

Harnessing Ayurvedic Herbs for Diabetes: A Review of Ayurvedic Approach to Diabetes Management.

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Abstract:- Diabetes mellitus, a chronic metabolic disorder, has seen a global increase, prompting interest in complementary treatments, including those derived from Ayurveda, the ancient Indian system of medicine. This review explores the role of Ayurvedic herbs in diabetes management, focusing on traditional uses and scientific evidence supporting their efficacy. Key herbs examined include Gulvel, Gurmar, Neem, Fenugreek, and Cinnamon, each known for their potential to regulate blood glucose levels and improve metabolic health. The review discusses the Ayurvedic perspective on diabetes, where it is considered a result of dosha imbalances, particularly Kapha and Pitta. It further outlines strategies for integrating these herbs with conventional treatments, emphasizing the importance of personalized approaches, quality sourcing, and professional guidance. The conclusion highlights the promise of Ayurvedic herbs as complementary therapies in diabetes management, while calling for further research to fully understand their mechanisms and optimize their use in clinical practice.

Key indicator Tinospora cordifolia -, Neem, Gymnema sylvestre, Fenugreek and Cinnamon.

Introduction: Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to impaired insulin production or action. As the prevalence of diabetes rises globally, there is growing interest in complementary approaches that can assist in its management. Ayurveda, the ancient Indian system of medicine, offers a holistic approach to health and disease, emphasizing lifestyle modifications, dietary changes, and herbal remedies. This review delves into the potential role of Ayurvedic herbs in managing diabetes, exploring both their traditional applications and the scientific evidence that supports their efficacy. By examining the Ayurvedic perspective on diabetes and the use of specific herbs, this review aims to provide a comprehensive understanding of how these natural remedies can be integrated into modern diabetes care.



Key Ayurvedic Herbs for Diabetes Management

Ayurveda offers a rich pharmacopeia of herbs that have been traditionally used to manage various health conditions, including diabetes. These herbs are believed to help regulate blood sugar levels, enhance insulin sensitivity, and support overall metabolic health. In this section, we explore the key Ayurvedic herbs commonly recommended for diabetes management, examining both their traditional uses and the scientific evidence supporting their efficacy.

1] *Tinospora cordifolia* :- Giloy, also known as guduchi or *Tinospora cordifolia*, is often called 'amruta' which translates into 'the drink of mortality.' Honestly, it has earned the name given the multiple benefits it can have for our health.

Hypoglycemic activity of Gulvel was shown in alloxan-diabetic rats. The aqueous and alcoholic extracts reduced fasting blood sugar and increase glucose tolerance followed by deterioration after one-month treatment. Significant hypoglycemic effects were shown in rabbits treated with aqueous, alcoholic, and chloroform extracts of Gulvel leaves. Aqueous root extract of Gulvel caused a significant reduction in blood glucose, brain lipids, and hepatic glucose-6-phosphatase, serum, acid, phosphatase, alkaline phosphatase, and lactate dehydrogenase, and increased the body weight, hemoglobin, and hepatic hexokinase levels. An indirect action of Gulvel on carbohydrate metabolism was suggested through its favorable effect on endogenous insulin secretion and glucose uptake, and inhibition of peripheral glucose release. Amelioration of experimental diabetic neuropathy and gastropathy in rats and modulation of morphology and some gluconeogenic enzymes in diabetic rat kidney suggest potential for preventing the complications of diabetes.(1)(18)(27).

