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#### Abstract:

Using botanicals created for therapeutic reasons, medicine made from herbs, phytomedicine, or plant-based drugs are interchangeable terms. Relative to traditional medical care, the utilization of herbal remedies for medical purposes in both the management and avoidance of illnesses like diabetes has an extensive background. Some of the main global wellness issues are diabetes. Diabetes, also known as hyperglycemia, is regarded as a prevalent health concern that is nevertheless challenging to fully manage. Hyperglycemia or persistently elevated glucose levels has the possibility to lead to major repercussions like as kidney damage, eyesight damage, heart failure, and amputations of the lower limbs that have been linked to diabetes mortality and morbidity. Natural remedies are one method that can be used for curing and avoiding diabetes in addition to its associated problems. The choice of herbal remedies, nevertheless, may be influenced by a number of variables, including the level during which the diabetic patient's condition is progressing, the sorts of complications they are experiencing, their accessibility and cost, along with their security character. The discussion below emphasizes the natural and organic therapies that are used in either the management or avoidance of this serious disease, diabetes, as well as the root causes that underlie their ability to reduce glucose levels in the blood as well as herbal remedies that have been granted approval for application when treating diabetes.

## Keywords: Diabetes Mellitus, Herbal remedies, Traditional medicine, Medical care

#### Introduction:

The global metabolism condition known as Diabetes Mellitus (DM) causes high blood sugar levels, high lipid levels, high amino acid levels, and decrease insulin levels. [1] Thus the release of insulin and activity is reduced as a result. It often leads to the onset of both macro and microvascular disorders, including cerebrovascular, and cardiovascular disorders as well as neuropathic and nephropathic conditions. [2] Decreased life expectancy and a spike in associated hazards for morbidity and fatality are connected with the condition. Microvascular and macrovascular problems can arise and advance as a result of persistent hyperglycemia [3]. In the year 2000, it was predicted that 2.8% of people globally had diabetes; by the year 2025, that number is expected to rise to 5.4%. Insulin and numerous oral antidiabetic medicines such as sulfonylureas, biguanides,  $\alpha$ -glucosidase inhibitors, and glinides are presently accessible as treatments for hyperglycemia. As items are costly and challenging to obtain in impoverished nations.

Primarily, to the numerous adverse consequences connected with ingesting hypoglycemic medications (herbal substances) for the management of DM, there is currently significant demand for botanical therapies. As a result, the application of conventional medicinal products that are derived from botanicals is very significant in the treatment of DM. [4] Herbal remedies have recently become more popular as an alternative to diabetic drugs. According to Marles and Farnsworth, approximately 1000 varieties of plants are utilized as traditional treatments for diabetes. [5]

The molecular structure of plant-based materials employed as complementary medications for managing diabetes corresponds to their physiological effects. Items made from plants or herbs are abundant in phenolic substances, flavonoids, terpenoids, coumarins, and other ingredients that lower blood sugar levels. [6, 7, 8] In both academic as well as common information available, different kinds of herbal remedies have been discovered to possess anti-diabetic properties. [9]

Medicinal products are recommended because they are thought to be helpful, have fewer adverse reactions in medical use, and are reasonably inexpensive. [10] The medical management of DM has been practiced for an extended period in numerous nations using therapeutic and culinary plant items. According to ethnobotanical data, there are approximately 1000 herbs that have been suggested to treat diabetes. The present review lists several of these species and describes their systems of conduct, including Bauhinia forcata, Combretum micranthum, Elephantopus scaber, Gymnema sylvestre, Liriope spicata, Parinari excelsa, Ricinus communis, Sarcopoterium spinosum, Smallanthus sonchifolius, Swertia punicea, Vernonia anthelmintica, etc.

## The way that herbal medications are known to inhibit diabetics' work: [11,12,13]

Plants' hypoglycemic effects are dependent on a number of processes. The factors that could represent the herbal anti-diabetics process of effectiveness may be:

a. Enzyme amylase suppression

b. The resorption of glucose by the kidneys is inhibited.

c. Inhibiting insulin oxidation mechanisms while also stimulating the islet beta cells to secrete insulin.

d. Exercises that reduce cortisol.

e. Lowering insulin sensitivity.

f. Giving the  $\beta$ -cells access to specific essential ions including magnesium, zinc, calcium, manganese, and copper.

g. Mending or replacing cells of the pancreas.

- h. The islets of Langerhans develop bigger and more cells.
- i. Inducing the release of insulin.
- i. Promotion of liver glycolysis and glycogenolysis.
- k. Galactosidase and glucosidase suppression.
- 1. A barrier against the disintegration of the tissues.
- m. An enhancement in metabolism, as well as a decrease in urea and glucose levels.

n. Reducing starch's aberrant transformation to glucose.

