

Major Therapeutic Activity of Gymnema

Traditional Use

Due to its ability to abolish the taste of sugar *Gymnema sylvestre* was given the Hindi name of Gurmar meaning 'sugar destroying'. Gymnema has been described in Hindu Materia Medica as a stomachic, diuretic and antiperiodic (e.g. to treat a periodic illness such as malaria). In Ayurvedic medicine indications for Gymnema include glycosuria, urinary disorders and diabetes mellitus.¹ Gymnema has been used in the treatment of diabetes mellitus in India for over 2000 years.²

The traditional knowledge is still practiced, for example, an ethnology study in 2009 noted that many Irulas families (a tribal community indigenous to south-eastern India) grow *Gymnema sylvestre* as a climbing vine near their home and it is a household custom to consume one leaf a day. They also regularly add leaves to several of the common curry dishes at least once a week even though the leaves add a bitter taste to the meal. If a young member of the household is diagnosed with diabetes, they will be asked to consume 2 to 3 fresh tender leaves every morning before meals with a glass of water for about a year.³

Gymnema is eaten as a leafy vegetable in the traditional diet of eastern Ethiopians.⁴

Constituents

Gymnema leaf contains 4–10% of a group of more than 20 saponin glycosides of the oleanane-type including gymnemic acids I–XVIII and gymnemasaponins I–V.^{5,6,7} Some of the gymnemic acids are acylated (contain an acyl group), while the gymnemasaponins are non-acylated. Acylation affects pharmacological activity.

Dammarane-type saponins⁸ and a polypeptide consisting of 35 amino acid residues called gurmarin⁹ and other oleanane-type saponins (gymnemasins)¹⁰ have also been isolated.

Clinical Studies

'Gymnemic acid' referred to in the literature is often not chemically defined and most likely refers to the crude

saponin fraction of Gymnema (i.e. all the saponins) or to a mixture of the gymnemic acids.

Sweet Taste Suppression

The sweet taste suppressant property of Gymnema was revealed to a British officer by the inhabitants of a northern Indian village in the mid-19th century.¹¹ Since then many studies with volunteers have confirmed that Gymnema leaf (as an infusion, or extract in solution) or gymnemic acids in solution reduces the sweetness of sweet substances to taste.^{12–24}

Hypoglycaemic Activity & Diabetes

A reduction in plasma insulin was observed in a single oral glucose tolerance test when participants were administered water extract of Gymnema (2 g) or gymnemic acid (50 mg). There was little change in plasma glucose.²⁵ (The Japanese study presumably involved healthy volunteers, not diabetics.)

Single dose of Gymnema concentrate (corresponding to about 5–6.5 g of dried leaf) to healthy volunteers did not produce an acute reduction in fasting blood glucose level.²⁶ A hypoglycaemic effect was observed in normal volunteers given Gymnema for 7 days (*see Table 1*).²⁷

The **reduction of urinary glucose levels** in diabetics by oral administration of Gymnema was reported as early as 1926.²⁸ Blood glucose levels were significantly reduced from baseline for the glucose tolerance test in diabetics after they had received 15 days of treatment (Gymnema decoction, equivalent to 6 g/day of dried herb). Improvements were not found for this test in normal volunteers who received Gymnema for 10 days. Fasting blood glucose was significantly decreased in both groups after Gymnema treatment. Patients had mild to moderate hyperglycaemia and were not receiving any other treatment.²⁹

Several clinical studies have evaluated the benefit of Gymnema in diabetics. Of particular interest is the **reduction of glycosylated haemoglobin**. The results are outlined in Table 1. Best results may require 6 to 12 months of continuous use.