Fig. *Tinospora cordifolia*

2] *Neem Leaf*:- The longer the period of pre-treatment with the aqueous extract of *A.*



indica leaves the better the protection against the onset of diabetes. The treatment of diabetic rats with aqueous extract of leaves of *A. indica* at a dose of 250 mg/kg body weight for 16 weeks resulted in gradual but significant fall in blood glucose and improvement in serum total, LDL and HDL cholesterol and triacylglycerol which increased in diabetic rats. It also showed improvement in body weight and reversed diabetic retinopathy. The mechanism behind it is not so clear but is said to be related

to its antiserotonin activity .The ameliorative role of Azadiracta indica leaves extract against adverse effects of diabetes on the structure and function of the testicular tissue of rats neonatally induced by streptozotocin. The obtained results revealed significant decreased levels of testicular antioxidants, serum testosterone and significant increased levels of serum cholesterol, triglycerides, and low density lipoprotein but a remarkable decrease in high density lipoprotein in diabetic rats. Azadirachta indica (Neem) is a medicinal plant, used in Ayurveda for treating various diseases, one of which is diabetes mellitus. It is known to possess antiinflammatory, antipyretic, antimicrobial, antidiabetic and diverse pharmacological properties. However, the molecular mechanism underlying the effect of A.

Fig.Neem Leaf



The anti-hyperglycemic effect is because of the antiserotonin function of neem leaf. Along with glucose, it was found that the neem leaf extract can reduce cholesterol (15%), lipids (15%), triglycerides (32%), creatinine (23%), and urea (13%) in rats. The absence of these deficits in CLE-treated rats suggests a neuroprotective effect of the extract in streptozotocin-induced diabetic rats. This may improve the cognitive function of the prefrontal cortex in diabetes mellitus. Administration of the extract can delay the onset of diabetes in diabetes prone subjects. This could be by quickening the sufficient production of insulin by the pancreas which activates the glucose transporters to transport glucose to the cells for effective utilization or possibly, the capability of the extract to regenerate the beta cells to produce enough insulin needed to signal the glucose transporters to carry glucose to the cells.

3] Gymnema Sylvestre :- In *Gymnema sylvestre* various secondary metabolites are present. Such metabolites are oleanane saponins and dammarane saponins. Oleanane saponins are of two types i.e. gymnemic acid and gymnema saponins. Gymnemasaponins consists of two aglycone saponins like gymnemagenin and

gymnestrogenin. Dammarane saponins include gymnemasides. All of these secondary metabolites have antidiabetic properties. Besides these triterpenoid saponins other antidiabetic constituents are anthraquinone, flavones, flavonoids, epicatechin, apigenin, luteolin, kaempferol, hentriacontane, pentatriacontane, phytin, resins, tartaric acid, formic acid, butyric acid, lupeol, β -amyrin related glycosides. Anthraquinones and their derivatives, alkaloids-conduritol, gymnamine, α and β chlorophyll, polypeptide (Gurmarin), d-quercitol, stigmasterol, nonacosane, parabin, calcium oxalate, cellulose, lignin etc. also possess antidiabetic potential.

Fig . *Gymnema sylvestre*

"Gurmar" in Hindi, which translates to "sugar destroyer," *Gymnema Sylvestre* has a long history of use in Ayurveda for managing diabetes. It is traditionally used to reduce sugar cravings, balance blood sugar levels, and support overall metabolic function.

In Ayurvedic texts, *Gymnema* is described as having a bitter taste (tikta rasa) and is believed to balance Kapha and Pitta doshas, making it particularly effective in treating Kapha-related diabetes.

Scientific Evidence:

Modern research has substantiated many of *Gymnema Sylvestre*'s traditional uses. The herb contains active compounds known as gymnemic acids, which are thought to inhibit the absorption of sugar in the intestines, thereby reducing postprandial (after-meal) blood glucose levels.

Clinical studies have shown that *Gymnema* can lower fasting blood glucose levels, improve HbA1c (a marker of long-term blood sugar control), and may even help regenerate insulin-producing beta cells in the pancreas.

Its ability to curb sugar cravings by temporarily blocking the taste of sweetness has been validated, which can be particularly helpful for individuals trying to reduce sugar intake. (1)(2)(33)(34).

