



ISSN: 0974-3030

Journal of Mountain Research

(A Peer Reviewed Journal of Society for Himalayan Action Research and Development)

HEALING HERBS IN DIABETES

ANKITA PATHAK AND REKHA NAITHANI

Department of Home Science, H.N.B Garhwal (A Central University), BGR Campus, Pauri (Garhwal),
Uttarakhand India-246001

Email: ankita.nutrition@gmail.com

Manuscript Info

Abstract

Manuscript History

Received: 10.11.2016

Revised: 15.11.2016

Accepted: 25.12.2016

Key words:

Medicinal Plant, Metabolic Disorder, Antidiabetic, Antioxidant, Diabetes

“Use Plants to bring Life”

Traditional Medicines derived from medicinal plants are being used by about 60% of the world's population. This review concentrates on Indian Herbal drugs and plants utilized in the treatment of diabetes, especially in India. Diabetes is a critical metabolic disorder afflicting many from various walks of life in several countries. In India it is proving to be a major health problem, particularly in the metropolitan areas. Though there are many ways to reduce the ill results of diabetes and its secondary complications, herbal preparations are preferred due to lesser side effects and low cost. A set of medicinal plants with proven antidiabetic and related benefits and of herbal drugs utilized in treatment of diabetes is compiled. These include Aloe vera, Neem, Cinnamon, onion, Indian gooseberry, bitter gourd, ivy gourd, holy basil, fenugreek, and Rennet (Ashwagandha) etc. One of the etiologic factors implicated in the development of diabetes and related complications induced by free radical and therefore an antidiabetic substance with antioxidant properties would be a little more beneficial. Therefore information on antioxidant effects of these medicinal plants is also included.

INTRODUCTION:

Within last few years there has been an exponential growth in the field of herbal treatments and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. Many traditional drugs used are derived from healing plants, minerals and organic matter¹. A number of medicinal crops, traditionally used for more than one thousand years named rasayana are present in herbal formulations of Indian traditional medical care systems². In Indian systems of medication most practitioners formulate and dispense their own recipes. The World Health Organization (WHO) has listed 21, 000 plants, which are listed for medicinal purposes throughout the world. Amongst these 2500 species are in India, out of which 150 species are being used commercially on a quite large scale. India is the most significant producer of medicinal herbs and is called as botanical

garden of the world³. The current review concentrates on herbal drug formulations and plants used in the treatment of diabetes mellitus, a crippling disorder in the world leading to huge monetary losses.

DIABETES AND SIGNIFICANCE:

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. Studies conducted in India within the last ten years have highlighted not only is the prevalence of diabetes high but also that it is increasing rapidly in the urban population⁴. Roughly, there are approximately 33.0 million adults with diabetes in India. This number is likely to increase to 57.2 million by 2025.

Diabetes mellitus is a complicated metabolic disorder as a result of either insulin insufficiency or insulin dysfunction. Type I diabetes (insulin dependent) is triggered due to insulin deficiency because of insufficient functioning of β cells. Patients battling from this are therefore totally dependent on exogenous supply of insulin while patients affected by Type II diabetes (insulin independent) are not able to respond to insulin and can be cured with dietary changes, exercise and medication. Type 2 diabetes is lot more common form of diabetes constituting 90% of the diabetetic population. Symptoms for both diabetetic conditions might include: (i) high levels of glucose in the blood; (ii) unusual thirst; (iii) frequent urination; (iv) extreme hunger and loss of weight; (v) blurred vision; (vi) nausea and vomiting; (vii) extreme weakness and fatigue; (viii) irritation, mood swings etc.

Though pathophysiology of diabetes remains to be fully understood, experimental evidences suggest the involvement of free radicals in the pathogenesis of diabetes⁵ and even more significantly in the development of diabetic complications⁶⁻⁸. Free radicals can damage cellular compounds, DNA, proteins and fats leading to altered cellular functions. Many recent studies reveal that antioxidants can neutralize free radicles are effective in preventing experimentally induced diabetes in animal models as well as reducing the intensity of diabetic coplications⁹⁻¹⁰.

