

Review on Medicinal Herbs Used for Diabetes

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ABSTRACT

In the last few years, there has been an exponential in the field of herbal medicine and gaining popularity both in developing and developed countries because of their natural origin and less side effect. A comprehensive review was conducted to pile up information about medicinal plants used for the treatment of diabetes mellitus. It is a metabolic disorder of the endocrine system and affecting nearly 10% of population all over the world also the number of those affected is increasing day to day. Medicinal plant used to treat diabetic condition are of considerable interest and a number of plant have shown varying degrees of hypoglycemic and anti-hyperglycemic activity. The wealth of tribal knowledge on medicinal plant point to great potential for research and the discovery of new drugs to fight diseases including diabetes, obtaining new foods and other new uses. There are lots of chemical agents available to control and to treat diabetic patients, but total recovery from diabetes has not been reported up to this date. Several medicinal plants have been investigated for their beneficial use in different types of diabetes. A considerable number of plants were subjected to clinical trials and were found effective. Moreover, during the past few years many phytoconstituent responsible for anti-diabetic effect have been isolated from hypoglycemic plants. This paper focus mainly on diabetes, plants used as anti-diabetic in various traditional medicines, constituents isolated from these plants, various mechanism through which herbs act against diabetes and few examples of anti-diabetic formulation available in the market.

Keywords: hypoglycemic, anti-hyperglycemic, traditional medicines

INTRODUCTION

In recent year, there has been renewed interest in the treatment against different disease using herbal drugs as they are generally non-toxic and World Health Organization has also recommended then evaluation of the effective of plants in condition where we lack safe modern drugs. Plant derivatives with hypoglycemic properties have been used in folk medicine and traditional healing system around the world from very ancient time. In traditional medicine diabetes mellitus is treated with diet, physical exercise and medicinal plants, even though, more than 1200 plants are used around the world in the control diabetes mellitus and approximately 30% of the traditional used antidiabetic plants were pharmacologically and chemically invested (Alarcon-Aguilar et al.,2002). As per the ethnobotanical literature phytotherapy of Indian medicinal plants. the species like *Asparagus racemosus*, *Butea monosperma*, *Catharanthus roseus*, *Coccinia indica*, *Gymnema sylvestre*, *Syzygium cumini* and *Momordica charantia* are consistently used by the communities for the treatment of diabetes as well as in modern medicine. The present study was performed with the aim of producing an inventory of plants used by traditional healers in southern western Ghats of Tamil Nadu to treat diabetes.

Ayurvedic and the unani, born are practiced more in the eastern continent. These traditions are still flourishing, since; approximately 80% of the people in the developing countries rely on these system of medicine for their

primary health care need. These plants contain substance that can be used for therapeutic purpose, of which are precursors for synthesis of drug. A lot of research work has been carried out on some medicinal herbs and they have been found to have definite action on the nervous, circulatory, respiratory, digestive and urinary system; as well as sexual organ, the skin, vision, bearing and taste. A diabetes mellitus is group of metabolic alteration characterized by hyperglycemia resulting from defect in insulin secretion, action or both. Its made up of two type: Type I and Type II. Type I diabetes often referred to as juvenile diabetes, is insulin dependant and known to affect 5% of the diabetic population. The Type II which is insulin non-insulin dependent, usually develop in adults over the age of 40. Its has already been established that chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and eventually the failure of organ, especially the eyes, kidney, nerves, heart and blood vessels. Its hasan adverse effect on carbohydrate, lipid and protein metabolism resulting in chronic hyperglycemia of abnormality of lipid profile.

There are more than 30 million of people with diabetes mellitus in India and the incidence is increasing. Patient with diabetes experience significance morbidity and mortality from micro vascular (Retinopathy, neuropathy, nephropathy) and macro vascular (heart attack, stroke and peripheral vascular disease). The cost of treating diabetes and associated complication exceed \$ 100 billion per year. The complication are far common and less severe in

people who have well-controlled blood sugar level. Acute complication include diabetes keto acidosis. In case of chronic complication, chronic elevation of blood glucose level leads to damage to blood vessels. In diabetes the resultant problem are grouped under "micro vascular disease" (due to damage to small blood vessels) and "micro vascular disease" (due to damage to arteries).

