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Review

A Review article on Gymnema Sylvester (Gudmar)

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Abstract

Gudmar, also referred to as Gymnema Sylvester Grows in topical forests in the parts of Africa, Central and Southern India. Gymnema Sylvester, an ayurvedic herb, become known as the destroyer of sugar because in ancient times, ayurvedic physician found That chewing a few leaves of Gymnema Sylvester lessened and sweetness of sugar. The plants leaves are frequently used in Indian Proprietary medication as a diuretics and to treat diabetes. The plant has been shown to have antihelmentic, anti-oxidant, antiobesity, Immunomodulatory, anti-microbial, diuretics, anti-inflammatory and digestive benefits. The numerous pharmacological actions and Applications of this plant are the primary focus of this review paper. Different parts of the plants including the root, stems and leaves Have been used as stimulants, laxative, diuretics, cardiotonics and uterine tonics in traditional medical system. The main purpose of the paper is to provide an overview of medicinal qualities of the Gudmar.

Keywords: Gymnema sylvestre, Pharmacological activity, Asclepiadaceae, Gymnemic acid, Anti-diabetic,Gurmar.

INTRODUCTION

Gudmar (Gymnema Sylvestre) also known as the sugar destroyer. The plant is woody climbing shrub and its hindi name "Gudamar"literally means "sugar killer"because of its traditional use in managing diabetes .The leaves of gudmar contain bioactive compound like gymnemic acids which are known to suppress the taste of sweetness and help lower blood sugar levals.

Gymnema Sylvestre R. Br. is a valuable herb belonging to the family Asclepiadaceae, and widely distributed in India, Malaysia, Srilanka, Australia, Indonesia, Japan, Vietnam, tropical Africa and the southwestern

region of the People's Republic of China. The plant is commonly known as Periploca of the woods (English); Gurmar (Hindi); Meshashringi, madhunashini (Sanskrit); Kavali, kalikardori (Marathi); Dhuleti, mardashingi (Gujrathi); Adigam, cherukurinja (Tamil); Podapatri (Telgu) and Sannagerasehambu (Kannada). The word "Gymnema" is derived from a Hindu word "Gurmar" meaning "destroyer of sugar" and it is believed that it might neutralize the excess of sugar present in the body in Diabetes mellitus [6]. The taxonomy of the plant is described in table 1.

Table: 1 Taxonomy of Gymnema Sylvester

Kingdom	Plantae(Plant)
Division	Magnoliophyta
Class	Magnoliopsida (Dicotyledons)
Ordor	Gentianales
Family	Asclepiadaceae (Milkweed Family)
Genus	Gymnema
Species	Gymnema Sylvestre

Table: 2 Taxonomy of Gymnema Sylvester

Habitat	It is indigenous to tropical and subtropical regions, thriving in warm, humid clamates and is commonly found in forests. scrub jungles and hill slopes up to 800 meters.
Leaves	Its features glossy green oval leaves arrange oppositely on the steams the leaves are soft hairy and can very in size depending on the type.
Flowers	Gudmar produces small, yellow flowers that grow in clusters, typically blooming during spring and autumn.
Roots	The gymnema plant possesses a taproot the roots are recorgnized for their medicinal properties.
Corolla	The corolla of the gymnema sylvestre flower is yellow and companulate (bell-shaped).
calyax	The calyx which are the sepals protecting the developing bud is pubescent (hairy) and almost divided to the base. The lobes of the calyax are long ovate and obtuse.
Fruits	The fruits are follicles, which are dry fruits that splits open along one side to realeases seeds. The fruits mature between march and may.
Seeds	The seeds of gymnema sylvestre are narrowly avoid-ablong about 1.3cm long and flat.

Picture

Fig 1:

Plant Description

G. sylvestre is a slow growing, perennial, woody climber, distributed throughout the India, in dry forests upto 600 m height. It is mainly present in the tropical forest of Central and Southern India. It is also found in Banda, konkan, Western Ghats, Deccan extending to the parts of western and northern India. The plant is a large, more or less pubescent, woody climber.

