International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 1 Jan-Feb 2023, pp: 799-803 www.ijprajournal.com ISSN: 2249-7781

A Review- Phytomedicines Used in Treatment of Diabetes Mellitus

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Submitted: 09-01-2023 Accepted: 19-01-2023

ABSTRACT-
Diabetes mellitus (DM), both insulin-dependent (IDDM) and non-insulin dependent (NIDDM) is common serious metabolic disorder throughout the world. The global prevalence of diabetes is estimated to increase from 4% in 1995 to 5.4% by the year 2025.Traditional plant treatments have been used throughout the world for the therapy of diabetes mellitus. Among many medications and other alternative medicines several herbs have been known to cure and control diabetes; additionally they have no side effects. Ayurveda and other Indian literature mention the use of plants in treatment of various human ailments. India has about 45000 plants species and among them, several thousands have been claimed to process medicinal properties. China & India has a long history on curing diabetes using plants as medicines, there medication contains aqueous extracts or is in powder form of different parts of plant alone or in a mixture with other plant extracts. Some of these herbal plants and their active chemical constituents which have a role in the management of diabetes mellitus are compiled here and discussed in this review.
Keywords:Diabetes mellitus, Herbal medicines.

I. INTRODUCTION:

Diabetes Mellitus is a group of metabolic disorder that effects and inhibits the absorption of glucose present in the blood. Drugs used to treat diabetes may lead to different micro- vascular and macro vascular diseases which in turn can be prevented by herbal medication. About 800 plants in India are known to have anti-diabetic properties in which 400 plants are clinically proven. China and India has a long history on curing diabetes using plants. Normally, blood glucose levels are tightly controlled by insulin, a hormone produced by the pancreas. Insulin lowers the blood glucose level. When the blood glucose elevates (for example, after eating food), insulin is released from the pancreas to normalize the glucose level. In patients with diabetes, the absence or insufficient production of insulin causes Hyperglycaemia. In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. Many traditional medicines in use are derived from medicinal plants, minerals and organic matter [1]. A number of medicinal plants, traditionally used for over 1000 years named rasayana are present in herbal preparations of Indian traditional health care systems [2]. In Indian systems of medicine most practitioners formulate and dispense their own recipes [3]. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world. Among these 2500 species are in India, out of which 150 species are used commercially on a fairly large scale. India is the largest producer of medicinal herbs and is called as botanical garden of the world.

Causes of Diabetes: Insufficient production of insulin (either absolutely or relative to the body's needs), production of defective insulin (which is uncommon), or the inability of cells to use insulin properly and efficiently leads to hyperglycaemia and diabetes. This latter condition affects mostly the cells of muscle and fat tissues, and results in a condition known as "insulin resistance." This is the primary problem in type 2 diabetes. The absolute lack of Insulin, usually secondary to a des- tructive process affecting the insulin producing beta cells in the pancreas, is the main disorder in type 1 diabetes. In type 2 diabetes, there also is a steady decline of beta cells that adds to the process of elevated blood sugars. Essentially, if someone is resistant to insulin, the body can, to some degree, increase production of insulin and overcome the level of resistance. After time, if production decreases and insulin cannot be released as vigorously, hyperglycemia develops. Glucose is a simple sugar found in food. Glucose is an essential nutrient that provides energy for the

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proper functioning of the body cells. Carbohydrates are broken down in the small intestine and the glucose in digested food is then absorbed by the intestinal cells into the blood stream, and is carried by the bloodstream to all the cells in the body where it is utilized. However, glucose cannot enter the cells alone and needs insulin to aid in its transport into the cells. Without insulin, the cells become starved of glucose energy despite the presence of abundant glucose in the blood stream. In certain types of diabetes, the cells' inability to utilize glucose gives rise to the ironic situation of "starvation in the midst of plenty". The abundant, unutilized glucose is wastefully excreted in the urine.