Trial Details	Dosage	Results	Ref
uncontrolled; normal volunteers and mild diabetics	Gymnema powder (10 g/day of dried herb)‡	<ul style="list-style-type: none"> significantly reduced fasting blood glucose levels from baseline* significantly reduced serum triglycerides, free fatty acids and cholesterol levels from baseline in diabetics (at day 7) significantly reduced urinary excretion of creatinine in diabetics (at day 7) body weight was unchanged (at day 7) 	27
controlled; type 1 diabetics on insulin therapy	Gymnema concentrate,§ for 6–30 months	<ul style="list-style-type: none"> reduced insulin requirements; lowered fasting blood glucose, glycosylated haemoglobin (HbA1c) and glycosylated plasma protein compared to baseline significantly decreased serum lipids compared to baseline after 20 months of treatment reductions were not observed in control patients on insulin therapy alone (10–12 months) 	30
controlled; type 2 diabetics on oral hypoglycaemic drugs	Gymnema concentrate,§ for 8–20 months	<ul style="list-style-type: none"> significantly decreased fasting blood glucose, glycosylated haemoglobin (HbA1c) and glycosylated plasma protein compared to baseline (at 18–20 months) significantly decreased serum lipids compared to baseline (at 18–20 months); significant reductions observed only for serum lipids in control patients taking only hypoglycaemic drugs (10–12 months) significantly increased fasting and postprandial serum insulin in the Gymnema group compared to the control patients (18–20 months) intake of hypoglycaemic drugs reduced after several weeks in 21 of the 22 patients taking Gymnema 	26
uncontrolled; type 2 diabetics mostly and several type 1 diabetics	Gymnema standardised extract (providing 200 mg/day of gymnemic acids), for 3 months	<ul style="list-style-type: none"> reduced fasting blood glucose, postprandial blood glucose and glycosylated haemoglobin (HbA1c) from baseline; decreases were greater in those patients with the poorest control (higher initial HbA1c) intake of drug medications decreased 16% of patients 	31
uncontrolled; newly diagnosed type 2 diabetics	Gymnema leaf powder (2 g, taken 30 minutes before breakfast, lunch and dinner), for 4 weeks	<ul style="list-style-type: none"> significantly lowered the fasting and postprandial blood glucose levels (from baseline, 4.1% and 3.3%, respectively) 	32

Table 1. Clinical studies of Gymnema for the treatment of diabetes.

Notes: ‡ Administered for 7 days (normal volunteers), 7 days (36 mild diabetics) and 21 days (7 mild diabetics). * For example: in normal volunteers 80.8 mg/dL (4.5 mmol/L, at baseline) vs 71.6 mg/dL (4.0 mmol/L, at day 7); in diabetics 151.7 mg/dL (8.4 mmol/L, baseline), 104.3 mg/dL (5.8 mmol/L, day 11), 101.2 mg/dL (5.6 mmol/L, day 21). § Extract of leaves prepared from 95% ethanol followed by acidic precipitation. Daily dose corresponded to about 10–13 g of dried leaf.³³

Mechanism of Action

The way in which Gymnema exerts hypoglycaemic activity may include:

- inhibition of glucose absorption in the small intestine;²⁵
- enhanced endogenous insulin production,²⁶ possibly by **pancreatic regeneration** (as serum levels of C-peptide, a by-product of the conversion of proinsulin to insulin, were raised from baseline in diabetics taking Gymnema for 16–18 months in comparison to both the insulin alone group and normal participants).³⁰

Potential Weight Loss

Gymnema teas and extracts have been sold in Japan for weight loss since at least the late 1980s.³⁴

A double-blind study conducted in the United States investigated the effects of sweetness perception on short-term intake of food in volunteers of normal weight. Participants rinsed with either concentrated Gymnema extract solution (gymnemic acid content not defined) or

placebo (tea solution) and rated the test solutions for sweetness. Thirty minutes after the last set of ratings a test meal consisting of snacks was presented in the context of providing refreshment. The Gymnema group **ate significantly less total calories** (501 ± 237 kcal vs 638 ± 333 kcal), total carbohydrates, total protein and total fat than participants whose taste perception was normal (placebo group).¹⁷

Actions

Antidiabetic, hypoglycaemic, hypolipidaemic, potentially weight-reducing.

Indications

- Hyperglycaemia, diabetes mellitus (prolonged administration required).
- Reactive hypoglycaemia (dysglycaemia) – at doses lower than those used for diabetes.
- Reduction of sweet cravings and appetite.
- Weight loss and dieting since Gymnema (in liquid form) anaesthetises the sweet taste buds. Gymnema

may be of benefit for patients whose weight problem is linked to excessive insulin production.

- May be of benefit for hyperlipidaemia, particularly in diabetics.

Cautions and Contraindications

Prescribe cautiously with hypoglycaemic drugs and insulin. As with all saponin-containing herbs, oral use may cause irritation of the gastric mucous membranes and reflux. To avoid the likelihood of this side effect, enteric-coated tablets are advised.

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