Study area and ethnic people

southern western Ghats of Maharashtra occupy the forest of with rich vegetarian and lies between the longitudes 77° 5' - 77° 40' E and latitude 8° 50' - 8° 50' N. These hill are characterized by numerous fold and extension engulfing small, narrow valley and elevation varies from 50 to 1869 m. These are two reserve forest Grizzled Giant Squirrel Sanctuary. The information was gathered from the two distinct indigenous people inhabiting the southern western Ghats of Maharashtra oldest group of the branch of ethnic group in India. However, modern way of living condition of these aboriginal communities at present seems to endanger the transmission of their traditional knowledge including medicinal plants uses, to future generations.

METHODOLOGY

Frequent field surveys were carried out in southern western Ghats of Maharashtra during January 2017 to March 2017. The information got from tribal was recorded in fields notebook and the voucher specimens were deposited in the herbarium at Kasturi Shikshan Sanstha's College Of Pharmacy, Shikrapur.

RESULTS AND DISCUSSION

Herbal medicine prescribed by tribal healer are either preparation based on single plant part or a combination of several plant parts. Always they prepare medicine to treat diabetes in the combination of more number of plants. They believe that combination of several plants parts cure disease rapidly. To improve the acceptability of certain remedies that are taken orally some additives re frequently used. Before starting the condition of the patients is observed deeply and then the prepared medicine are given to treat diabetes. Most of plants cited by kani tribal are widely used by the other tribal in Maharashtra.

Enumeration of Antidiabetic plants

Abrus precatorius L. (Fabaceae). Local Name: Kundumani. The plants is a climber commonly known as Wild Liquorice and found the plains of India. Leaf of this plants is mixed with the leaves of *Andrographis paniculata*, *Gymnema sylvestre* and seed of *Syzygium cumini*. The mixture is shade dried and ground into powder and taken orally along with cow's milk. Dosage: About 50ml of mixture is taken orally twice a day before food for 120 days.

Andrographis lineate wallichex Nees (Acanthaceae). Local Name: Siriya nangai. The plats is annual herb found in the hedgerows throughout the plains in India and commonly cultivated in gardens. Leaf is shade dried, powdered and taken orally along with cow's or goat's

milk. Dosage: 2 teaspoonof powder is taken twice a day after food for 2-3 month.

Andrographis paniculata (burm.f.) Wall. Nees Acanthaceae).

Local Name: periya nangai. The plant is annual herb (commonly known as king of Bitters) found in the hedgerows throughtout thae plains in India and cultivated in garden. Leaf is shade dried, powdered and mixed with boiled rice and cow's milk and taken orally. Dosage :50ml of mixture is taken thrice a day food for 120days.

Canthium parviflorum Lam (Rubiaceae). Local Name: Periya nangai. The plants is annual herbs (Commonly known as king of bitters) found in the hedgerows throughout the plain in India and cultivated in garden. Leaf is shade dried, powdered and mixed with boiled rice and cow's milk and taken orally. Dosage: 50 ml of mixture is taken thrice day after food for 120 days.

Costus speciosus (Koenig.) J. E. Smith (costaceae). Local name: kostak-kilangu. A tuberous fleshy herb, plentifully found in north India and in Ghats the plant is seen in hilly area. Fresh rhizome is ground into paste and taken orally. Dosage 20-25 gram is taken thrice a day after food for 2 month.

Gymnema Sylvester (Retz) R.Br. ex schultes (Asclepiadaceae). Local name: Siru Kurinjan. A climbing shrub commonly found in the plains of central and southern India. Dried leaves are pounded and the fine powder thus obtained is taken orally along with milk. Dosage: About 50 ml is taken twice a day after food for 120 days to treat diabetes.

Memecylon umbellatum Burm. f (Melastomatacea). Local Name: Sakkarai vaambu. A bushy small tree found in the hilly area of western Ghats. Shade dried leaf powder is mixed with cup of water and boiled rice and kept overnight taken orally. Dosage: one teaspoon is taken early in the morning for forty days or until cure.