4] Cinnamon:-There is some evidence to suggest that the consumption of cinnamon is associated with a short-term reduction in blood pressure. Although the evidence is hopeful, it would be premature to recommend cinnamon for blood pressure control until a comprehensive randomised controlled trial (RCT) involving a larger number of patients has been carried out. More recent studies have, to date, shown less promising findings. Lowers blood sugar and risk of type 2 diabetes It has been suggested that cinnamon can have a moderate effect in improving glycaemic control and supporting the management of type 2 diabetes. For, conclusions are mixed, and larger randomised controlled trials are needed in well-defined population groups using standardised interventions in order to definitively determine the efficacy of using cinnamon in subjects with diabetes. However, a small amount used at breakfast or in baking will not do any harm, and can be eaten as part of a balanced diet. The effective dose is typically 1–6 grams or around 0.5–2 teaspoons of cinnamon per day. It can also increase your insulin sensitivity, making insulin high efficient at moving sugar into cells. Cinnamon can help keep these blood sugar spikes after meals in check. Some research suggests that it does this by slowing down the rate at which food empties out of your stomach. Cinnamon is high in antioxidants and other useful compounds. (1)(2)(29)(30).



Fig.Cinnamon

5] Fenugreek:- Fenugreek is a widely used herbal medicine as a complementary therapy for diabetes mellitus. Lots of clinical trials have proved its beneficial effect on glycemic control parameters and lipid profiles. Thus, we conducted a systematic review and meta-analysis to evaluate the effectiveness and safety of fenugreek as a treatment for type 2 diabetes mellitus. We searched PubMed, Embase, Cochrane, China Knowledge Resource Integrated Database (CNKI), Korean studies Information Service System (KISS), Research Information Sharing Service (RISS), and ScienceON to select RCTs which used fenugreek targeting hyperglycemia with a control group. We used

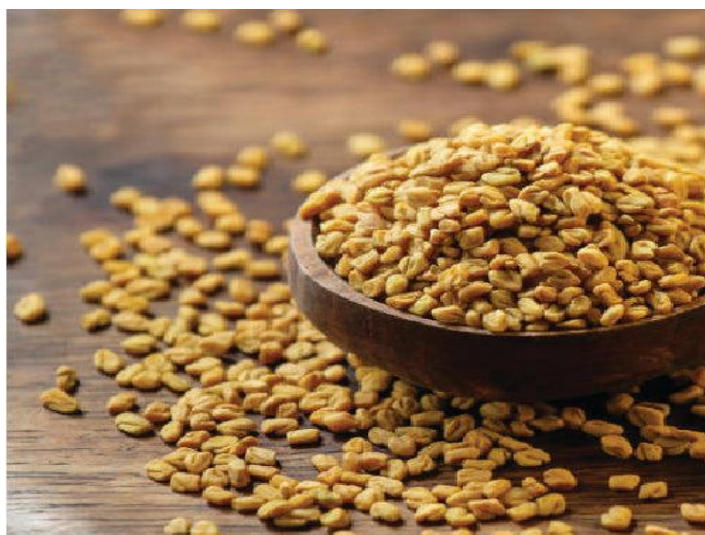
either a random effect model or a fixed model in a meta-analysis of Fasting blood glucose (FBG), 2 h plasma glucose during a 75 g oral glucose tolerance test (OGTT) (2-hPG), homeostatic model assessment for insulin resistance (HOMA-IR), glycosylated hemoglobin (HbA1c)/total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL-C), low density lipoprotein (LDL-C), body mass index (BMI). After screening, a total of 10 studies (706 participants) remained. Fenugreek significantly reduced FBG, 2-hPG, and HbA1c, but it did not significantly decrease HOMA-IR. Moreover, it significantly improved TC, TG, and HDL-C, while there were no significant differences in LDL-C and BMI. Hepatic or renal toxicity was not observed, and there were no severe adverse events associated with fenugreek despite mild gastrointestinal side effects in some studies. In conclusion, fenugreek improves overall glycemic control parameters and lipid profile safely.