The leaves are opposite, usually elliptic or ovate (1.25 – 2.0 inch x 0.5-1.25 inch). Flowers are small, yellow, in axillary and lateral umbel in cymes; Follicles are terete and lanceolate upto 3 inches in length. The Calyx-lobes are long, ovate, obtuse and pubescent. Corolla is pale yellow campanulate, valvate, corona single, with 5 fleshy scales. Scales adnate to throat of corolla tube between lobes; Anther connective produced into a memberanous tip, pollinia 2, erect, carpels 2,

G. sylvestre is a potent antidiabetic plant and used in folk, ayurvedic and homeopathic systems of medicine. It is also used in the treatment of asthma, eye complaints, family planning, snakebite, urinary complaints, stomach problems, piles, chronic cough, breathing troubles, colic pain, cardiopathy, constipation, dyspepsia and hemorrhoids, hepatosplenomegally. In addition, it also possesses antimicrobial, antihypercholesterolemic, anti- inflammatory and sweet suppressing activities and it also acts as feeding deterrents to caterpillar.

Literature surveys reveal that, G. sylvestre is a popular plant used in treating various ailments and used as one of the important ingredient in several ayurvedic formulations, very little efforts have also been made to verify its efficacy through scientific screening in animal models and clinical trials. The present review highlights the various folk, ayurvedic uses and, phytochemical and pharmacological studies conducted on G. sylvestre.

Pharmacognostical Studies

Leaves of G. sylvestre are widely used for the treatment of diabetes and as a diuretic in Indian proprietary medicines and in most of herbal drug market of the country, leaves are being sold along with the aerial parts as Gurmarbuti. Therefore, macroscopic and microscopic characters of the aerial parts are described below:

Traditional uses

In the traditional Ayurvedic medicine, G. sylvestre is used to treat both type I and type II diabetes. Additionally, it is used to treat respiratory issues, piles, chronic cough, asthma, eye complaints, cardiopathy, constipation, jaundice, and bronchitis. It is also used to treat stomach issues, urinary complaints, and breathing problems. Trials also employ it to treat and neutralize the venomous effect of snake bites . Gymnema sylvestre is used as a sugar destroyer in a cases of Glucosuria and other urinary diseases, according to sushruta, because chewing the leaves destroys the ability to detect the sweet tastes.etc. It`s nature has been reported in a variety of ways, including that it is bitter, astringent, thermogenic, anti-inflammatory, digestive, liver tonic, diuretic, stomachic, stimulant, anthelmintic, laxative, cardio tonic, anti-pyretic, and uterine tonic, etc.

Mechanism of Action of Gymnema sylvestre:

1. Taste Receptor Level (Sweetness Blocker)

Gymnemic acids bind to sweet taste receptors on the tongue (T1R2/T1R3), blocking sugar molecules from activating them.

Result → Suppression of sweet taste for ~1–2 hours → reduced sugar craving and intake. Traditional name "gurmar" means "sugar destroyer."

2. Intestinal Absorption of Glucose

Gymnemic acids resemble glucose molecules structurally . They competitively inhibit glucose transport across the intestinal epithelium by blocking SGLT-1 (sodium-glucose co-transporter-1) and related transporters.

Result → Reduced absorption of glucose from the gut → lower post-prandial blood glucose.

3. Pancreatic β-Cell Effects

Animal studies show regeneration or protection of pancreatic β-cells destroyed in diabetes models (STZ-induced).Possible stimulation of insulin secretion from surviving β-cells.

Result → Improved endogenous insulin production.

4. Enzyme Inhibition

Inhibits digestive enzymes (α-amylase, α-glucosidase) that break down complex carbs into glucose.

Result → Slower carbohydrate digestion → blunted post-meal glucose spikes.

5. Peripheral Tissue Effects

Enhances glucose uptake in muscle and adipose tissue (via increased GLUT4 translocation, insulin sensitivity).Decreases lipid accumulation in adipocytes (antiobesity effect).Improves lipid metabolism: ↓TG, ↓LDL, ↑HDL in studies.

