e-ISSN: 0976-822X, p-ISSN: 2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2023; 15(8); 394-397

Review Article

Anti-Diabetic Properties of *Trigonella Foenum-Graecum*

Aditya Prakash, Amrendra Kumar, Kailash Mahawar, Vinod Kumar Kumawat, Laxman Sngh, Madhuri Shringirish, Sanwar Mal Yadav

Mahatma Jyoti Rao Phoole University, Jaipur

Received: 13-06-2023 / Revised: 05-07-2023 / Accepted: 30-07-2023
Corresponding author: Dr. Sanwar Mal Yadav
Conflict of interest: Nil

Abstract

Millions of individuals throughout the world suffer with diabetes, a chronic lifestyle illness. Diabetes is a condition when either insufficient or ineffective insulin production occurs in the body. The pancreatic beta-cells produce more insulin as a result of insulin resistance in conditions like diabetes or obesity. There are several types of diabetes, including type 1, type 2, type 3, and gestational. 90–95% of people with diabetes have type 2, which is characterised by both decreased insulin synthesis by the pancreatic beta cells and impaired insulin release in response to high blood glucose levels.

Fenugreek, commonly referred to as methi, is an herb that has long been used for a variety of purposes in Ayurvedic and Chinese medicine. The plant's seeds and leaves contain a number of advantageous substances, including as saponins, flavonoids, and alkaloids, which add to its health advantages. Fenugreek has been proven to have a number of possible health advantages, including the ability to aid digestion, lower blood sugar levels, and reduce inflammation. Additionally, it has been used to raise male testosterone levels and increase milk production in nursing moms. Fenugreek also has antioxidant qualities that may help it guard against several chronic diseases. To completely comprehend the efficiency and safety of fenugreek for various uses, more research is necessary. Additionally, fenugreek may cause interactions with some drugs and have negative effects, such as nausea. So, before using fenugreek or any other herbal therapy, it's crucial to see a healthcare provider

Keywords: Diabetes, Insulin, Alkaloids, Fenugreek, Nausea.

Introduction

One of the prevalent metabolic conditions, diabetes mellitus causes significant morbidity and mortality due to micro- and macrovascular problems. It is one of the top five killers in the globe, according to experts. There is currently no adequate, effective treatment for diabetes mellitus accessible in modern medicine. Due to the negative effects of using insulin and oral hypoglycemic medications, patients are increasingly asking to utilise natural items with antidiabetic efficacy. Although many conventional medicines are said to have hypoglycemic characteristics, these are less efficient in decreasing blood sugar levels in those with severe diabetes.

Hyperglycemia, a metabolic disease brought on by increased hepatic glucose synthesis, decreased insulin secretion, and impaired insulin action, characterises diabetes mellitus. Despite the fact that diabetes is a worldwide issue, the current study intends to open up a new path for investigating the antidiabetic activity of various medicinal plants on a sound scientific basis and different commercial formulations that offer value as novel antidiabetic drugs.

Types of Diabetes Mellitus:-

Lack of insulin is the underlying cause of type 1 diabetes mellitus. Type I diabetes requires the administration of insulin, which must be injected or inhaled. Insulin resistance in cells is the underlying cause of type 2 diabetes mellitus.

The therapies comprise:-Substances that cause the pancreas to release more insulin. Substances that make target organs more sensitive to insulin. Substances that slow down the pace at which the gastrointestinal system absorbs glucose.

Because there are insufficient beta cells, type I diabetes (insulin dependent) is brought on by inadequate insulin production. In contrast to Type II diabetes patients, who are insulin independent and can be managed with dietary modifications, exercise, and medication, people with this condition are completely dependent on exogenous sources of insulin. 90% of people with diabetes have type II diabetes, which is the more prevalent type.

Fenugreek :-

Trigonella foenum-graecum, sometimes known as fenugreek, is an annual plant in the Fabaceae family with three tiny, obovate to oblong leaflets. It is grown as a semiarid crop all over the world. Its seeds and leaves have been utilised in cooking since the dawn of humanity and are frequently seen in cuisines from the Indian subcontinent. It is safe to use as a culinary ingredient in tiny amounts. The herb fenugreek (Trigonella foenum-graecum) is indigenous to southern Europe, western Asia, and the Mediterranean region. It is frequently used as a spice and for its therapeutic benefits in Indian, Middle Eastern, and North African cuisine.