Fenugreek seeds contain soluble fiber, saponins, and a range of bioactive compounds that have been shown to lower blood glucose levels and improve insulin sensitivity. Research suggests that Fenugreek can reduce fasting blood glucose, improve HbA1c levels, and enhance glucose tolerance.

The fiber content in Fenugreek seeds also helps in reducing postprandial blood sugar spikes, making it a valuable herb for diabetes management.

Traditional Use:- Fenugreek is used as an ingredient in spice blends and a flavoring agent in foods, beverages, and tobacco. Fenugreek extracts are also used in soaps and cosmetics. In North Africa, Asia, and southern Europe, fenugreek was traditionally used for diabetes and to increase milk supply in women who were breastfeeding.(1)(23).

Fig. Fenugreek



Conclusion:

Ayurvedic herbs present a promising complementary approach for managing diabetes mellitus, combining ancient wisdom with modern scientific insights. Key herbs such as Gulvel, Gurmar, Neem, Fenugreek, and Cinnamon have shown potential in regulating blood glucose levels, enhancing insulin sensitivity, and supporting overall metabolic health. However, the safe and effective use of Ayurvedic herbs requires

careful consideration, including the sourcing of high-quality products, awareness of potential interactions with conventional medications, and ongoing monitoring. While traditional uses provide a foundation, scientific validation is crucial to ensure these herbs are used effectively and safely in clinical practice.

Further research is needed to deepen our understanding of the mechanisms behind these herbs and to establish standardized guidelines for their integration into diabetes care. As interest in complementary therapies continues to grow, Ayurvedic herbs may play an increasingly important role in enhancing diabetes management and promoting overall well-being.

Reference:-

1]Charaka, S. (2003). *Charaka Samhita*. (Edited by P. K. K. Shastri). Chaukhambha Orientalia.

2]<https://www.ijpsjournal.com/article/A+Review+Article+On+Extraction+Of+Fenugreek+Seed>.

3]https://search.app?link=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F220000552_Tinospora_cordifolia_and_its_varied_activities_what_is_believed_and_what_is_known&utm_campaign=aga&utm_source=agsad1%2Csh%2F%2Fm2%2F4.

4] Sushruta, D. (2005). *Sushruta Samhita*. (Translated by K. C. Chunekar). Chaukhambha Orientalia. Vagbhata. (2008). *Ashtanga Hridayam*. (Translated by A. R. S. K. Sharma). Chaukhambha Surbharati Prakashan.

5]<https://www.ijpsjournal.com/article/A+Review+On+AntiDiabetic+Effect+Of+Neem+Azadirachta+Indica+Leaves>.

6]https://www.researchgate.net/publication/339827720_Medicinal_and_Nutritional_Perspective_of_Cinnamon_A_Mini-review.

7]Preeti S. *Tinospora cordifolia* (Amrita)-a miracle herb and lifeline too many diseases. *Int J Med Aromat Plants*. 2011;1(2):57-61.

8] Study of some *Crataegus* leaves component and effect of their aqueous extract on oxidative stress during ischemia/ reperfusion brain damage.

9] Optimization of Cinnamon (*Cinnamomum zeylanicum* Blume) Essential Oil Extraction: Evaluation of Antioxidant and Antiproliferative Effects.

10] Abdirahman, Y. A., Juma, K. K., Makori, W. A., Agyirifo, D. S., Ngugi, M. P., Gathumbi, P. K., ... & Njagi, E. N. M. (2015). Blood glucose lowering effect and safety of the aqueous leaf extracts of *Zanha africana*. *Pharmaceutica Analytica Acta*, 6(9), 1-9.

11] Christian, E. O., Onyeaghana, O. C., Ngozi, N. N., Olivia, O. O., Okwukwe, E. P., Ann, O. E., ... & Henrietta, O. C. (2020).

