treatment systems. As an alternative medication, therefore, they play an important role because of less side effects and low cost. It has been stated that the active principles present in medicinal plants possess pancreatic beta cells that regenerate, release insulin and combat the problem of insulin resistance. The etiology of the occurrence of diabetic complications includes hyperglycemia. Hypoglycemic herbs increase the secretion of insulin, increase the absorption of glucose by adipose or muscle tissues, and prevent the absorption of glucose from the intestine and the production of liver glucose [3]. The key players in the management are still insulin and oral hypoglycemic agents such as sulphonylureas and biguanides, but there is a quest to create more effective anti-diabetic agents.

II. MEDICINAL PLANTS WITH ANTIDIABETIC PROPERTIES

1. *Abelmoschus moschatus Medik (Malvaceae)*

It is a medicinal, aromatic plant native to India. Myricelin, an active A-principle. Moschatus, through enhanced post-receptor insulin signaling mediated by enhancements in IRS-1-associated PI3-kinase and GLUT for production in the muscles of obese sugar rats, enhances insulin sensitivity. Myricetin can be used as a model substance for the development of antidiabetic substances

2. *Acacia arabica (Lam) Wild. (Mimosaceae)*

It is found in India. By acting as a secret agent for releasing insulin, the plant extract acts as an antidiabetic agent. It causes hypoglycemia in control rats, but not in animals with alloxanization. Seeds of powdered A. Arabica causes hypoglycemic symptoms when administered (2, 3 and 4 g/kg body weight) to normal rabbits by inducing insulin release from pancreatic beta cells.

3. *Achyranthes aspera L (Amaranthaceae)*

It is spread all over the tropical globe. Oral administration with A. Aspera powder causes a major hypoglycemic dose-related effect in both normal and diabetic rabbits. Blood glucose levels in normal and alloxan diabetic rabbits are also lowered by water and methanol extracts. At dosages up to 8 g/kg orally, the acute toxicity analysis in rabbits does not show any harmful or side effects of this folk medicine. By supplying the beta-cells with some essential elements such as calcium, zinc, magnesium, manganese and copper, the plant could act.

4. *Achyrocline satureioides (Less) DC (Asteraceae)*

It is the emblem of a medicinal plant in the state of Rio Grande do Sul in Brazil. Achyrofuran, a new prenylated dibenzofuran, is a compound derived from A. Satureioides significantly decreased blood glucose levels by 20 mg/kg q.d when administered orally [4]. Aqueous extract of the aerial components of A. Satureioids administered prior to bromobenzene (BB) at a dosage of 300 mg/kg inhibited liver ALT and AST increases, while the liver caused by BB

showed an increase in the content of thiobarbituric acid reacting substances (TBARS). The depleted levels of liver glutathione and bile flow in rats are also substantially rising. In addition, a substantial increase in bile flow from rats was observed at the same dosage. The results of the aqueous extract of A. were obtained. Satureioides support its use as a hepatoprotective and digestive agent in common medicine, and the effects may be mediated by the antioxidant and choleretic activities.

5. *Agrimony eupatoria L. (agrimony) (Rosaceae)*

Agrimony, which counters weight loss, polydipsia, hyperphagia and hyperglycemia of STZ-diabetic mice when introduced into the diet (62.5 g/kg) and drinking water (2.5 g/L). Aqueous extract (1mg/mL) induces the secretion of insulin from the BRIN-BDII pancreatic B-cell line, the transport of 2-deoxy-glucose, the oxidation of glucose and the integration of glucose into glycogen in the abdominal muscle of the mouse, comparable to 0.1μM-insulin. The presence of anti-hyperglycemic, insulin-releasing and insulin-like activity in A. Eupatoria is demonstrated in these findings.

6. *Allium cepa L. (onion): (Liliaceae)*

Allium cepa is known only for cultivation, but in Central Asia there are similar wild species. In diabetic rabbits, various ether soluble fractions as well as insoluble fractions of dried onion powder show anti-hyperglycemic activity. A. Cepa is also known to be involved in antioxidants and hypolipidemics. Administration of amino acid-containing sulfur S-methyl cysteine sulphoxide (SMCS) (200 mg/kg for 45 days) to alloxan-induced diabetic rats with substantially regulated serum and tissue blood glucose and lipids. It normalizes liver hexokinase, glucose 6-phosphatase and HMG Co A reductase activities [5][6]. Post-prandial glucose levels were dramatically controlled when diabetic patients were given a single oral dose of 50 g of onion juice.

