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A REVIEW ON HERBAL ANTIDIABETIC DRUGS

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ABSTRACT

Ayurvedic texts are mentioned this *Vedic shastra* as a science of life. *Ayurveda* mainly targeted lifestyle of human being & mentioned number of drugs on various diseases. Among these disorders, diabetes is a major disorder. Due to which people are suffering alot. Diabetes is a major metabolic disorder. Anti-diabetic drugs from modern science can treat this disease but at the cost of major side effects. Diabetic patients are using the modern drugs at strong doses & these drugs are much costlier. Need of today's era is to use alternate therapies for diabetes. Among all possible therapies *Ayurveda* gives light of hope by using the Anti-diabetic drugs as mentioned in ancient texts. *Ayurveda* uses many drugs for diabetes (Madhumehhar) especially herbal and herbomineral preparations. This review paper targets on various *Ayurvedic* drugs herbal, herbomineral (single/compound preparations). This paper targets on antidiabetic properties of *Ayurvedic* drugs mentioned in *Ayurvedic* texts as well as their pharmacological effects, phytochemical effects and their scientific studies.

KEYWORDS: Diabetes, *Ayurveda*, Antidiabetic drugs, Herbal, Herbominerals.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease of multiple reasons followed by chronic hyperglycemia with disruption of carbohydrate, fat and protein metabolism resulting from disturbance in insulin secretion & insulin action. Diabetes Mellitus cause long–term damage, dysfunction, & failure of multiple organs.[1] Diabetes mellitus is divided into three main types.[1-5]

Type 1 diabetes (insulin-dependent diabetes mellitus) is an autoimmune disease developing when insulin producing cells of the pancreas in the body have been damaged and produces little or no insulin. A person who has type 1 DM must take insulin regularly to survive. Type 1 diabetes evolves most often in children & young adults.

Type 2 diabetes ("insulin-independent diabetes mellitus") which assumed for more than 90% of detected cases of DM in adults.In this type of DM pancreas produces enough insulin but the body can't use that insulin effectively, a condition called insulin resistance.

Gestational diabetes mellitus (GDM- Diabetes during pregnancy) is glucose intolerance in the second or third trimester during the period of pregnancy. Gestational diabetes is caused by the pregnancy hormones or lack of insulin. It is one of the most popular metabolic disorder during pregnancy.

Hyperglycaemia in Diabetes cases may cause number of secondary complications affecting the eyes, nerves, and kidneys, vascular system leading to, nephropathy, retinopathy, peripheral vascular disease, and neuropathy. The WHO has been given the list of >21,000 herbal plants, which are used for health care plan around the world. Among all these, more than 2000 species are found in India.[6] Around 800 herbals have been shown to have anti-diabetic properties.[7] There are number of phytochemicals in *Ayurvedic* herbal plants having active principles having possible role to treat Diabetes.[8]

Ayurveda termed Diabetes as a *Prameha*. Among all types of *Prameha, Madhumeha* shows similarity with Diabetes. *Ayurveda* explained specially lifestyle as well as disturbed metabolism & Vatadosha can create *Madhumeha*. There are several *Ayurvedic* preparations like herbs, herbominerals drugs which are helpful to treat the patients of Diabetes (*Madhumeha*). *Ayurvedic* medicines are gaining fame now a days worldwide because of their minimum side effects.

Ayurvedic Herbs Most Useful In Diabetes

Currently the extract forms of medicinal plants and herbs are used to treat Diabetes Mellitus. Many clinical studies confirmed that medicinal plants extracts shows anti diabetic activity and restoring the action of pancreatic β-cells.

1) *Jamuna* (Eugenia jambolana, Indian Gooseberry)

The *Jamuna* pulp extract show the hypoglycemic activity in streptozotocin induced diabetic mice within 30 min of giving while *Jamuna* seed required 24 h. The oral use of the extract resulted in increase in serum insulin levels in diabetic rats. Insulin secretion was established to be stimulated on incubation of plant extract with isolated islets of Langerhans from normal & diabetic animals. These extracts also hampered insulinase activity from liver & kidney.[9]

2) *Karela* (Momordicacharentia, bitter gourd)