12] Anusree DasNandy, ... Debprasad Chattopadhyay, in *Journal of Integrative Medicine*, 2023.

13] Tiwari P, Mishra BN, Sangwan NS. Phytochemical and pharmacological properties of *Gymnema sylvestre*: an important medicinal plant. *Biomed Res Int*. 2014;2014:830285. doi: 10.1155/2014/830285.

14] Mehta, D. S., & Patel, M. N. (2018). *Traditional and Modern Herbal Medicine for Diabetes*. CRC Press.

15] Wang, J., & Zhang, Q. (2018). "Integration of traditional herbal medicine with modern medicine for diabetes management: A review of current practices and future directions." *Frontiers in Pharmacology*, 9, 1374. Link

16] <https://www.ijpsjournal.com/article/A+Review+On+Giloy+One+Plant+Many+Roles>.

17] <https://journaljpri.com/index.php/JPRI/article/view/4765/9539>.

18] *Tinospora cordifolia* (Giloy): An insight on the multifarious pharmacological paradigms of a most promising medicinal ayurvedic herb. Abhishek Gupta, Priyanka Gupta, Gunjan Bajpai.

19] Vagbhata. (2008). *Ashtanga Hridayam*. (Translated by A. R. S. K. Sharma). Chaukhambha Surbharati Prakashan.

20] Ahsan, F., Shah, Z., & Sultana, B. (2020). "Gymnema sylvestre: A review of its therapeutic potentials in diabetes and obesity." *Journal of Ethnopharmacology*, 246, 112226. Link

21] Ali, A., & Al-Dosari, M. S. (2016). "Momordica charantia (bitter melon) as a potential therapeutic agent for diabetes mellitus." *Phytotherapy Research*, 30(4), 596-605. Link

22] Jiao, H., Zhu, Z., & Zhang, M. (2022). "Curcumin: A review of its effects on glucose metabolism and diabetes management." *Journal of Diabetes Research*, 2022, 6473834. Link

- 23] Wolever, T. M. S., & Abou-Samra, A. B. (2019). "Fenugreek: A review of its effectiveness in diabetes management and its potential mechanisms." *Nutrients*, 11(3), 538. [Link](#)
- 24] Grover J.K., Yadav S., Vats V. Medicinal plants of India with antidiabetic potential. *J. Ethnopharmacol.* 2002;81:81–100. doi: 10.1016/s0378-8741(02)00059-4. [DOI] [PubMed] [Google Scholar]
- 25] Baynes J.W., Thorpe S.R. The role of oxidative stress in diabetic complications. *Curr. Opin. Endocrinol.* 1997;3:277–284. [Google Scholar].
- 26] A COMPREHENSIVE REVIEW ON DIABETES MELLITUS: AN OVERVIEW.
- 27] Antidiabetic appraisal of Guduchi (*Tinospora cordifolia* (Willd.) Miers): Insightful exposition of Ayurvedic claims.
- 28] Antidiabetic activity of a polyherbal formulation (DRF/AY/5001).
- 29] Cinnamon-flavored electronic cigarette liquids and aerosols induce oxidative stress in human osteoblast-like MG-63 cells.
- 30] Cinnamon extract inhibits allergen-specific immune responses in human and murine allergy models.
- 31] *Journal of Functional Foods* Volume 74, November 2020, 104171 An overview of Neem (*Azadirachta indica*) and its potential impact on health.
- 32] *Journal of the Saudi Society of Agricultural Sciences* Volume 17, Issue 2, April 2018, Pages 97-106 Fenugreek: A review on its nutraceutical properties and utilization in various food products
- 33] GYMNEMA SYLVESTRE R.BR. (GURMAR, MESHASRINGI): A REVIEW July 2023 *International Journal of Pharmacognosy and Phytochemical Research* 10(7):356-361
- 34] *Gymnema sylvestre* stimulates insulin release in vitro by increased membrane permeability.