Insulin is a hormone that is produced by specialized cells (beta cells) of the pancreas.(The pancreas is a deep-seated organ in the Abdomen located behind the stomach.) In addition to helpingglucose enter the cells, insulin is also important in tightly regulating the level of glucose in the blood. After a meal, the blood glucose level rises. In response to the increased glucose level, the pancreas normally releases more insulin into the bloodstream to help glucose enter the cells And lower blood glucose levels after a meal. When the blood glucose levels are lowered, the insulin release from the pancreas is turned down. It is important to note that even in the fasting state there is a low steady release of insulin than fluctuates a bit and helps to maintain a steady blood sugar level during fasting. In normal individuals, such a regulatory system helps to keep blood glucose levels in a tightly controlled range. As outlined above, in patients with diabetes, the insulin is either absent, relatively insufficient for the body's needs, or not used properly by the Body. All of these factors cause elevated levels of blood glucose (hyperglycaemia).[4]

Herbal Treatment of Diabetes Mellitus :

AMLA:

Biological Source:It is obtained from the dried as well as fresh fruits of Emblica officinalis, belonging to the family Euphorbiaceae.

Chemical Constituents:

Amla is a rich natural source of vitamin C. It contains 0.5% fat, phyllemblin, 5% tannin. It also contains phosphorus, iron & calcium. It contains pectin & 75% moisture.[5]

Use: It is used as anti-diabetic.[6]

Scientific work done:

Emblica officinalis has shown Anti-diabetic activity in animal models.[7]

Dosage form:

It is used as amalaki capsules.

Dose:Capsule- 1 capsule/ twice a day before meal.

FENUGREEK:

Biological source:

It is obtained from the leaves and seeds of Trigonella foenum- graecum, belonging to the family Fabaceae.

Chemical constituents:

The nicotinic acid, alkaloid trogonelline, and coumarin contained by defatted section of the seedof fenugreek prove to be the responsible active ingredient for its anti-diabetic properties.[8]

Uses: It is used as anti-diabetic. The fiber-rich fraction of fenugreek seeds can lower blood sugar levels in people with type II diabetes.[9]

Scientific works done:

Metabolic and molecular action of Trigonella foenum-graecum (fenugreek) and trace metals has been shown in experimental diabetic tissues.[10]

Fenugreek Seed has shown the postprandial hypoglycemic activity.[11]

Dosage forms:

The leaves & seeds of fenugreek are used in therapeutic purpose.

Doses:

Leaves- 5-30 gm/ thrice daily with meal, Seeds- 3 ½ ounces/ daily.

NEEM:

Biological source:

It is obtained from the leaves of Azadirachta indica, belonging to the family Meliaceae.

Chemical constituents:

It contains glycerides of saturated & unsaturated fatty acids. The main fatty acids are oleic (50%) & stearic (20%) acids. The oil contains 2.0% of bitters, which are sulphur containing compounds, nimbidin, nimbin, nimbinin, nimbidol. The unsaponifiable part contains nimbosterol (0.03%). The main limonoid that it contains is azadirachtin but it also contains azadiradione, fraxinellone, nimbin, salannin, salannol, vepinin, vilasinin.[12]

Use: It is used in diabetes.[13]

Scientific work done:

Azadirachta indica leaf extract has shown antihyperglycemic and antidyslipidemic activity.

Dosage form:

Capsules are used.

Dose:

Capsule- 1-2 capsules/ twice daily.Δ

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BLACKBERRY:

Biological Source:

It is obtained from the edible fruits of the plant Rubus fruticosus belonging to the family Rosaceae.

Chemical Constituents:

The principal compounds isolated from red blackberry leaves are hydrolyzable tannins. Simple compounds such as 1,2,6-tri-O -galloyl-glucose[14] and penta- O -galloyl glucose are oxidatively coupled through galloyl groups to form more complex compounds such as casuarictin,

Pendunculagin, and kaempferol3- O -â-D-Glucuronopyranoside[15]. Major leaf volatiles studied by GC-MS include the monoterpenes geraniol and linalool as well as 1-octane-3-ol and decanal[16]. Phenolic acids common to the Rosaceae family have also been identified.[17]

Use:

It Is used as anti-diabetic.