It consists of fresh green fruits. Momordicacharentia belonging to family Cucurbitaceae. Chemical Constituents are - Chiratin (steroidal saponin) and mimordicin. Bitter gourd (*Karela*) is a nutritious vegetable & also used in regular medical practices to treat type 2 diabetes mellitus (DM). In South India it is used in the dishes *pachadi* (which is used as medicinal food for diabetics). It is also used in abdominal pain, flatus-relieving, tonics, treatment of rheumatoid artiritis, gout, disease of spleen and liver.[10]

3) *Nimba* (Azadirachta indica)

Neem (Azadirachta Indica, Family- Maliaceae) leaf extracts and seeds are used as an active ingredient as well as cure for diabetes. It has been carefully proved after a number of tests and research by leading medical institutes, that *neem* parts have high potency in treating Diabetes. A large number of natural *neem* tablets are exported and manufactured worldwide for treating large number of patients. *Neem* leaf extracts upgrades the blood circulation by dilating the blood vessels & helpful in reducing the use of hypoglycaemic drugs.[11]

4) *Gurmar* (Gymnema sylvestre)

The drugs consist of dried leaves of *Gurmar* belonging to family- Asclepidaceae. It climbs up as a woody climber in tropical forests. It is found in central and south India. It was easy for them to use it for diabetes as natural treatment for more than two millennium. The Chemical constituents in *Gurmar* are gymnemic acid, innositol, hentriacontane, penta triacontane. Acc. to the Agricultural department at Purdue University, it has been used in India for the cure of diabetes for 2000 years. These drug components are useful for the control and cure of diabetes.[12]

5) Onion (Allium cepa)

Various ether soluble fractions & insoluble fractions of onion powder (dried) show anti-hyperglycemic activity in diabetic rabbits. Allium cepa is well known for its antioxidant &

hypolipidaemic activity. Administration of a sulphur consist of amino acid from Allium cepa, S-methyl cysteine sulphoxide to alloxan administered diabetic rats significantly controlled blood glucose & lipids in serum, tissues & normalized the activities of liver hexokinase, glucose 6-phosphatase & HMG Co A reductase.[13]

6) Garlic (Allium sativum)

This is a perennial herb cultivated throughout India. Allicin, a sulphur containing mixture is responsible for its pungent odour & it has been visible to have significant hypoglycemic activity. This effect is conception to be due to increased hepatic metabolism, increased insulin release from pancreatic beta cells or insulin sparing effect.[14]

7) *Guduchi* (Tinosporacordifolia)

Oral administration of a moist T. cordifolia root extract to alloxan diabetic rats lead to a significant reduction in blood glucose & brain lipids. The moist extract at a dose of 400 mg/kg could elicit significant anti-hyperglycemic effect in separate animal models, its effect was equivalent to just one unit/kg of insulin.[15]

8) *Ghritakumari* (Aloe vera & Aloe barbadensis)

Management of chronic diabetes but not a single dose exudates of Aloe barbadensis leaves showed hypoglycemic effect in alloxanized diabetic rats. Single & chronic doses of bitter principle of the same plant also appear hypoglycemic effect in diabetic rats. This action of Aloe vera & its bitter principle is stimulation of synthesis or release of insulin from pancreatic beta cells.[16]

9) *Methi* (Trigonellafoenum-graecum)

Trigonellafoenum-graecum (fenugreek, *methi)* associated to the family Fabaceae. Leaves & seeds are efficacious parts of the *Methi*. Numerous studies on separate animal models have proved that fenugreek is having anti-hyperglycemic property.[17,18] Clinical studies have also confirmed the lipid-lowering & glucose lowering effect of fenugreek (*Methi*).[19] Number of studies on fenugreek seed extract & leaves can decrease blood cholesterol & glucose levels in clinical studies & in investigational animals as a diabetic.[20,21]

Fenugreek is having anti-diabetic property due to existence of saponins[22],4-hydroxy-isoleucine[23], & trigonelline, an alkaloid[24]& a high-fiber content.[25] One of the steroid present in *Methi* was describe to reducing the blood glucose level when it is given to diabetic

rats.[26] It is caused by addition of the area of insulin-immunoreactive β cells.[27] The anti-hyperglycemic effect is caused by increase glucagon level.[28] The anti-diabetic effect of *Methi* is due to peripheral utilization of glucose & increase in insulin sensitivity.[29] In STZ induced diabetic rats, the result was excellent showing decreasing the maltase activity, for this reason it could be a good antidiabetic.[30]