7. *Artemisia herba-alba Asso (Med).(Asteraceae)*

It is a perennial shrub that typically grows in the steppes of Northern Africa, Western Asia, the Arabian Peninsula and Southwestern Europe. Oral administration of 0.39 g/kg body weight of an aqueous leaf or bark extract results in a substantial decrease in the level of blood glucose, while aqueous root extract and methanolic extract of an aerial portion of a plant show almost no decrease in the level of blood glucose. The extract of the plant's aerial parts tends to have limited negative effects and a high LD50 value.

8. *Artemisia dracunculus L. (Asteraceae)*

"Commonly referred to as "dragon herb". From easternmost Europe across central and eastern Asia to India, western North America, and south to northern Mexico, it is native to a large region of the Northern Hemisphere. The hypoglycemic activity of the extract increases 3-5-fold with the bio-enhancer Labrasol at doses of 50-500rag/kg/day, making it equivalent to the activity of the antidiabetic medication metformin [7]. Ethanolic extract, Tarralin, decreases

elevated blood glucose levels by 24 percent compared to control animals. The extract also enhances the binding to its receptor in vitro of the glucagon-like peptide. These findings suggest that tarralin has antihyperglycemic activity and plays a potential role in diabetic status management.

9. *Ocimum sanctum L. (Lamiaceae)*

It is popularly referred to as Tulsi. This plant has been renowned for its medicinal properties since ancient times. The aqueous leaf extract shows a substantial decrease in the amount of blood sugar in both normal and alloxane-induced diabetic rats [8]. Hypoglycemic and hypolipidemic effects of tulsi in diabetic rats have shown to be important reductions in fasting blood glucose, uronic acid, total amino acid, total cholesterol, triglyceride, and total lipid [9]. Oral administration of plant extract (200 mg/kg) for 30 days results in a reduction in the level of plasma glucose. In diabetic rats, the content of renal glycogen increases 10 times, while the level of skeletal muscle and hepatic glycogen decreases by 68 and 75 percent, respectively, compared to control [10]. This plant also demonstrates the activities of antioxidants, antibacterial, antifungal, antiviral, antiasthemitic, antistress, antitumor, gastric antiulcer, antimutagenic and immunostimulant.

Use of Synthetic Drugs and Herbal Medicine:

Only in the treatment of type 2 diabetes, which is a condition requiring resistance to secreted insulin, are oral hypoglycemic drugs included. Type 1 diabetes entails insulin deficiency and requires insulin for therapy. Four classes of hypoglycemic drugs are now available: These drugs are only licensed for use in patients with type 2 diabetes and are used in patients who have not adapted to diet, weight loss and exercise. They are not licensed for the care of women with diabetes who are pregnant. Sulfonylureas are the medicines most commonly used to treat type 2 diabetes and tend to operate by inducing the secretion of insulin. The net effect is increased responsiveness to both glucose and non-glucose secretagogues of ß-cells (insulin secreting cells located in the pancreas), resulting in the release of more insulin at all blood glucose concentrations. Sulfonylureas can also have extra-pancreatic effects, one of which is to improve tissue insulin sensitivity, although these effects are of limited clinical significance.

Since ancient times, herbs have been used for medicinal purposes and to encourage well-being and are not listed as medicines, but considered as food since they are natural products. Herbal drugs, health and dietary supplements are entering the markets nowadays. For several ailments, the use of the correct way offers efficient and safe care and the efficacy is largely subjective to the patient. The potency varies depending on the genetic variation, growing conditions, harvesting timing and process, air exposure, light, humidity, and herb preservation type. Herbal medicines can be used for healing and encouraging health purposes and are not addictive or habit-forming, but are strong nutritional agents that naturally benefit the body. They encourage wellbeing and, without side effects, act as excellent healing agents. To boost physical and mental well-being, Chinese herbs are taken as tonics and can nourish the deepest and most

essential elements of the body. They are also safe for wellbeing, healing, weight loss/gain/maintenance, and effective.

III. CONCLUSION

A severe metabolic condition is diabetes. Pandemic development is optimized by variations in social structure, psychological stress, obesity, hormonal imbalance and inheritance. Via the use of biguanides, thiazolidinediones, sulphonylureas, D-phenylalanine derivatives, meglitinides, and alpha-glucosidase inhibitors in addition to insulin, diabetes management usually primarily includes a sustained reduction in hyperglycemia. However, the effectiveness of these compounds is debatable due to unintended side effects and there is a need for new diabetes treatment compounds. Therefore, as a rich, as yet unexplored source of potentially useful antidiabetic drugs, plants have been suggested. However, due to a lack of mechanism-based in vitro assays available, only a few have been subjected to thorough scientific investigation. These initiatives will provide care for all and justify the role of new conventional plants with anti-diabetic potential as medicinal plants.

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