# Indian herbal remedies having Therapeutic Benefits for Diabetes and Other Conditions:

Numerous medicinal products are recommended for hyperglycemia and its consequences. The principal components of these compositions are medicinal herbs. Several alternative botanical remedies include:

- The Allium Sativum [AS]: Garlic, as it is known regionally, is a member of the plant family Liliaceae, which includes AS [14]. Extract of garlic dissolved in ethanol (10 ml/kg/day) often exhibits a lowering effect on blood sugar [15]. Garlic extract outperformed the anti-diabetic medication glibenclamide [16]. In STZ-induced rodents, petroleum-based ether, ethanol, and ethyl acetate (ETA) extracts were seen to exhibit anti-diabetic action. Garlic exhibits a variety of medicinal benefits, including anti-platelet, antimicrobial, hypertension, and cholesterol-lowering properties [17].
- 2) Borbadensis Aloe: It is referred to as Ghikanvar and is a member of the family of Liliaceae. It has greenish knife-shaped leaflets which are hefty, narrow, hairy in texture, and covered in a transparent viscid fluid, giving it the appearance of a prickly shrub. Aloe Vera Gel's fluid extract taken orally at a quantity of 150 mg/kg of body mass considerably lowers the amount of sugar in the blood [14]. The gel form of aloe has a variety of medicinal qualities, including anti-diabetic, antioxidant, and a four-fold rise in glutathione levels in rats with diabetes [18].
- 3) Indica Azadirachta: It is known as "neem" in local cultures and is a member of the family of Meliaceae. Both India and Myanmar have access to it [14]. Massive amounts of Azadirachta indica's ethanol-based and fluid extracts demonstrate a drop in blood sugar levels. In type 2 diabetic people whose condition is not managed solely through traditional medications, it might be paired with such medications [15]. Neem pills made from organic components are used to cure a lot of individuals globally. By

widening the vessel walls of the blood, the concentrate enhances blood flow and is helpful in lowering the level of glucose in the blood [19].

- 4) Juncea Brassica: It is referred to as Rai and is a member of the Cruciferae family. It is frequently employed as a condiment in many different foods. The blood glucose-lowering effect of the watery extract of seeds was demonstrated in diabetic mice generated by alloxan. Extract dosages of 250, 350, and 450 mg/kg exhibit hypoglycemic action [20].
- 5) Papaya Carica: It is referred to by the name papaya and is a member of the Caricaceae family. In alloxan-induced mice with diabetes, a combination of seed and leaf extract lowers blood glucose levels, lowers the number of lipids, and promotes wound reconstruction [21].
- 6) Rose Catharanthus: It is referred to as Vinca roseus and is a member of the Apocynaceae family. In alloxan-treated rats with diabetes, the methanolic solution of twigs and foliage demonstrates a reduction in glucose levels. Animals' levels of sugar in their blood were reduced when foliage and twig solution was given orally in doses of 500 mg/kg [14]. Increased generation of insulin from the Langerhans cells is Catharanthus roseus' mode for functioning [15].
- 7) Sativum Coriandrum: It is primarily recognized as coriander and is a member of the family of Apiaceae. It is frequently incorporated as an ingredient in many different foods. In alloxan-induced diabetic rodents, 200 mg/kg extract of seeds often improves the activity of the Langerhans cells, lowers the level of blood sugar, and induces the production of insulin from the pancreatic beta cells. Coriandrum sativum compound exhibits blood glucose reducing and insulin synthesizer properties [15].
- 8) Jambolana Eugenia: It is a member of the Myretaceae family and is commonly referred to as Jamun. It has mature berries and desiccated pods from Eugenia Jambolana. Ferulic acid and malvidin 3-laminaribiosidea are its key components. Management of patients with diabetes is done by utilizing dehydrated 200 mg/kg seed extract. [19]
- 9) Sylvestre Gymnema: Gudmar, which roughly translates to "the sugar destruction," is the name given to this member of the Asclepidaceae family. In streptozotocin-induced rats, a leaf extract of G. sylvestre (3.4/13.4 mg/kg) significantly decreased blood glucose levels. It is primarily employed for managing hyperglycemia in Indian naturopathic medications. G. Sylvester has flavonoids, alkaloids, saponins, and carbohydrates as its key ingredients. Additionally, it is utilized for the management of inflammatory conditions, malignancy, and a number of microbiological disorders [17].
- 10) Indica Mangifera .: It belongs to the Anacardiaceae genus and is frequently referred to as the mango. Although the ingestion of a liquid extract had no effect on the levels of blood glucose in mice with alloxan-induced diabetes, the leaf extract (250 mg/kg) demonstrated efficacy in reducing Diabetes. [22]
- 11) Charantia Momordica: It's a member of the family Cucurbitaceae and is frequently referred to as Karela (bitter gourd). It contains momordic I and momordica II,

and cucurbitacin B. It is employed for the management of diabetes. It contains lectins with effects similar to insulin. Lectin, a non-protein, has a relationship with receptors for insulin. By functioning on tissues around the body, this lectin lowers the level of sugar in the blood [23]. M. charantia extracts from fruit (200 mg/kg) exhibits hypoglycemic action.