Momordica charantia L. (Cucurbitaceae). Local Name: Kaattu pagar-kai. The plant is commonly known as bitter guard and has many varites. The plants is climbing shrub and generally cultivated everywhere in India. Unripe fruits are taken orally with food. Dosage: 2-3 fresh unripe fruits are taken at any time per day for 3 month

Syzygium cumini (L.) (Myrataceae). Local Name: Naaval maram. The plant is large tree and commonly known as Jambolan or black plum found throughout the plain. Juice extracted from the leaf is mixed with honey or cow's milk and fresh fruits are taken orally. Dosage: 2 teaspoon of juice is taken a day after food for 3 month. Its one of the significance antidiabetic plant and it has long been reported for its use in many pharmacological activities mainly diabetes. During the last four decades, numerous folk medicine and scientific repots on the anti diabetic effect of this plants have been cited in the literature. Clinical and experimental studies suggest that, different parts of plants especially fruits, seed and sten bark posses promising activity against diabetes mellitus (Mukherjee et al., 2006). *S. cumini* exert a dual effect namely a combination of mechanism of action of sulfonylurea and biguanids and may bring about its hypoglycaemic action

through stimulation of surviving β cells of islets of langerhans to release more insulin (Sagrawat et.,2006).

Wattakaka volubilis (L.F.) Stapf. (Asclepiadaceae) Local Name: Perun-kurinjan. The plant is a fleshy and very large climber found throughout the plains with papery leaves. Leaf powder is taken orally along with cow;s milk. Dosage: 50-75 ml of mixture is taken twice a day food for 90 days.

Need and Scope of Alternative Remedies

Regardless of the type of diabetic, patient are required to control their blood glucose with medication and by adhering to an exercise and a dietary plan. Insulin therapy by injection is given to those with type 1 DM and also to some patient with type 2 DM when oral hypoglycemic drug fail to lower blood glucose. Due to modernization of life style, non-insulin dependent diabetes mellitus is becoming a major health problem in developing countries.

Oral antidiabetic agent exert their effect by various mechanism:

Stimulation of beta cell in the pancreas to produce more insulin (sulfonylureas),

increasing the sensitivity of muscles and other tissue (thiazolidinediones),

decreasing gluconeogenesis by the liver (bigunides), and

delaying the absorption of carbohydrates from the gastrointestinal tract (alpha-glucosidase inhibitor).

Herbal Remedies

As per ancient literature, more than 800 plants are reported to have antidiabetic properties. Ethnopharmacological surveys indicate that more than 1200 plants are used in traditional medicine for their alleged hypoglycemic activity. Medicinal plants, Since time immemorial, have been used in virtually all culter as a source of medicine. A study of ancient India. The knowledge of this system of diabetes mellitus, as the history reveals, existed with the Indian since prehistoric age.

Ayurvedic antidiabetic herb improve digestive power, increasing obne of the rasas (gastric secretion); being laghu, get easily digested in the body; and being Rusha, decrease output of overall body fluid e.g. urine, sweat etc. Food item, which are 'madhumeahghnaa' (antidote), are an important underlying principle of therapy for the prameha (diabetes) patient. Food item which correct the metabolic imbalance by their action e.g. food exhibiting 'rasa', 'katu', 'laghu', 'medaghna', properties are old cereals, roasted cereals, barley, jawar, ragi, mung dal, horsegram, tur dal, drumstick leaves, bittergourd, jamun, amla, fig, raw papaya, milk, meat of animal that live in dry region, etc. The indigenous diet may not be used in lowering the blood sugar to same extent as insulin and other hypoglycaemic agent do.

Mechanism of Action of Herbal Antidiabetics

The anti-diabetic activity of herbs depends upon variety of mechanism. The mechanism of action of herbal anti-diabetic could be grouped as

Adrenomimeticism, pancreatic beta cell potassium channel blocking.

Inhibition in renal glucose reabsorbtion.

Stimulation of insulin seceration from beta cell of islet and inhibition of insulin degradative processes.

Reduction in insulin resistance.

Providing certain necessary elements like calcium, zinc, magnesium, manganese and copper for the beta-cell.

Regenerating and repairing pancreatic beta cells.

Increasing the size and number of cells in the islet of langerhans.

Stimulation of insulin secretion.

Stimulation of glycogenesis and hepatic glycolysis.

Protective effect on the destruction of the beta-cell.

Improvement in digestion along with reduction in blood sugar and urea.

Prevention of pathological conversion of starch to glucose.

Inhibition of β -galactidase and α -glucosidase.

Cortisol lowering activities.

Inhibition of alpha-amylase.

Preventing oxidative stress that is possibly involved in pancreatic β -cell dysfunction found in diabetes.

Hence, the wide range of plant constituents could have different site of action within the body, herbs exert different mechanism of action including the mechanism of action synthetic oral hypoglycemic drugs.