For the development of diabetic complications, the abnormalities produced in fats and proteins are the major etiologic factors. In diabetics, extra-cellular and long lived proteins, such as elastin, laminin, collagen are the major targets of free radicals. These proteins are modified to form glycoproteins due to hyperglycemia. The modification of these proteins present in tissues such as lens, vascular wall and basement membranes are associated with the development of complications of diabetes such as cataracts, microangiopathy, atherosclerosis and nephropathy¹¹. During diabetes, lipoproteins are oxidized by free radicals. There are also multiple abnormalities of lipoprotein metabolism in very low density lipoprotein (VLDL), low density lipoprotein (LDL), and high density lipoprotein (HDL) in diabetes¹²⁻¹³.

As diabetes is a multifactorial disease bringing about several complications, and therefore demands a multiple therapeutic approach. Patients of diabetes either do not make enough insulin or their cells do not respond to insulin. In total absence of insulin, patients are given insulin injections. Whereas in the case of those where cells do not respond to insulin various drugs are developed considering possible disturbances in carbohydrate-metabolism. For example, to manage post-prandial hyper-glycaemia at digestive level, glucosidase blockers such as acarbose, miglitol and voglibose are being used. These inhibit wreckage of carbohydrates thereby minimizing the glucose absorption by the cells. To improve glucose uptake by peripheral cells biguanide such as metformine can be used. Although several therapies are being used

for treatment, there are certain limitations due to high cost and side results such as progressive hypoglycemia, weight gain, gastrointestinal disorders, liver toxicity etc¹⁴.

Medicinal plants are being looked up once again for the treatment of diabetes. Many conventional drugs have been produced from prototypic molecules in medicinal plants.

Indian Medicinal Plants with Antidiabetic and Related Beneficial Effects

There are many herbal remedies suggested for diabetes and diabetic complications. Medicinal plants form the main ingredients of these formulations. A list of medicinal plants with antidiabetic and related beneficial effects is given in following Table 1¹⁵.

Table 1 Medicinal Plants and their benefits:

Latin Name	Common Name	Uses
<i>Aegle marmelos</i>	Bael Tree, Bengal Quince Bael, Belgin	Diabetes, jaundice, cholera and asthma (leaves); tonic, coolant with antibiotic properties (leaves, fruits and root); fruit valuable for its rich nutritive, sweet, aromatic mucilage and pectin contents – very good for all kinds of stomach disorders; root bark given in case of poverty of seminal fluid, palpitation of heart and melancholia; other properties described under Refreshing Herbs
<i>Alpinia galangal</i>	Greater Galangal, Siamese Ginger, Barakalijan, Kulinjan	Aromatic rhizomes recommended for the treatment of diabetes; described under Aphrodisiac Herbs
<i>Aloe barbadensis</i>	Aloe vera	Extracts of aloe gum effectively increases glucose tolerance. This action of Aloe vera and its bitter principle is through stimulation of synthesis and/or release of insulin from pancreatic beta cells. This plant also has an anti-inflammatory activity in a dose dependent manner and improves wound healing .
<i>Azadirachta indica:</i>	Neem	Hydroalcoholic extracts of this plant shas anti-hyperglycemic activity and this effect is because of increase in glucose uptake and glycogen deposition. Apart from having anti-diabetic activity, this plant also has anti-bacterial, antimalarial, antifertility, hepatoprotective and antioxidant effects.
<i>Borassus flabellifer</i>	Palmyra Palm, Desert Palm, Tad, Tal	Fresh, sweetish juice obtained from cuts made in the flowering stalk is given in diabetes after slight fermentation; other properties described under Refreshing Herbs
<i>Butea monosperma</i>	Bengal Kino, Flame of the Forest, Dhak	Leaves, flowers and seed anti-diabetic, diuretic, tonic, and aphrodisiac; they induce fall in the amount of blood-sugar