- 12) Sanctum Ocimum: It's referred to as tulsi which is a member of the Labiateae family. It has a broad distribution throughout India. It is utilized in herbal products from India for managing a variety of illnesses. A water-soluble extract of Ocimum sanctum leaves (200 mg/kg) showed anti-diabetic action in streptozotocin-induced rats, according to numerous research investigations. Additionally, it is employed in the management of tumors, microbial infections, decreasing stress, viral infections, and stomach ulcers. [24]
- 13) The Cardifolious Tinospora: Called as guduchi, it belongs to the Menispermaceae family. Diterpene substances, including tinosporone, tinosporic acid, Syringen, berberine, and giloin, are vital elements of T. cardifolia [25]. In diabetic rats treated with streptozotocin, consumption of T. cardifolia roots extract (50-200mg/kg) results in a reduction in both urine and blood glucose levels over the course of a six-week period. It is primarily employed for managing hyperglycemia in Indian naturopathic medications. Additionally, the extract of roots forbids a decrease in weight. [22] [26-30]

In broad terms, the maceration process, infusion, diffusion, decoction, and extraction by soxhlet are used for obtaining distinct components of plants like stems, roots, foliage, and seeds. Particularly frequently employed solutions include methanol, ethanol, and petroleum-based ether.

# **Conclusion:**

Natural healthcare is effectively employed and trusted by individuals all over the globe to address a variety of ailments. Since numerous people with diabetes experience negative adverse reactions from conventional medicine, people have begun to resort to complementary approaches known to inhibit hyperglycemic benefits. It is hardly surprising given that persistent illnesses, which standard therapy might only substantially ameliorate, have seen the most widespread usage of alternative remedies. A popular type of alternative treatment for decreasing blood glucose levels is herbal medicine. Nevertheless, more research investigations that are well-constructed and well-supervised are required to assess their effectiveness and security. Many additional plant-based materials though, that are regularly referenced in the local medical communities across the globe, remain in need of investigation by scientists. As stated in the current piece, screening a significant amount of medicinal plants to identify their anti-diabetic properties has produced some intriguing prospects. However, numerous medicinal products derived from plants are still not sufficiently developed to the point where they can replace or lessen the necessity for the oral synthetic pharmaceuticals that are presently accessible. However, there is still demand in conducting studies into natural remedies under the hope that in the future scientists may be capable to develop a chemical that is less dangerous, more efficient, and meets all the criteria for a therapy that can displace chemical drugs. Recently, curiosity about using medicinal plants has increased. Plants hold forth the genuine potential for the treatment of hyperglycemia. The treatment of diabetes may benefit greatly from the separation, recognition, and production of effective chemical ingredients using plants.