6. Liver & Metabolism

May reduce gluconeogenesis (hepatic glucose production).Supports glycogen synthesis in liver and muscle.

Result → Better control of fasting blood glucose.

7. Peptide Component (Gurmarin)

Gurmarin, a polypeptide isolated from G. sylvestre, also suppresses sweet taste response in animals.Helps reinforce reduced sugar intake behaviorally.

Pharmacological Uses

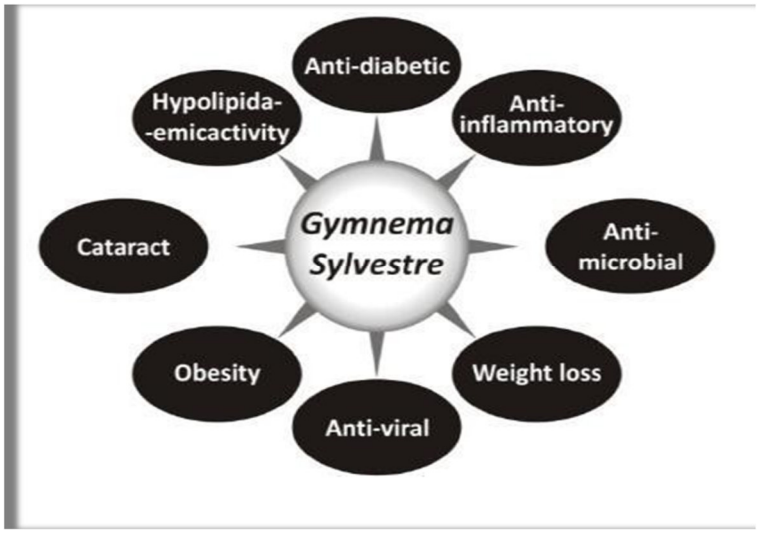

Fig 2:

General Pharmacological Activities

The LD50 of ethanolic and water extract of G. sylvestre administered intraperitoneally in mice was found to be 375 mg/kg. In an acute toxicity study in mice, no gross behavioral, neurologic, or autonomic effects were observed. The safety ratio (LD50/ED50) was 11 and 16 in normal and diabetic rats, respectivelyn. The pharmacological activities of G. sylvestre are desribed below:

1. Antiobesity Study

G. Sylvestre helps to promote weight loss possibly through its ability to reduce cravings for sweets and control blood sugar levels. It has been reported that the gurmarin peptide block the ability to taste sweet or bitter flavors and thus reduces sweet cravings. A standardized G. sylvestre extract in combination with niacin-bound chromium and hydroxycitric acid has been evaluated for antiobesity activity by monitoring changes in body weight, body mass index (BMI), appetite, lipid profiles, serum leptin and excretion of urinary fat metabolites. This study showed that the combination of Gymnema Sylvestre extract and hydroxycitric acid, niacin bound chromium can serve as an effective and safe weight loss formula that can facilitate a reduction in excess body weight and BMI while promoting healthy blood lipid levels.

2. Antidiabetic Activity

The first scientific confirmation of G. sylvestre use in human diabetics came almost a century back when it was demonstrated that the leaves of G. sylvestre reduce urine glucose in diabetics. In an animal study, Paliwal et al have investigated that gurmar leaf powder had positive and encouraging effects over blood glucose levels. No adverse effect was observed on the health status of the subjects and thus, it can thus be concluded that gurmar powder is effective in lowering the fasting as well as postprandial blood glucose levels . Moreover, Sugihar et all have investigated the antihyperglycemic action of a crude saponin fraction and five triterpene glycosides derived from the methanol extracts of G. sylvestre.

3. Hypolipidaemic Activity

The administration of leaf extracts to hyperlipidaemic rats for two weeks have been found to show reduction in elevated serum triglyceride (TG), total cholesterol (TC), very low density lipoprotein (VLDL) and low density lipoprotein (LDL) – cholesterol in dose dependent manner. The efficiency of this drug was almost similar to that of a standard lipid lowering agent clifibrate.