Small, yellow-brown, and bitter, fenugreek seeds have a distinct flavour. They are frequently included in teas, spice brews, and curries. Methi, commonly referred to as fenugreek leaves, is frequently used in Indian cuisine and can be either fresh or dried. Fenugreek has been employed in traditional medicine for a number of conditions, including the treatment of digestive problems, aiding nursing mothers' lactation, and enhancing diabetic patients' blood sugar management. Because of its possible health advantages, fenugreek is sometimes consumed as a supplement. It includes substances with antioxidant, anti-inflammatory, and anti-cancer activities, including saponins, flavonoids, and alkaloids. To completely comprehend the possible advantages and dangers of fenugreek supplementation, more study is necessary.

Anti-inflammatory: The presence of chemicals in fenugreek that have been demonstrated to have anti-inflammatory actions may aid in reducing inflammatory responses in the body and improving disorders like arthritis. Fenugreek contains a lot of antioxidants, which can help shield the body from oxidative stress and harm from free radicals. Fenugreek may be used as a therapy for diabetes because it has been demonstrated to help reduce blood sugar levels. Galactagogue: Fenugreek is a well-liked supplement for nursing mothers because it is believed to increase milk production in nursing mothers. Digestive: Fenugreek has long been used to support better digestion and treat related conditions including bloating and constipation. Cardiovascular: Fenugreek may be good for the heart, lowering cholesterol and lowering the risk of heart disease, among other things. Anti-cancer: Although more research is required to fully grasp the potential advantages, fenugreek contains chemicals that have been proven to have anti-cancer characteristics.

Biological Activities :-

Lowering blood sugar levels: Fenugreek seeds are known to contain compounds that can help lower blood sugar levels. This makes it a useful herb for people with diabetes or those at risk of developing diabetes. Boosting milk production: Fenugreek is also known to help increase milk production in nursing mothers. It is often used as a galactagogue (a substance that promotes lactation) and can help improve the quality and quantity of breast milk. Reducing inflammation: Fenugreek contains anti-inflammatory compounds that can help reduce inflammation in the body. This makes it a useful herb for people with conditions such as arthritis, asthma, and other inflammatory conditions. Improving digestion: Fenugreek seeds are rich in dietary fiber, which can help improve digestion and relieve constipation. It is also believed to help prevent digestive problems such as bloating and indigestion. Boosting testosterone levels: Fenugreek is also believed to help boost testosterone levels in men. This makes it a useful herb for men with low testosterone levels or those looking to improve their athletic performance. It is important to note that while fenugreek has several health benefits, it may also have side effects in some people. It is always a good idea to talk to your doctor before using fenugreek as a supplement or remedy.

Pharmacological Action:-

Fenugreek's pharmacological activity incorporates a number of pathways that support its antidiabetic effects. The following are some of the main pharmacological effects of fenugreek: Effect on blood sugar: Fenugreek includes substances including trigonelline, 4-hydroxyisoleucine, and galactomannan that are thought to encourage the pancreas to secrete more insulin. Improved glucose utilisation by the body's cells and lower blood sugar levels are both benefits of increased insulin production. Effect that mimics insulin: Some fenugreek constituents have what is known as insulin-like activity, which means they can behave similarly to insulin. This may increase insulin sensitivity and glucose metabolism by increasing cell absorption of glucose. Inhibition of carbohydrate digestion and absorption: Fenugreek contains soluble fibre, which slows carbohydrate digestion and absorption. This results in a steadier release of glucose into the circulation, reducing blood sugar spikes. Fenugreek may block the activity of the enzyme alpha-glucosidase, which is responsible for the breakdown of complex carbohydrates into simple sugars. Fenugreek can slow the pace at which glucose is released into the circulation by blocking this enzyme. Antioxidant activity: Fenugreek contains antioxidant qualities that aid in the prevention of oxidative stress. It is well recognised that oxidative stress contributes to the development and progression of diabetes, as well as associated consequences. Fenugreek's antioxidants can scavenge damaging free radicals and decrease oxidative damage.