		and so are given for the treatment of glycosuria; kino (resinous gum) is aphrodisiac and also used in medicines for throat troubles; kino is secreted in cavities between the wood and bark, and oozes out after incisions have been made; in the air the resin hardens into a solid reddish mass
<i>Cassia auriculata</i>	Tanner's Cassia, Avari, Tangedu, Taroda	This plant is given in diabetes with excellent results; flower buds are specially preferred; decoction of the flowers, flower buds and seed is an excellent remedy for diabetes;
<i>Cassia sophera</i>	Senna Sophera, Banar, Bas-ki-kasuda, Kasaundi	Infusion of bark and powdered seeds with honey are good remedy for diabetes; also aphrodisiac tonic, blood purifier and throat cleanser
<i>Ceiba pentandra</i>	Kapok Tree, White Cotton Tree, Safed Samel	Juice of roots (stimulant, tonic) is highly valued as a cure for diabetes; described under Aphrodisiac Herbs
<i>Ficus benghalensis</i>	Banyan Tree, Bargat	Infusion of bark in water (1:10) is a specific remedy for diabetes, as it reduces blood sugar
<i>Ficus glomerata</i>	Fig Tree, Gular	Bark and fruits (figs) taken with honey are very useful in diabetes; pulverized seeds mixed with honey are a specific remedy for diabetes
<i>Momordica charantia</i>	Bitter gourd, Bitter melon, Karela	Leaves and fruits anti-diabetic, blood purifier and hypoglycaemic; bitter melon increases the number of beta cells by the pancreas, thereby improving the body's ability to produce insulin; three different groups of constituents in bitter melon have been reported to have hypoglycemic, blood sugar lowering actions of potential benefit in diabetes mellitus; these include a mixture of steroidal saponins know as charantin, insulin-like peptides, and alkaloids. The bitter melon improves glucose tolerance in Type II diabetes patients; active constituents oleanolic acid glycosides, Momordins prevent absorption of sugar from the intestine.
<i>Phyllanthus emblica</i> (= <i>Emblica officinalis</i>)	Emblic Myrobalan, Amla, Amlaki	Fruits and seeds very useful in diabetes; described under General Tonic Herbs
<i>Ocimum sanctum</i> :	Holy basil, tulsi	Significant reduction in fasting blood glucose, uronic acid, total amino acid, total cholesterol, triglyceride and total lipid indicated the hypoglycemic and hypolipidemic effects of tulsi. This plant also showed antiasthemitic, antistress,

		antibacterial, antifungal, antiviral, antitumor, gastric antiulcer activity, antioxidant, antimutagenic and immunostimulant activities
<i>Syzygium cumini</i>	Black Plum, Indian Blackberry, Jamun, Jambolan	Fresh or dried powdered seeds most effective in diabetes mellitus and glycosuria; they quickly reduce sugar in urine, liquid extract from fresh seeds is particularly suitable; mixture of Jamun fruit juice + mango juice (1:1) is a very effective drink for quenching thirst in diabetes; nutritious edible fruit cures cancer, anaemia and is diuretic, tonic
<i>Terminalia chebula</i>	Chebulic / black myroblan, Harada	Fruits anti-diabetic, alterative, tonic for anaemia, antibilious; stimulates liver activity; mild, safe and an efficient laxative to cure all digestive disorders; bark is useful as cardiac tonic, raises blood pressure, and as an effective diuretic
<i>Trigonella foenum-graceum</i>	Fenugreek, Methi	Water-soaked seeds are useful to treat diabetes; described under General Tonic Herbs

(Source: <http://www.mediherbs-india.com>)

OTHER ANTI-DIABETIC HERBS:

- *Acacia arabica* (Babul): Stem bark and gum cure diabetes; described under General Tonic Herbs
- *Catheranthus roseum* (Periwinkle): Leaves- anti-diabetic; described under Anti-cancer Herbs
- *Strychnos nux-vomica* (nux-vomica): seeds controls diabetes; described under General Tonic ¹⁶

CONCLUSION:

To prevent diabetes related morbidity and mortality, there is an immense need of dedicated self-care behaviors in multiple domains, including food choices, physical activity, proper medications intake and blood glucose monitoring from the patients. Realizing the multi-faceted nature of the problem, a systematic, multi-pronged and an integrated approach is required for promoting self-care practices among diabetic patients to avert any long-term complications.

