

Review on Clinical Properties of Miracle Plant: *Gymnema sylvestre*

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ABSTRACT

Gymnema sylvestre R. Br. (Asclepiadaceae) is found in many regions of Asia, Africa and Australia. Traditionally the leaves are used for the treatment of diabetes and as a diuretic. It is currently utilised in contemporary therapeutics as a nutritional supplement. Gymnemasaponins are separated from the plant, and gymnemic acid is the primary chemical component that is active. In addition to having many other advantageous qualities like digestive, anti-inflammatory, diuretic, antiviral, anticancer, and antihelminthic, this plant has the ability to reduce blood glucose levels. It is also used to treat leucodermal problems, dyspepsia, constipation, jaundice, haemorrhoids, asthma, and bronchitis. A review of the literature uncovered some noteworthy properties of the plant, including anti-inflammatory, antidiabetic, and anti-obesity, antibacterial, and free radical scavenging properties. The present review is an attempt to highlight the various uses as well as phytochemical and pharmacological reports on *G. sylvestre*.

Keywords: *Gymnema*, Gurmar, Madhunashini, Phytochemical,

INTRODUCTION

Gymnema sylvestre R. Br. Belongs to the family Asclepiadaceae, and widely distributed throughout the world. Common Names of the plant are
English- Periploca of the woods;
Hindi- Gurmar;
Sanskrit Name- Meshashringi, madhunashini;
Marathi Name- Kavali, kalikardori;
Gujarati Name- Dhuleti, mardashingi;
(Anonymous, 1956, Kanetkar et al, 2007, Paliwal et al., 2009, Rachh et al., 2010).

The word “Gymnema” is derived from “Gurmar” which means “destroyer of sugar”. This neutralizes the excess of sugar present in the body due to Diabetes mellitus (Keshavamurthy, 1990).

Plant description

It is a perennial, slow growing, plant. This is a large, more or less pubescent, woody climber. The leaves are opposite, elliptic or ovate in shape. Flowers are small and yellow, cymose, arranged in axillary and lateral umbel; Follicles are lanceolate upto 3 inches in length.

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The Calyx-lobes are long and pubescent. Corolla is pale yellow, corona single, with 5 fleshy scales. Anther connective produced into a membranous tip, carpels 2, unilocular; locules many ovuled (Potawale, 2008, Kritikar et al., 1998, Zhen et al., 2001, Gurav et al., 2007).

G. sylvestre is widely known as antidiabetic plant which is used in medicines like ayurvedic and homeopathic.

Common Uses of *Gymnema*-

In the treatment of asthma;

Eye problems;

Snakebite;

Family planning;

Urinary Disorders;

Stomach treatments;

Cough and breathing troubles etc.

It also possesses antimicrobial, antihypercholesterolemic, and anti-inflammatory activities (Kumar et al., 2008, Nadkarni, 2004).

The present review highlights the various folk, ayurvedic uses and pharmacognostical, phytochemical and pharmacological studies conducted on *G. sylvestre*.

Phytochemistry

Leaves: *G. sylvestre* leaves contain triterpene saponins which are oleanane and dammarene classes.

Oleanane saponins are gymnemic acids and gymnemasaponins;

Dammarene saponins are gymnemasides (Dateo, 1973, Khramov et al., 2008, Yoshikawa et al., 1992).

The leaves also have resins, albumin, chlorophyll, carbohydrates, tartaric acid, anthraquinone derivatives, alpha and beta chlorophylls, lupeol, inositol alkaloids, organic acid, parabin, calcium oxalate, lignin, cellulose etc (Sinsheimer, et al, 1970).

Stem: With the help of chromatographic techniques, it was investigated that many important chemical compounds are found in the stem lie stigmasterol and triterpenoid saponin.

Stigmasterol is used as antidiabetic, hypoglycaemic, antioxidant and anticancer agent.

Triterpenoid saponins exhibit anti-tumor, anti-fungal and anti-diabetic properties (Matsuda et al., 1997, Kaur et al, 2011, Garai, 2014, Liu et al, 2014).

Mechanism of Action

Some potential processes by which the leaves, particularly the gymnemic acids from *G. sylvestre*, produce their hypoglycemic effects include:

- It has been demonstrated to increase the activities of enzymes responsible for utilising glucose by insulin-dependent pathways,
- an increase in phosphorylase activity,
- a decrease in gluconeogenic enzymes and sorbitol dehydrogenase, and
- an increase in phosphorylase activity.

It also causes inhibition of glucose absorption from the intestine. (Nakamura et al., 1999).

Traditional Uses

It is described in Susruta that *G. sylvestris*, is a destroyer of glycosuria and other urinary disorders. It is a bitter in taste, astringent, acrid, thermogenic, anti-inflammatory, anodyne, digestive, liver tonic emetic, diuretic, stomachic, stimulant, anthelmintics, laxative, cardiogenic, expectorant, antipyretic and uterine tonic. It is useful in dyspepsia, constipation and jaundice, haemorrhoids, renal and vesicle calculi, cardiopathy, asthma, bronchitis, amenorrhoea, conjunctivitis and leucoderma (Nadkarni, 1993, Vaidyaratnam, 1995, Chopra et al., 1992). The drug is also used in the composition of ayurvedic preparations like Ayaskri, Varunadi kasaya, Varunadighrtam, Mahakalyanakaghrtam (Joy et al., 1998).