Marketed Products

Today, up to 600 traditional plants medicine has been reported in India for diabetes. Numerous medicinal used in ayurvedic system of medicine for diabetes. These medicine are prescribed in different forms; most commonly used are- choorna, vati, arka, quath, etc. These preparation may contain the aqueous extract or powder of the different parts of plants which are used in the treatment of diabetes. All the antidiabetic formulation available in the market contain 3 to 25 herbs and mainly, used herbs are coccinia indica, *Tragia involucrate*, *G. sylvestre*, *Pterocarpus marsupium*, *T. foenum-graceum*, *Moringa oleifera*, *Eugenia jambolana*, *Tinospora cordifolia*, *Swertia chirayita*, *Momordica charantia*, *Ficus glomerata*, *ficus benghalensis*, *Vinca rosea*, *Mucuna prurita*, *Terminala bellirica*, *Azadirachta tamala*, *Curcuma-sanctum*, *Salacia-oblonga*, *Cassia-auriculata*, *Curcuma-longa*, *Andrograpis paniculata*, *Emblica officinalis* etc. Following are few preparation available in the market for the pretreatment of diabetes that contain drug in powder form or as extracts. Only the name of the herbs added in the preparation are reported, along with these herbs some preparation, may contain animal-derived product and minerals.

Hyponid tablets, *Momordica charantia*, *swertia chirata*, *Melia azadiracta*, *Tinospora cordifolia*, *Gymnema sylvestra*, *Enicostemma litterole*, *Emblica officinalis*, *Eugenia jambolana*, *Cassia auriculata*, *Curcuma longa*.

Mersina capsules, *Gymnema sylvestra*, *Momordica charantia*, *Cassia auriculata*, *Syzigium cumini*, *Phyllanthus emblica*, *Melia azadiracta*, *Trigonella foenum graecum*, *Coccinia indica*, *Tinospora cardifolia*, *Potassi carbonas*.

Herbovedice mahantak churna, *Nai*, *Kadu*, *Kariyatu*, *Kalijeeri*, *Methi*, *Kalumbo*, *Kakach*, *Indrajav*, *Karela*, *Hladi*, *Jeshthimsdha*.

Madhuhari powder, *Gudmar*, *Karela beej*, *Jamun*, *Babool*

Scientifically Validated Antidiabetic Plants

Among the traditional plants used for diabetes, only a small number of these have received scientific and medical evaluation as follow:

Botanical Name	Family
Acacia Arabica	Mimosaceae
Correa Roxb.	Rutaceae
Zizyphus sativa	Rhamnaceae.
Mangifera indica	Anacardiaceae
Euphorbia convulsioides	Euphorbiaceae
Khaya senegalensis	Meliaceae
Vernonia amygdalina	Asreraceae
Fiscus thonnigii	Moraceae
Angeissus leiocarpus	Combretaceae
Gossypium hirsutum	Malvaceae
Vitillarta paradoxa	Sapotaceae
Anacardium occidentale	Anacardiaceae
Anana senegalensis	Anonaceae
Psidium guajava	Myrtaceae
Moringa oleifera	Mringaceae
Azadirachta indica	Meliaceae
Alluvium cepa	Liliaceae
Ctrus medica	Rutaceae
Parkta filicoidea	Mimosaceae
Allium sativum	Liliaceae
Balanites aegyptiaca	Zygophylliaceae
Bauhinia reticulate	Casalpiniaceae

ki chhal, Amba halad, Gudwel, Bilva patra, Neem patra, Shilajeet, Trivang bhasma.

Dianex, *Gymnema sylvestre*, *Eugenia jambolana*, *Momordica charantia*, *Azadirachta indica*, *Cassia auriculata*, *Aegle marmelos*, *Withania somnifera* and *Curcuma longa*,

Diamed, *Azadirachta indica*, *Cassia auriculata* and *Momordica charantia*.

Aavirai kudineer, *Cassia auriculata*, *Cassia fistula*, *Salacia prinoidea*, *Cyperus rotundus*, *Saussurea lappa*, *Eugenia jambolana* and *Terminalia arjuna*

Madhymeha churna, *Azadirachta indica*, *Cassia auriculata*, *Cassia fistula*, *Gymnema sylvestre*, *Eugenia jambolana*, *Eugenia jambolana*, *Zizyphus mauritina*, *Curculigo orchioidea*, *Melochia corchorifolia*, *Michelia cghqampaca*, *Cynodon dactylon*, *Murraya koenigii*, *Acacia catechu*, *Salacia oblonga*, *Momordica charantia*.