Thus many different plants have been used individually or in formulations for treatment of diabetes and its complications. One of the major problems with this herbal formulation is that the active ingredients are not well defined. It is important to know the active component and their molecular interaction, which will help to analyze therapeutic efficacy of the product and also to standardize the product. Major hindrance in amalgamation of herbal remedies in modern medical procedures is lack of scientific and clinical data indicating their efficacy and basic safety. There is a requirement of executing clinical research in herbal drugs, developing simple bioassays for biological standardization, medicinal and toxicological evaluation, and developing various animal models for toxicity and safe evaluation.

REFERENCES:

1. Grovr J.K., Yadav S., Vats V. (2002). Medicinal plants of India with antidiabetic potential. J. Ethnopharmacol.81:81-100.
2. Scartezzini P., Sproni E. (2000). Review on some plants of Indian traditional medicine with antioxidant activity. J. Ethnopharmacol. 71:23-43.
3. Seth S.D., Sharma B. (2004). Medicinal plants of India. Indian J. Med. Res. 120:9-11.
4. Ramachandran A., Snehalatha C., Viswanathan V. (2002). Burden of type 2 diabetes and its complications- the Indian scenario. Curr. Sci., 83:1471-1476.
5. Matteucci E., Giampietro O. (2000). Oxidative stress in families of type 1 diabetic patients. Diabetes Care., 23:1182-1186.
6. Oberlay L.W. (1988). Free radicals and diabetes. Free Radic. Biol. Med. 5:113-124.
7. Baynes J.W., Thorpe S.R. (1997). The role of oxidative stress in diabetic complications. Curr. Opin. Endocrinol., 3:277-284.
8. Lipinski B. (2001). Pathophysiology of oxidative stress in diabetes mellitus. J. Diabet. Complications., 15:203-210.
9. Kubish H.M., Vang J., Bray T.M., Phillips J.P. (1997). Targeted over expression of Cu/Zn superoxide dismutase protects pancreatic beta cells against oxidative stress. Diabetes.,46:1563-1566.
10. Naziroglu M., Cay M. (2001). Protective role of intraperitoneally administered vitamin E and selenium on the oxidative defense mechanisms in rats with diabetes induced by streptozotocin. Biol. Stress Elem. Res. 47:475-488.
11. Glugliano D., Ceriello A., Paolisso G. (1996). Oxidative stress and diabetic vascular complications. Diabet. Care. 19:257-267.
12. Brownlee M. (1996). Advanced protein glycosylation in diabetes in diabetes and ageing. Ann. Rev. Med., 46:223-234.
13. Elgawish A., Glomb M., Friendlander M., Monnier V.M. (1999). Involvement of hydrogen peroxide in collagen cross-linking by high glucose *in vitro* and *in vivo*. J. Biol. Chem., 271:12964-12971.
14. Dey L., Anoja S.A., Yuan C-S. (2002). Alternative therapies for type 2 diabetes. Alternative Med. Rev. 7:45-58.
15. Dixit P.P., Londhe J.S., Ghaskadbi S.S., Devasagayam T.P.A. (2006). In: Antidiabetic and related beneficial properties of Indian medicinal plants, *in Herbal Drug Research- A twenty first century perspective*. Sharma R.K., Arora R., editors. Jaypee brothers medical publishers (New Delhi, India) Limited: 377-386.
16. <http://www.mediherbs-india.com/Anti-Diabetes%20herbs.htm>