Ethnobotanical Uses

All over India, there are more than 400 distinct tribal and other ethnic groups. Each tribal group has its unique understanding of how to employ natural resources as cures for illnesses. It is said that the Nagari Hills residents of the North Arcot District, Bombay, and Gujarat have a morning ritual of chewing green *G. sylvestre* leaves, which keeps their urine pure and lowers their blood sugar levels. Gujarati and Bombay bourgeois also chew

fresh leaves for the same result, which keeps their bodies in good shape. The leaves are suggested for the treatment of furunculosis and madhumeha in Bombay and Madras. Vomiting can be treated with the root juice (Ekka et al., 2007).

General Pharmacological Activities

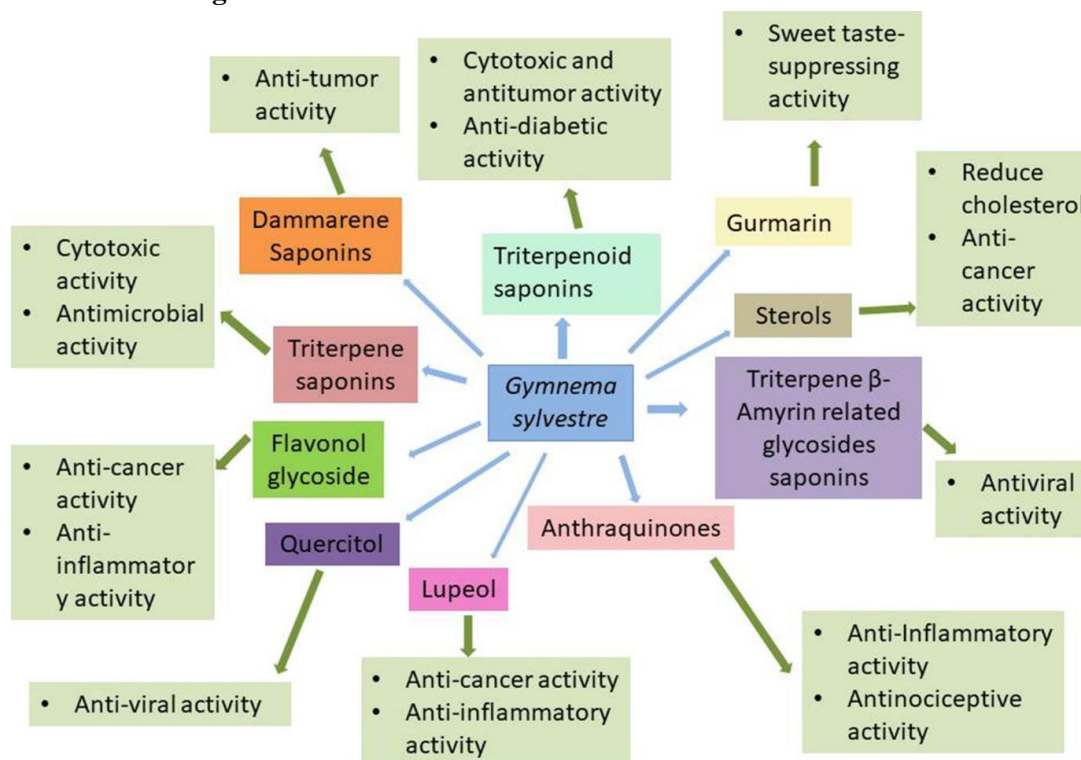


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1. Antiobesity Activity

G. Sylvestre reduces cravings for sweets and control blood sugar levels which helps to promote weight loss.

A. Gurmarin peptide- It block the ability to taste sweet or bitter flavors and thus reduces sweet cravings in a person (Pierce, 1999 and Ninomiya et al., 1995).

B. In combination with niacin-bound chromium and hydroxycitric acid- It alters body mass index (BMI), appetite, lipid profiles, serum leptin and excretion of urinary fat metabolites (Presuss et., al 1999).

2. Antidiabetic Activity

A. The leaves of *G. sylvestre* reduces urine glucose in diabetics (Charpurey, 1926). No adverse effect was observed due to its application. Ethanol extract reduces glucose level by 46%; water extract by 26% and

Pharmacological Uses

Following the folk and traditional uses of the plant, it has been investigated scientifically to validate the potential of plant in cure of variety of ailments.

methanol extract by 12%. (Mcburney and Gent, 1978, Luo et al. 2006, Shah et al, 2011 and 2012).

B. It reduces the level of insulin, protein, triglycerides, cholesterol and glucose and improves liver histopathology (Sujin, 2008).

3. Lipid lowering Activity

The leaf extracts was applied to hyperlipidaemic rats for two weeks and potent results have been observed. It was detected that this extract lowered the level of serum triglyceride (TG), total cholesterol (TC), very low density lipoprotein (VLDL) and low density lipoprotein (LDL) – cholesterol in various doses. It was suggested that this plant have hypolipidaemic activity due to presence of acidic components like flavonoids, saponins and tannins etc. (Rachh et al, 2010, Dholi and Raparla, 2014).