4. Antimicrobial Activity

The ethanolic extract of G. sylvestre leaves showed good antimicrobial activity against Bacillus pumilis, B. subtilis, Pseudomonas aeruginosa and Staphylococcus aureus and no activity was found against Proteus

vulgaris and Escherichia coli. The aqueous and methanolic extract of G. sylvestre leaves also showed moderate activity against the three pathogenic Salmonella species (Salmonella typhi, S. typhimurium and S. paratyphi). Out of the two extracts used, aqueous extract showed higher activity against the Salmonella species. Ethanolic, Chloroform and Ethyl acetate extracts of the aerial parts of G. sylvestre also reported to have antibacterial effects against P. vulgaris, E. coli, P. aeroginosa, Klebsella pneumoniae and S. aureus.

5. Anti-Inflammatory Activity

The aqueous extract of G. sylvestre leaves was investigated for evaluation of antiinflammatory activity in rats at a dose 200, 300 and 500 mg/kg in carrageenin-induced paw oedema and cotton pellet method. The aqueous extract at 300 mg/kg decreased the paw oedema volume by 48.5% with in 4 h after administration, while the standard drug phenylbutazone decreased the paw oedema volume by 57.6% when compared with the paw oedema volume of control. The aqueous extract at the dose of 200 mg/kg and 300 mg/kg produced significant reduction in granuloma weight, when compared to control group.

6. Free Radical Scavenging Activity

In vitro, the inhibitory effects of DPPH radicals and LDL oxidation were found with aqueous extract of G. sylvestre. G. sylvestre require 32.1 µl, for scavenging 50% of the DPPH radicals. ‘

Dosage Forms:

(1) Liquid

(2) Tablet

(3) Capsule

(4) Powder

Description of Dosage Form

In market, G. sylvestre is available in the form of crude plant, powder, extract paste and solid in standardized form. The plant material is also available in the form of capsule or tablets in combination with other herbal plants

Adult dose

In liquid form (extract), 25 to 75 ml per week is recommended. Best results of this medicine will come after 6 to 12 months of continuous use. It is also prescribed in tablet form, in this case 8 to 12 g per day of leaf equivalent is recommended.

Pediatric dose

In this case, there is insufficient evidence about its uses for pediatric population, so it can not be recommended for them.

Application of Gymnema Sylvester (Gudmar)

1. Antidiabetic Activity:

Helps lower blood glucose levels.
Reduces intestinal absorption of sugar and enhances insulin secretion.
Regenerates pancreatic β-cells and controls sugar cravings.

2. Anti-obesity Effect:

Suppresses appetite and reduces sweet taste sensation.
Promotes weight loss by improving fat metabolism.

3. Hypolipidemic Action:

Decreases total cholesterol and triglycerides.
Supports cardiovascular health.

4. Antioxidant Property:

Neutralizes free radicals and protects cells from oxidative damage.

5. Anti-inflammatory and Antimicrobial:

Useful in reducing inflammation and preventing infections.

6. Digestive and Liver Support:

Improves digestion and supports liver function.

7. Traditional Medicinal Uses:

Used in Ayurveda to treat cough, asthma, urinary disorders, and constipation.

CONCLUSION

Among naturally occurring substances that alter sweetness, Gymnema sylvestre holds a special place. As a botanical companion, It exhibits potential in terms of health and wellbeing. The herb has been used for many medicinal purposes as a traditional ayurvedic medicine since ancient times, and its use has grown in popularity in the contemporary era. When taken as part of a balanced diet, contains 75% of gymnemic acid from the leaf extract, which supports the pancreas nutritionally and helps to keep blood sugar levels in check. Because G. sylvestre has medicinal properties in all forms, it is a highly commercially exploitable plant. Over the past few decades, significant progress has been made regarding its physiological function and potential medical applications. As a result, it might be regarded as a source for commercial goods meant to cure diabetes and other long-term illnesse.

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