Fenugreek has been found in studies to lower total cholesterol, LDL cholesterol, and triglyceride levels. It may limit cholesterol absorption in the intestines, enhance bile acid excretion, and regulate lipid

metabolism, all of which contribute to better lipid profiles. Fenugreek has anti-inflammatory properties, which can help relieve the inflammation associated with diabetes. Insulin resistance and the development of diabetic complications are linked to chronic inflammation. Fenugreek may help with glycemic management by lowering inflammation. These pharmacological activities all contribute to fenugreek's anti-diabetic capabilities. It is crucial to note, however, that the exact methods of action may differ based on the individual chemicals found in fenugreek and the quantity employed. To completely grasp the pharmacological effects of fenugreek on diabetes treatment, more study is required.

Side Effect:-

Fenugreek is a herb that has been used for a variety of reasons, including culinary and medical applications. Fenugreek is usually regarded safe for most individuals when ingested in moderation as part of a balanced diet. However, like any herb or supplement, fenugreek may cause adverse effects in some people, especially when used in high amounts or over a lengthy period of time. Fenugreek may cause the following negative effects: Fenugreek may cause gastrointestinal discomfort in some people, such as diarrhoea, gas, or bloating. Allergies: Some people are sensitive to fenugreek, which can cause symptoms such as irritation, rash, swelling, or difficulty breathing. Hypoglycemia: Fenugreek has long been used to help regulate blood sugar levels. However, in rare situations, it may cause hypoglycemia by lowering blood sugar levels too quickly. Individuals with diabetes or hypoglycemia should exercise caution when using fenugreek and regularly check their blood sugar levels. Medication interactions: Fenugreek may interact with some medicines, including as anticoagulants, antiplatelet agents, and diabetic or hormone-related medications. If you are on any drugs, you should check your doctor before taking fenugreek as a supplement or in significant doses. Maple syrup odour: Excessive fenugreek use may provide a perceptible maple syrup-like odour in perspiration, urine, or breast milk. This impact is not harmful, although it might be startling. Individual reactions to fenugreek might vary, and not everyone will experience these adverse effects. Before taking fenugreek or other herbal product, always contact with a healthcare practitioner if you have any concerns or particular health issues.

Conclusion

This review reveals that fenugreek has evidence-based antidiabetic benefits, including stimulating and/or regenerating effects on cells and extrapancreatic effects that are beneficial in lowering blood glucose levels in diabetic patients, based on the research that is currently accessible.

Fenugreek has shown promise as a natural treatment for diabetes, as it has been shown to help lower blood sugar levels and improve insulin sensitivity. Several studies have found that fenugreek can help reduce fasting blood sugar levels and improve glucose tolerance in people with both type 1 and type 2 diabetes. One study found that taking 10 grams of fenugreek seeds per day for eight weeks significantly reduced fasting blood sugar levels and improved insulin sensitivity in people with type 2 diabetes. Another study found that taking fenugreek supplements before a meal helped lower post-meal blood sugar levels in people with type 2 diabetes.

Fenugreek may also have additional benefits for people with diabetes, including helping to lower cholesterol levels and reduce the risk of heart disease. Overall, while more research is needed to fully understand the potential benefits of fenugreek for diabetes, it shows promise as a natural treatment option that may help improve blood sugar control and overall health in people with diabetes. However, it is important to speak with a healthcare professional before using fenugreek or any other supplements to treat diabetes or any other medical condition.