4. Antimicrobial Activity

Bacillus pumilis, *B. subtilis*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* were all effectively eradicated by the ethanolic extract of *G. sylvestre* leaves, while *Proteus vulgaris* and *Escherichia coli* were not. (Satdive et al., 2003). The three pathogenic *Salmonella* species were somewhat responsive to the aqueous and methanolic extract of *G. sylvestre* leaves (*Salmonella typhi*, *S. typhimurium* and *S. paratyphi*). Aqueous extract shown more effectiveness against the *Salmonella* species out of the two extracts utilised (Pasha et al., 2009).

5. Anti-Inflammatory Activity

Rats were given doses of 200, 300, and 500 mg/kg of the aqueous extract of *G. sylvestre* leaves to test for anti-inflammatory efficacy in the carrageenin-induced paw oedema and cotton pellet technique. When compared to the paw oedema volume of the control, the conventional medicine

phenylbutazone decreased the paw oedema volume by 57.6%. The aqueous extract at 300 mg/kg decreased the paw oedema volume by 48.5% within 4 hours of administration. When compared to the control group, the aqueous extract at doses of 200 mg/kg and 300 mg/kg significantly reduced the weight of the granuloma (Malik et al., 2003).

6. Antiarthritic Activity

Gymnema sylvestre's aqueous and petroleum extract shown considerable (p 0.01) antiarthritic efficacy (Malik et al., 2003).

Gymnema sylvestre was said to have slowed down the release of inflammatory mediators, which is important to slow down bone loss in an anti-arthritic condition (Malik et al., 2010). Its root ethanolic extract effectively (p 0.01) decreased carrageenan-induced rat paw oedema and suppressed 39–75% of histamine-induced rat paw oedema in another investigation (Shankar and Rao, 2008).

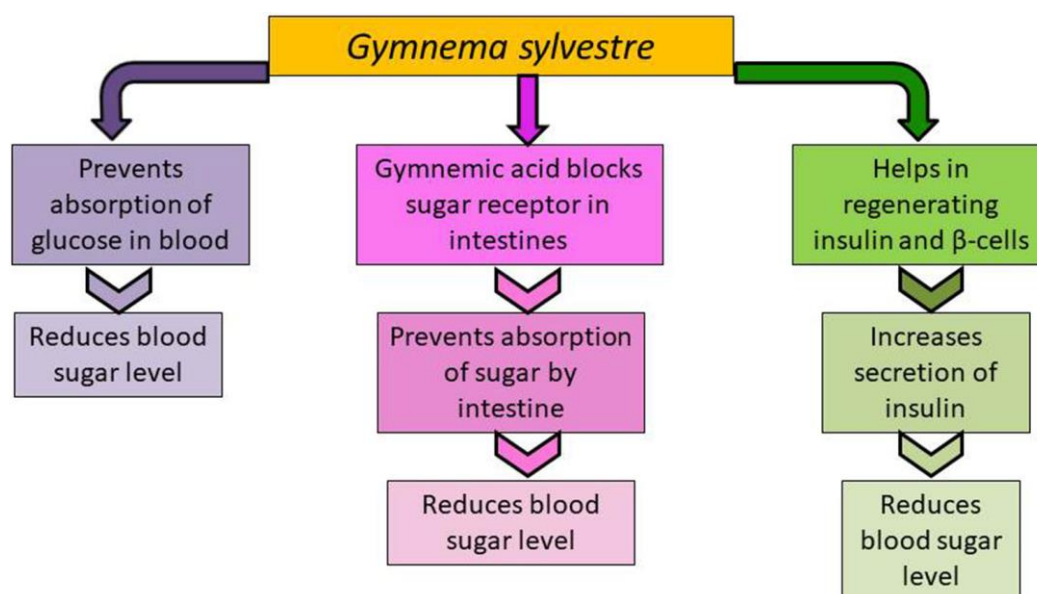


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DISCUSSION

Traditional and ethnobotanical uses of natural substances, particularly those with plant origins, have drawn a lot of interest in recent years since they have undergone extensive efficacy testing and are widely regarded as safe for use by humans. A few of the most recent scientific techniques that require serious

scrutiny include physiochemical characterization, biological assessment, toxicity research, investigation of the molecular mechanism(s) of action of isolated phytoprinciple (s), and their clinical trials. The problem of diabetes, which is becoming more widespread globally, is the subject of several novel drugs.

In addition to treating diabetes, dyspepsia, constipation, jaundice, haemorrhoids, renal and vesicle calculi, cardiopathy, asthma, bronchitis, amenorrhea, conjunctivitis, and leucoderma, gymnema sylvestre holds a significant place among other anti-diabetic medicinal plants. Future research must also evaluate the isolated principles from Gurmar in a scientific way using a variety of cutting-edge experimental models and clinical trials in order to comprehend how they work and find any additional active ingredients that might expand their potential therapeutic applications.

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