# **References:**

- 1. Altan, V.M., The pharmacology of diabetic complications. Current Medicinal Chemistry 10, (2003) 1317–1327.
- Feldman, J.M., In Diabetes Mellitus, 9th ed. Indianapolis, Eli Lilly & co., (1988) 28-42.
- 3. Strojek, K., Features of macrovascular complications in type 2 diabetic patients. Acta Diabetologica 40, (2003) 334–337.
- **4.** Patel, K., Srinivasan, K., Plant foods in the management of diabetes mellitus: vegetables as potential hypoglycemic agents. Nahrung 41, (1997) 68–74.
- **5.** R.J. Marles, N.R. Farnsworth, Antidiabetic plants and their active constituents, Phytomedicine 2, (1995) 137–189.
- **6.** C.N. He, C.L. Wang, S.X. Guo, Study on chemical constituents in herbs of Anoectochilus roxburghii II, Chin. J. Chin. Materia. Medica 30, (2005) 761–776.
- 7. M. Jung, M. Park, H-Ch. Lee, Y. Kang, E.S. Kang, S.K. Kim, Antidiabetic agents from medicinal plants, Curr. Med. Chem. 13, (2006) 1203–1218.
- H.F. Ji, X.J. Li, H.Y. Zhang, Natural products and drug discovery, EMBO Rep. 10 (3) (2009) 194–200.
- 9. Valiathan, M.S., Healing plants. Curr. Sci. 75, (1998)1122–1126.
- **10.** Verspohl, E.J., Recommended testing in diabetes research. Planta Med. 68, (2002) 581–590.
- **11.** Pulok KM, Kuntal M, Kakali M, Peter JH. Leads from Indian medicinal plants with hypoglycemic potentials. J Ethnopharmacol 2006;106:1–28.
- **12.** Mohamed B, Abderrahim Z, Hassane M, Abdelhafid T, Abdelkhaleq L. Medicinal plants with potential antidiabetic activity-A review of ten years of herbal medicine research (1990-2000). Int J Diabetes Metabol 2006;14:1-25.
- Manisha Modak, Priyanjali Dixit, Jayant Londhe, Saroj Ghaskadbi, and Thomas Paul A. Indian Herbs and Herbal Drugs Used for the Treatment of Diabetes., J. Clin. Biochem. Nutr.2007; 40: 163–173.
- 14. Malvi R, Jain S, Khatri S, Patel A, Mishra S. A Review on Antidiabetic Medicinal Plants and Marketed Herbal Formulations. International Journal of Pharmaceutical & Biological Archives;2011(2):1344–1355.
- **15.** Rahimi M. A Review: Anti Diabetic medicinal plants used for diabetes mellitus. Bulletin of environmental, pharmacology and life. sciences;2015(4):163–180.
- **16.** Gebreyohannes G, Gebreyohannes M. Medicinal values of garlic: A review.International. Journal of Medicine and Medical Sciences;2013(5):401–408.

- **17.** Lakshmi MS. Rani KSS, Reddy UKT. A review on diabetes mellitus and the herbal plants used for its treatment. Asian. journal of pharmaceutical and clinical research;2012(5):15–21.
- **18.** Bordoloi R, Dutta KN. A Review on Herbs Used in the Treatment of Diabetes mellitus. Journal of Pharmaceutical, Chemical and Biological. Sciences;2014(2):86–92.
- **19.** Mishra R, Shuaib M, Shravan M, S P. A review on herbal antidiabetic drugs. Journal of Applied Pharmaceutical Science2011;1(6):235–237.
- **20.** Arumugam G, Manjula P, Paari N. A review :Antidiabetic medicinal plants used for diabetes mellitus. Journal of acute diseases; 2013.
- **21.** Giovannini P, Jayne MR, Howes E, E S. Medicinal plants used in the traditional management of diabetes and its sequelae in Central America: a review.Journal of. Ethnopharmacology; 2016(2).
- **22.** Dwivedi CP, Daspaul S. Antidiabetic herbal drugs and polyherbal formulation used for diabetes: A review. The journal of phytopharmacology;2013(2):44–51.
- **23.** Khan Y. Aziz I, Bihari B, Kumar H, Roy M, Verma VK. A Review- Phytomedicines Used in Treatment of Diabetes. Asian Journal of Pharmaceutical reserach;2014:4–3.
- **24.** Kumar D, Trivedi N. Dixit RK. Herbal medicines used in the traditional indian medicinal system as a therapeutic treatment option for diabetes management: A review. World Journal of Pharmacy and Pharmaceutical Sciences2015; 4(4).
- **25.** Ozougwu JC. Anti-diabetic effects of Allium cepa (onions) aqueous extracts on alloxan-induced diabetic Rattus novergicus. Journal of Medicinal Plants Research;2011(5):1134–1139.
- **26.** Nugroho AE, Andrie M, Warditiani NK, Siswanto E, Pramono S, Lukitaningsih E. Antidiabetic and antihiperlipidemic effect of Andrographis paniculata (Burm. f.) Nees and andrographolide in high-fructose-fat-fed rats. Indian journal of Pharmacology 2012;44(3):377–381.
- **27.** Khan BA, Abraham A, Leelamma S. Hypoglycemic action of Murraya koeingii (curry leaf) and Brassica juncea (mustard): mechanism of action. Indian Journal of Biochemistry and Biophysics;1995(32):106–108.
- **28.** Abesundara KJ, MatsuiT M, K. Alpha-glucosidase inhibitory activity of some Sri Lanka plant extracts one of which Cassia auriculata exerts a strong antihyperglycemic effect in rats comparable to the therapeutic drug acarbose. Journal of Agricultural and Food Chemistry;2004(52):2541–2545.
- **29.** Platel K, Srinivasan K. Plant foods in the management of diabetes mellitus: vegetables as potential hypoglycemic agents. Die. 1997;p. 41–68.
- **30.** Ravi K, Ramachandran B, Subramanian S. Protective effect of Eugenia jambolana seed kernel on tissue antioxidants in streptozotocininduced diabetic rats. Biological and Pharmaceutical Bulletin;2004:27–1212.