10) Tulsi (Ocimum sanctum)

It is known as *Tulsi* & belongs to Labiateae family. It is commonly found all over India. It is used in Indian *ayurvedic* medicines for treatment of various diseases. Various animal studies proved that moist extract of Ocimum sanctum (*Tulsi*) leaves showed the hypoglycemic activity in streptozotocin induced rats. It is also used for management of viral infection, management of fungal infection, reduces stress, management of tumor & management of gastric ulcer.[31]

Role of *Bhasma* as an Antidiabetic

In a clinical study *Nag bhasma* along with modern antidiabetic drug shows good response in reducing blood sugar level.[32] *Swarna makshik bhasma* in comparability along with drug Glibenclamide for streptozocin induced diabetic rats. So *Swarna makshik bhasma* shows to lowered blood sugar level remarkably.[33]

Abhrak bhasma shows to be potent in raising in glucose tolerance test in glucose loaded hyperglycemic rats.[34] In rats having normal blood glucose level *Yasad Bhasma* can reduced fasting blood glucose level.[35] *Nag bhasma* at the doses of 11. 25mg/kg body weight along with *Nisha amalki* shows prominent in reducing blood sugar level of alloxan induced mice. One more advantage is that it can expands beta cells of pancreas upto 75%.[36]

The Challenges of herbal medicines in India

The medicinal ethics of herbs, there are certain leveled against it, like need of consistency, exact amount of medicine is not prescribed to patients, dose not strictly given on time, the producing method is not standardized, fluctuate quantity of the active ingredient are present. Now the problem is “how to arrange these herbal drugs to clear the above criticisms to compete with pharmaceutical medicines. It will require through research activity separation & categorization of active ingredients of medicinal plants.

Also, the herbal drugs & even the common medicine currently in use basically not resulted to cure many diseases. There is require to examine the alternative therapeutic management through study of the plant kingdom & reasons of their potentials through relative studies.[37,38]

The Future elevation of herbal remedies for diabetes mellitus

Many herbal drugs are used by people & various native drugs are normally being introduced into current therapeutics. About 80% of the people, in developing countries particularly the rural area people, depands on the common medical remedies for health care requirements. There has been a rebirth of interest in herbal drugs in established countries due to a large quantity on the choice of products from natural sources. Therefore, there's a need to differentiate between herbal drugs supplied by a medical practitioner and those herbal remedies easily accessible to the people for self medication. The rapidly growing development of diabetes mellitus is a critical to human physical condition in all over the world. Recently, new active medicines have been extracted from plants & take control of antidiabetic activity with more efficacy than oral hypoglycemic agents used in proven therapy. In current years, consciousness has been drawn towards discovery of herbal drugs with antidiabetic activity that may be useful to people. It may also provide evidence for the improvement of a new oral drug for the treatment of diabetes mellitus.[39]

DISCUSSION

Ayurveda explains number of *Ayurvedic* drugs as an antidiabetic. The drugs are having excellent potential as antidiabetic. Number of clinical & animal trials have given significant data that *Ayurvedic* drugs can be used as a antidiabetic agent. The drugs may be single, polyherbal or herbomineral preparations. The *Ayurvedic* drugs are having excellent anti hyperglacemic effect, antiglucose tolerance effect plus regeneration of beta cells of langerhans, so this could be value addition in biology of diabetic patients.

CONCLUSIONS

Diabetes mellitus is a most ordinary endocrine disorder, affecting millions of people all over the world. It is a group of metabolic disorders described by hyperglycemia resulting from deficiency in insulin secretion, insulin action, or both. The increase in resistance & community of patients at some risk, because of coexistence of the restricted number of commercially available drugs for diabetes that still present have many side effects & also problems like unwanted hypoglycemic effect are the cause to shift the research towards traditionally available medicine which have low side effect & wide range of bioactivity do

not require laborious pharmaceutical synthesis seems highly attractive. From this review article alternative medicine to cure different kinds of diabetes problem using herbal preparation. Substances & extracts isolated from different natural resources play very important role to design medicine & treat hyperglycemic problem in diabetes mellitus.

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