Diagon tables, *Eugenia jambolana*, *Andrograpis paniculata*, *Tinospora cordifolia*, *Curcuma longa*, *Berberis aristata*, *Vetiveria zizanoides*, *Strychnos potatorum*, *Moimosa pudica*, *Gymnema sylvestre*.

Glucolev capsule, *Amalika powder*, *Sudha shilajeet*, *Jasa bhasma*, *Methika beej*, *Jambu beej*, *Madhunasini*, *Ashwagandha*.

Glucio-essentials capsules, *Vaccinium myrtillus*, *Gymnema sylvestris*, *Momordica charantia*, *Cinnamomum zeylanicum*, *Trigonella foenum graecum*, *Panax quinque*, *Panax ginseng*, *Visum alba*, *Amorphophallus konjac*, *Hydrastis canadensis*, *Ocimum basilicum*, *Cynara scolymus*, *PKLntago ovate*, *Prfaaffia paniculata*, *Arctostaphylos uva ursi*.

Diasulin, *Cassia auriculata*, *Coccinia indica*, *Curcuma longa*, *Momordica charantia*, *Scop[aria dulcis*, *Gymnema sylvestre*, *Emblica officinalis*, *Syzygium cumini*, *Tinospora cordifolia*, *Trigonella foenum graecum*.

Glucolib, *Eugenia jambolana*, *Gymnema sylvestris*, *Aegle marmelos*, *Melia azadiracta*, *Momordica charantia*, *Enicostema littorale*, *Trigonella foenum graecum*.

Diaveda capsules, *Trigonella foenum graecum*, *Emblica officinalis*, *Curcuma longa*, *Melia azadiracta*, *Gymnema sylvestris*, *Tribulus terrestris*, *Tinospora cordifolia*, *Syzygium cumini*, *Azadieachta indica*, *Terminalia belerica*, *Terminalia chebula*, *Piper nigrum*, *Piper longum*, *Zingiber officinalis*.

Glucocare, *Glyzyrrhiza glabra*, *Asparagus racemosus*, *Pterocarpus marsupium*, *Gymnema sylvestris*, *Momordica charantia*, *Commiphora mukul*.

Glucomp tablets, *Enicostema littorale*, *Phyllanthus niruri*, *Eugenia jambolana*, *Melia azadiracta*, *Terminalia arjuna*, *Asphaltum*, *Aegle marmelos*, *Momordica charantia*.

Glucova, *Pterocarpus marsupium*, *Enicostema littorale*, *Eugenia jambolana*, *Tinospora cordifolia*.

Pancreas tonic, *Tinospora cordifolia*, *Syzygium cumini*, *Melia azadiracta*, *Momordica charantia*, *Gymnema sylvestris*, *Pterocarpus marsupium*, *Aegle marmelos*, *Cinnamomum zeylanicum*.

Tincture of Panchparna, *Coccinia indica*, *Coculus villosus*, *Catharanthus roseus*, *Gymnema sylvestre* and *Momordica charantia*.

DWN-12, *Strychnos potatorum*, *Terminalia chebula*, *Emblica officinalis*, *Terminalia belerica*, *Salacia reticulata*, *Pterocarpus marsupium*, *Piper longum*, *Cosciniun fenestatum*, *Tribulus terrestris*, *Syzygium cumini*, *Rhabdia lyuoies*, *Elettaria cardamom*

CONCLUSION

Herbal therapy for diabetes has been followed all over the world successfully. Herbal are used to manage Type I and Type II diabetes and their complication. The above-mentioned plants have been considered for their possible hypoglycemic action and the research have carried out some preliminary investigation. Scientific validation of several Indian plants species has proved the efficiency of the botanical in reducing the sugar levels. A large number of plants, screened for their anti-diabetes effects, have yielded certain interesting leads as mentioned above, but till to date no plants-based drug has reached such an advanced stage of investigation or development as to substitute or reduce the need for the currently-available oral synthetic drugs. The study of ethno medical system and plants as therapeutic agents is addressing health problem of traditional communities. Among the plants used by traditional healers. Most of the plants been used in folk medicine and traditional healing system around the world from very ancient time. Instead of trying to identify the active components of herbs through massive collection of plants from natural sources, it is better to start investigating the efficacy of the medicine plants based on the traditional healthcare practices by indigenous people.

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