Dosage form:

It is used as fruit powder.

Dose:

Dried fruit powder- 20 mg/day.

GINSENG:

Biological source:

It is obtained from the dried roots of Panax ginseng, belonging to the family Araliaceae.

Chemical Constituents:

Ginseng contains a mixture of several saponin glycosides, belonging to triterpenoid group. They are

Grouped as follows-

• Ginsenosides

• Planetoids

• ChikusetsusaponinGinsenosides contain aglycone dammarol while panaxosides have oleanolic acid as aglycone. About 13 Ginsenosides have been identified. Panaxosides give oleanolic acid, panaxadiol & panaxatriol on Decomposition.[18]

Use: It is used as hypoglycemic agent.[19]

Scientific works done:• Use of Ginseng in diabetes.[20]• Ginseng has shown hypoglycemic effect.

Dosage forms: Dried root and tincture are used.

Dosage:Dried root- 0.5- 9 gm/ daily, Tincture- 0.2-3/ one To three times daily.

INDIAN KINO TREE:

Biological source:

It is obtained from the dried juice of the plant Pterocarpus marsupium & obtained by making vertical Incisions to the stem bark & it belongs to the family Leguminaceae.

Chemical constituents:

It contains about 70%- 80% of kinotannic acid, kino- red, k- pyrocatechin (catechol), resin & gallicAcid. Kinotannic acid is glucosidal tannin, while kino- red is anhydride of kinoin. Kinoin is an Insoluble phlobaphene & is produced by action of oxydase enzyme. It is darker in colour than Kinotannic acid. If the juice is boiled during drying, enzyme gets destroyed & thus insolubilisation & Darkening is prevented.[21]

Uses:The heartwood of the plant is used in treatment of diabetes. The gum resin is the only herbal product .Ever found to regenerate B cells that make insulin in the pancreas.[22]

Scientific works done:

• Phenolics from Pterocarpus marsupium has shown antihyperglycemic activity.[23]

• Hypoglycaemic activity of Pterocarpus marsupium has been seen.[24]

• Dosage form:

The wood extracts & bark decoction is used.

Doses: Wood extract (pterostilbene) – 10 mg/ kg, Bark

Decoction- 1 gm/ 100 mg body weight for 10 days.

Clinical research of CAM supplements in diabetes:

Currently, there is not yet sufficient evaluation of herbs, vitamins, and mineral supplements for lucose control in diabetes. Aside from relatively poor study methodological quality, this area of supplement research has been fraught with several complications. First, the multiple constituent natures of botanical products has made standardization a challenging task. Proponents of herbal remedies caution that in standardizing to one constituent, resulting extracts may have lost a proportion of benefit as compared with the whole plant 178Precise considerations of purity, chemical composition, and potency of derivatives may be grossly influenced by the age of the plant (especially of roots), the source location, the season of harvest, the method of drying and crude preparation, etc. In the literature we examined, several herb studies used “homemade” or otherwise unspecified preparations. Although individual companies have begun to standardize supplements, there is a general lack of consistency across the market. With vitamin and mineral supplements, these issues are less relevant. In addition, the development of proper supplement regulation and safety codes has been slow. Currently, all dietary supplements (including herbal products) are regulated under the Dietary Supplement Health and

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Education Act of 1994 (DSHEA), which specifically differentiates supplements from drugs. Consequently, DSHEA does not require the extensive premarket approval that the Food and Drug Adminstration requires for a prescription drug, and although it calls for "good manufacturing practices [GMP]," the burden of proof that a supplement is unsafe lies with the government, leaving
Manufacturers to operate unchecked. This has contributed to scepticism among clinicians, and makes it especially difficult for physicians to responsibly recommend supplements to patients.

