

Study of Anti-Diabetic Activity of *Trigonella foenum-graecum*, *Cinnamomum Zeylanicum* and *Syzygium Cumini*

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Abstract: *This review paper examines the antidiabetic properties of gummies formulated with Trigonella foenum graecum (fenugreek), Cinnamomum zeylanicum (cinnamon), and Syzygium cumini (jamun). Diabetes mellitus is a global health concern, and the search for natural remedies with minimal side effects has intensified. Fenugreek, cinnamon, and jamun are well-known for their antidiabetic effects due to their rich phytochemical composition. Gummies offer an attractive delivery system for these bioactive compounds, combining convenience with potential therapeutic benefits. This review discusses the pharmacological actions, bioactive constituents, and clinical evidence supporting the use of these botanicals in managing diabetes, with a focus on their incorporation into gummy formulations. Additionally, challenges and future prospects in the development of antidiabetic gummies are addressed*

Keywords: Fenugreek, cinnamon oil, Java plum, Anti-diabetic

I. INTRODUCTION

Diabetes mellitus, a chronic metabolic disorder characterized by elevated blood glucose levels, poses a significant global health challenge. With an increasing prevalence worldwide, effective management and treatment strategies are crucial to mitigate its complications and improve patient outcomes. Anti-diabetic medications play a pivotal role in achieving glycemic control and preventing associated complications.

This comprehensive review aims to provide an overview of the various classes of anti-diabetic medications, their mechanisms of action, efficacy, safety profiles, and current clinical guidelines for their use. Understanding the pharmacological properties and therapeutic implications of these agents is essential for healthcare professionals involved in the management of diabetes.

The landscape of anti-diabetic therapy has evolved significantly over the years, with the development of novel drugs targeting different pathways involved in glucose metabolism and insulin regulation. From traditional agents such as metformin and sulfonylureas to newer classes like GLP-1 receptor agonists and SGLT-2 inhibitors, there is a wide array of treatment options available to tailor therapy according to individual patient needs and preferences.

In addition to discussing the pharmacological aspects of anti-diabetic medications, this review will also explore emerging trends in diabetes management, including the integration of technology such as continuous glucose monitoring systems and insulin pumps, as well as the role of lifestyle interventions in conjunction with pharmacotherapy.

Overall, this review aims to provide a comprehensive understanding of the pharmacological landscape of anti-diabetic medications, with implications for clinical practice, research, and patient care.

Fenugreek :



Synonym –Methi

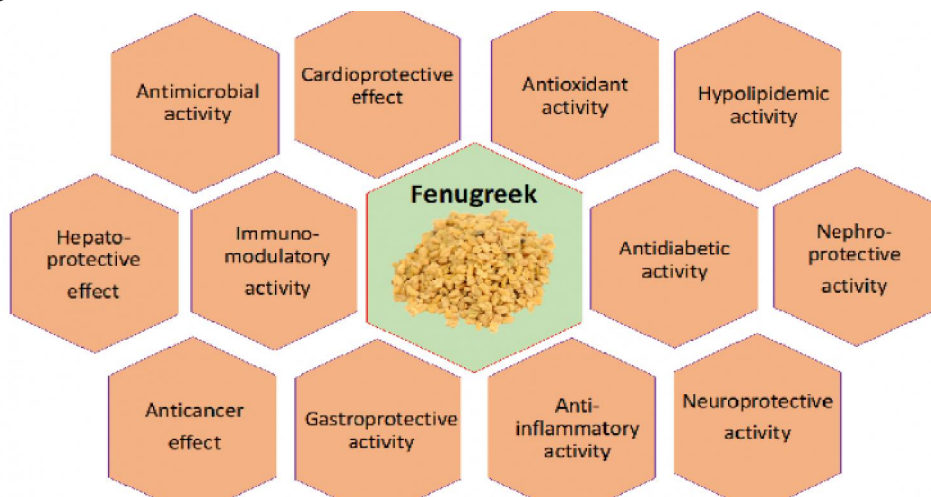
Biological source –It consist of seeds and leaves of *Trigonella foenum-gracum*

Family –Fabaceae

Chemical constituents - Methi contains not less than 0.1% w/w trigonelline on dry basis. Alkaloids such as trimethylamine, neurin, choline, trigonellin, gentianine, carpaine and betain are present. Amino acids such as isoleucine, histidine, lysine are present. Saponins such as graecunins, fenugrin B, fenugreekine are present.

Uses :

Breast milk production, Blood sugar control, Hypercholesterolemia, Inflammation, Benefits of fenugreek seeds, Menstrual cramps, Obesity, Diabetes, Heart disease, Wound, Antioxidant, Digestion, Constipation, Hypocholesterolaemic activity, Immunomodulator, Improved hair health, Increase sperm levels, and testosterone Lactation aid



Kingdom : Plantae

Division :Magnoliophyta

Class : Magnoliopsida

Order :Fabales or Leguminales

Sub-family :Trifoliae

Genus : *Trigonella*

Sub-genus : *Foenumgraecum*

Species : *Trigonella foenum-graecum*

Antidiabetic activity of fenugreek:

Fenugreek galactomannan is one of the constituents of fenugreek seed, and shows promising antidiabetic properties.

It shows little effect on glucose uptake by peripheral cells and antioxidant activity.

Fenugreek galactomannan lowered %GHbA_{1c}, so it can be used in long-term therapy

Increase in the liver glycogen content after fenugreek galactomannan treatment can be brought about by an increase in glycogenesis and/or a decrease in glycogenolysis; hence, it is likely that fenugreek galactomannan stimulates glycogenesis and/or inhibits glycogenolysis in the liver of diabetic rats.