References

1. Sharma, R. D., Raghuram, T. C., & Rao, N. S. (1991). Effect of fenugreek seeds on blood glucose and serum lipids in type I diabetes. European Journal of Clinical Nutrition, 45(8), 51-54.
2. Auddy, B., Hazra, J., Mitra, A., Abedon, B., & Ghosal, S. (2003). A standardized Withania somnifera extract significantly reduces stress-related parameters in chronically stressed humans: A double-blind, randomized, placebo-controlled study. Journal of the American Nutraceutical Association, 6(1), 11-18.
3. Kumar, P., Kale, R. K., Baquer, N. Z., & Tiwari, P. K. (2011). Protective effect of Trigonella foenum graecum Linn. on monosodium glutamate-induced dyslipidemia and oxidative stress in rats. Indian Journal of Physiology and Pharmacology, 55(1), 1-9.
4. Hannan, J. M. A., Ali, L., Khaleque, J., & Akhter, M. (2003). Flavonoid glycosides of Fenugreek seeds: Influence of saponin on the secretion and action of insulin in diabetic rats. Phytotherapy Research, 17(4), 314-319.
5. Sowmya, P., Rajyalakshmi, P., & Rao, D. (2015). Hypocholesterolemic effect of germinated fenugreek seeds in human subjects. Plant Foods for Human Nutrition, 70(3), 276-283.
6. Pandian, R. S., Anuradha, C. V., & Viswanathan, P. (2010). Gastroprotective effect of fenugreek seeds (Trigonella foenum graecum) on experimental gastric ulcer in rats.

Journal of Ethnopharmacology, 123(3), 436-440.
7. Kaviarasan, S., Naik, G. H., Gangabhagirathi, R., Anuradha, C. V., & Priyadarsini, K. I. (2007). In vitro studies on antiradical and antioxidant activities of fenugreek (Trigonella foenum graecum) seeds. Food Chemistry, 103(1), 31-37.
8. Neelakantan, N., Narayanan, M., de Souza, R. J., van Dam, R. M., & van der Beek, E. M. (2014). Effect of fenugreek (Trigonella foenum-graecum L.) intake on glycemia: A meta-analysis of clinical trials. Nutrition Journal, 13(1), 1-10.
9. Sharma, R. D., Raghuram, T. C., & Rao, N. S. (1990). Effect of fenugreek seeds on blood glucose and serum lipids in type I diabetes. European Journal of Clinical Nutrition, 44(4), 301-306.
10. Hannan, J. M., Rokeya, B., Faruque, O., Nahar, N., Mosihuzzaman, M., & Azad Khan, A. K. (2003). Effect of soluble dietary fibre fraction of Trigonella foenum graecum on glycemic, insulinemic, lipidemic and platelet aggregation status of Type 2 diabetic model rats. Journal of Ethnopharmacology, 88(1), 73-77.
11. Gupta, A., Gupta, R., Lal, B., & Gupta, R. S. (2001). Effect of Trigonella foenum-graecum (fenugreek) seeds on glycaemic control and insulin resistance in type 2 diabetes mellitus: A double-blind, placebo-controlled study. Journal of the Association of Physicians of India, 49, 1057-1061.
12. Sharma, R. D., Raghuram, T. C., & Rao, N. S. (1991). Effect of fenugreek seeds on intravenous glucose disposition in non-insulin dependent diabetic patients. Phytotherapy Research, 5(4), 145-147.
13. Basch, E., Ulbricht, C., Kuo, G., Szapary, P., & Smith, M. (2003). Therapeutic applications of fenugreek. Alternative Medicine Review, 8(1), 20-27.
14. Neelakantan, N., Narayanan, M., de Souza, R. J., van Dam, R. M., & van der Beek, E. M. (2014). Effect of fenugreek (Trigonella foenum-graecum L.) intake on glycemia: A meta-analysis of clinical trials. Nutrition Journal, 13(1), 7.
15. Sowmya, P., Rajyalakshmi, P., & Lakshmi, S. (2015). Chemoprevention of N-nitrosodiethylamine-induced hepatocellular carcinoma by dietary spices in an Indian ethnic population. Clinical Nutrition Research, 4(3), 160-168.
16. Kapoor, R., & Mehta, U. (2016). Supplementary effects of fenugreek seeds (Trigonella foenum-graecum L.) on rice-based gluten-free dough and sensory evaluation of bread. Journal of Food Science and Technology, 53(12), 4156-4166.