II. CONCLUSION:

Diabetes mellitus is the most common endocrine disorder, affecting more than 300 million people worldwide. For this, therapies developed along the principles of western medicine (allopathic) are often limited in efficacy, carry the risk of adverse effects & are often too costly, especially for the developing world. Therefore, treating diabetes mellitus with plant derived compounds which are accessible & do not require laborious pharmaceutical synthesis seems highly attractive. All the herbal drugs discussed in the review exhibit significant clinical & pharmacological activity. The potency of herbal drugs is significant & they have negligible side effects than the synthetic anti diabetic drugs.

REFERENCE:

[1]. Grover JK, Yadav S, Vats V. Medicinal plants of India with antidiabetic potentialEthnopharmacol. 2002;81:81–100.
[2]. Scartezzini P, Sproni E. Review on some plants of Indian traditional medicine with antioxidant activity. J. Ethnopharmacol. 2000;71:23–43.
[3]. Seth SD, Sharma B. Medicinal plants of India. Indian J. Med. Res. 2004;20:9–11.
[4]. Medscape.com. Type 2 Diabetes Mellitus.
[5]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 264
[6]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 264
[7]. Rakesh Kumar Singh, Dolly Jaiswal, Prashant Kumar Rai, (November 2009) - Anti-diabetic activity of Emblica officinalis in animal models.
[8]. Hannan J.M., Ali L., Rokeya B., Khaleque J., Akhter M., Flatt P.R., Abdel- Wahab Y.H.-Soluble dietary fibre fraction of Trigonella foenum-graecum (fenugreek) seed improves glucose homeostasis in animal models of type 1 and type 2 diabetes by delaying carbohydrate digestion and absorption, and enhancing insulin action.
[9]. Hannan J.M., Ali L., Rokeya B., Khaleque J., Akhter M., Flatt P.R., Abdel- Wahab Y.H.-Soluble dietary fibre fraction of Trigonella foenum-graecum (fenugreek) seed improves
[10]. Glucose homeostasis in animal models of type 1 and type 2 diabetes by delaying carbohydrate digestion and absorption, and enhancing insulin action.
[11]. NAJMA ZAHEER BAQUER, PARDEEP KUMAR, ASIA TAHA, RK KALE, SM COWSIK and P MCLEANMetabolic and molecular action of Trigonella foenumgraecum (fenugreek) and trace metals in experimental diabetic tissues.Bawadi Hiba A., Maghaydah Sofyan N.; Tayyem Rabab F., Tayyem ReemaF.- The Postprandial Hypoglycemic Activity of Fenugreek Seed and Seeds' Extract in Type 2 Diabetics: A Pilot Study.
[12]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 296
[13]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 296
[14]. Haddock E., et al. The metabolism of gallic acid and hexahydroxydiphenic acid in plants. Part É. Introduction. Naturally occurring galloyl esters. J Chem Soc 1982; 11:2515.
[15]. Gudej J., et al. Flavonoid compounds from the leaves of Rubus idaeus L. Herba Pol 1996; 42(4):257.
[16]. Maga J., et al. Bramble leaf volatiles. Dev Food Sci 1992; 29:145.
[17]. Krzaczek T. – Phenolic acids in some tannin drugs from the Rosaceae family. Farm Pol 1984; 40(8):475. CA 102:146198s.
[18]. Text Book of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 222.

[19]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 223
[20]. Jing Tian Xie, Sangeeta Mehendale and Chun-Su YuanGinseng and Diabetes.
[21]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 270
[22]. Text Book Of Pharmacognosy, C. K. Kokate, A.P. Purohit, S.B. Gokhale, P: 270
[23]. Manickam M., Ramanathan M., Farboodniay Jahromi M. A., Chansouria J. P. N., and Ray A. B.Antihyperglycemic Activity of Phenolics from Pterocarpus marsupium.
[24]. Dhanaba S. P., Kokate C. K., Ramanathan M., Kumar E. P., Suresh B. – Hypoglycaemic activity of Pterocarpus marsupium Roxb..