The alcoholic extracts of seeds have been shown to restore the activities of key enzymes of carbohydrate and lipid metabolism close to normal values.

These results tend to suggest that fenugreek galactomannan and alcoholic extract of seeds are promising agents for the management of diabetes mellitus. Further research in diabetic human patients warrants exploration for its potential as an antidiabetic agent.

Cinnamon :



Synonym : Kalmi-dalchini

Biological source : It consists of the dried inner bark of the shoots of coppiced trees of *Cinnamomumzeylanicum* Nees

Family : Lauraceae

Chemical constituents :

Cinnamon contains about 10% of volatile oil, tannin, mucilage, calcium oxalate and sugar.

Volatile oil contains 60-70% cinnamaldehyde, 5 to 10% eugenol, benzaldehyde, cuminaldehyde, terpene hydrocarbons such as phellandrene, cymene, caryophyllene, pinene and small quantities of ketones and alcohols.

1.2 % TANNINS: PHLOBATANNINS SWEET SUBSTANCE: MANNITOL

Uses :

Health Benefits of Cinnamon

Anti-Inflammatory	Anti-Cancer
Anti-Diabetic	Anti-Bacterial
Heart Health	Anti-Fungal
Memory Support	Anti-Microbial
Anti-Oxidants	



Mood enhancer. Cinnamon oil's properties make it a popular choice for at-home aromatherapy treatments.

Antibacterial properties. Research suggests that cinnamon oil:

Hair fullness and growth.

Food flavoring and cosmetics

Kingdom: Plantae

Division : Magnoliophyta

Phylum : Magnoliophyta

Class : Magnoliopsida

Order : Laurales

Genus : *Cinnamomum*

Species : *Zeylanicum*

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Antidiabetic activity of Cinnamon:

The dry bark of cinnamon trees is rich in botanical source of polyphenolics and has been used to improve general health and treat a variety of disease conditions including diabetes . In addition to anti-diabetic properties, cinnamon is known to have anti-inflammatory, antibacterial, and antioxidant properties . Cinnamon lowering effect of glucose level may be due to many mechanisms; many *in vitro* studies have showed that cinnamon increases glucose entry into cells by enhanced insulin receptor phosphorylation and the translocation of glucose transporter glucose transporter-4 (GLUT4) to the plasma membrane . The active compound responsible is believed to be poly-phenolic compound . Another possible mechanism that explains the hypoglycemic effect of cinnamon is an increase in the expression of peroxisome proliferator-activated receptor (PPAR) (alpha) and (gamma) receptors thereby increasing insulin sensitivity . Furthermore, it has also been demonstrated that cinnamon possesses an inhibitory effect on intestinal glucosidases and pancreatic amylase. Ceylon cinnamon is the most potent inhibitor of pancreatic amylase and intestinal sucrase . A clinical study has demonstrated its ability to delay gastric emptying as well as lowering the postprandial glucose level .

Java plum :



Biological source : Syzygiumcumini (L.) Skeels, syn. Syzygiumjambolanum DC.; Eugenia cumini Druce

Family : Myrtaceae

Chemical constituents: anthocyanins, glucoside, ellagic acid, isoquercetin, kaemferol and myrecetin

Uses :

Edible Fruit: The fruit of the Java plum is edible and is consumed fresh, as well as used in making jams, jellies, juices, and desserts.

Medicinal Purposes: In traditional medicine, various parts of the Java plum tree, including the fruit, seeds, bark, and leaves, are used for their medicinal properties. They are believed to have benefits for diabetes, digestive disorders, respiratory ailments, and more.

Dye: The fruit pulp is sometimes used as a natural dye, particularly in the textile industry.

Wood: The wood of the Java plum tree is used in making furniture, tools, and agricultural implements.

Landscaping: Due to its attractive foliage, flowers, and fruit, the Java plum tree is often planted for ornamental purposes in parks, gardens, and along roadsides.

Soil Erosion Control: The dense foliage of the Java plum tree helps in preventing soil erosion, making it useful in erosion-prone areas.

Livestock Feed: The fallen fruit and leaves of the Java plum tree are sometimes used as fodder for livestock.

Kingdom : Plantae

Division : Magnoliophyta

Clade : Angiosperms

Order: Myrtales

Genus: Syzygium

Species: S.cumini

Antidiabetic activity of Java plum seed:

Ayurveda suggests Jamun as a highly effective fruit while fighting against diabetes. The seeds of the fruit have active ingredients called jamboline and jambosine that slow down the rate of sugar released into the blood and increases the insulin levels in the body. It converts starch into energy and reduces the symptoms of diabetes such as frequent urination and thirsting.

Comparative study:

Comparing anti-diabetic properties of gummies from *Trigonella foenum-graecum* (fenugreek), *Cinnamomum zeylanicum* (cinnamon), and *Syzygium cumini* (jamun) involves assessing their effects on blood sugar levels, insulin sensitivity, and potential side effects. Research suggests fenugreek can improve glycemic control, while cinnamon may enhance insulin sensitivity. Jamun has shown potential in managing diabetes due to its hypoglycemic effects. However, individual responses can vary, so it's essential to consider factors like dosage, purity, and any potential interactions with medications. Conducting a controlled trial comparing these gummies' efficacy and safety would provide valuable insights into their relative benefits for diabetes management.

Safety and toxicity :

Evaluation of the safety profile of fenugreek, java plum, and cinnamon.

Discussion on potential adverse effects and precautions associated with their use in diabetes management.

II. CONCLUSION

Summary of key findings and Insights regarding the anti-diabetic activity of fenugreek, Java plum, and cinnamon.

Implications for future research and clinical practice.

Final remarks on the significance of traditional medicinal plants in combating diabetes.

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