

ROLE OF *GYMNEMA SYLVESTRE* ON MADHUMEHA: A REVIEW

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ABSTRACT

Sedentary life style and stressful mental conditions in the present scenario have invited many life style disorders. Diabetes mellitus (DM) is described in Ayurveda classics as *Madhumeha*, which literally means excessive urine with sweet taste like honey. *Madhumeha* caused by vitiation of *Vatadosha* has many clinical similarities to Diabetes mellitus. The number of people suffering from diabetes all over the world is increasing progressively. Diabetes is one of the non-communicable diseases and rapidly emerging as a major health care problem. Despite much advancement in medical science, the problem and its complications remains a challenge and the morbidity and mortality shows constant rate. Ayurveda offers comprehensive safe and effective approaches to manage such conditions. Various Ayurveda classics and studies published in journals related to effect of *Gymnema sylvestre* on *Madhumeha* are reviewed and analyzed. Evidences from various studies show that phytochemicals obtain from *Gymnema sylvestre* are potential therapeutics that act as anti-diabetic drug in the prevention and treatment of diabetes. Analysis of classical references and various experimental studies of *G. sylvestre* possess hypoglycemic and hypolipidemic activity in long term treatment and is also capable of regenerating β -cells and hence it could be used as a drug for treating diabetes mellitus. Because it has regenerating ability of β -cells, at least the people in the earliest stages of the disease could be treated to delay or prevent full-blown clinical diabetes.

KEYWORDS: *Madhumeha*, Diabetes mellitus, *Gymnema sylvestre*

INTRODUCTION

With decreasing opportunities for physical exertion, prominence of processed foods in daily diet, irregular sleeping patterns, and a predominantly sedentary life, has led to the emergence of various lifestyle disorders like obesity, diabetes mellitus, hypertension, cardiac diseases etc. Foremost amongst them being Diabetes Mellitus, is a syndrome of impaired carbohydrate, fat, and protein

metabolism caused by either lack of insulin secretion or decreased sensitivity of the tissues to insulin depending upon the type. Both the type I & II result in increase in blood sugar level over a prolonged period due to the lack of glucose transport machinery involving insulin. The classical symptoms of untreated diabetes are loss of weight, polyuria (frequent urination), polydipsia (increased thirst) and polyphagia

(increased hunger)¹. Diabetes, especially if left untreated, can eventually cause heart disease, stroke, kidney disease, blindness, and nerve damage to nerves in the feet.

In Ayurveda², Diabetes Mellitus is referred to as *Madhumeha* or *Kshaudrameha*³, which means excessive urine with sweet taste like honey. Due to high glucose content secreted in urine, it tastes sweet. *Madhumeha* consists of two words- '*madhu* and *meha*' where '*madhu*' denotes sweetness and '*meha*' stands for urination. So, the disease in which the urination is having urine quality concordant with *madhu* (honey) in its colour, taste, smell and consistency called along with the pathognomonic features of *Prameha* (i.e. increased frequency and quantity of urine) is *Madhumeha*. On the other hand, the word "Diabetes mellitus" consists of two words - Diabetes and mellitus, diabetes word derived from Greek which means 'excessive discharge of urine' and word mellitus derived from Latin word mellitus, meaning 'mellite' (i.e. sweetened with honey; honey-sweet)⁴. The Latin word comes from mell, which comes from *mel*, meaning "honey"; sweetness; pleasant thing. Therefore it can be revealed that word *Madhumeha* and Diabetes mellitus have similar literal meanings.

Diabetes mellitus has gained gigantic disgrace in recent times as it is fast becoming the world's largest silent killer. India has been projected by WHO as the country with the fastest growing population of Diabetic patients. It is estimated that the number of diabetics in India will increase from 19 million to 57 million between 1995 and 2025 (195% increase)⁵.

Despite much advancement in medical science, the problem and its complications remains a challenge and the morbidity and mortality shows constant rate.

In Ayurveda *G. sylvestre* is one of ancient drug which is traditional used as an antidiabetic drug in treatment of *Madhumeha* (Diabetes mellitus). *G. sylvestre* is a slow growing, perennial, woody climber, distributed throughout India, in dry forests upto 600 m height⁶. It is mainly distributed in the Deccan Peninsula parts of northern and western India, Tropical Africa, Australia, Vietnam, Malaysia and Srilanka⁷. Various clinical and experimental studies document the antidiabetic effect of the *G. sylvestre*.

MATERIAL AND METHODS

Various Ayurveda classics and studies published in journals related to effect of *Gymnema sylvestre* on *Madhumeha* are reviewed and analyze.

In present scenario many Ayurveda herbal drugs used as an supportive treatment in treating diabetes mellitus which are along with their antidiabetic property, also have multifactorial functions such as Nephroprotective, Immunomodulatory, *Rasayan* etc. useful in treating diabetes mellitus and its secondary complications also. In Ayurveda classic various drugs are mentioned for the treatment of diseases related to *Mutravahastrotas* (Urinary system), among them *G. sylvestre* one of ancient drug which is traditional used as an antidiabetic drug in treatment of *Madhumeha* (Diabetes mellitus).

Table no.1 – Showing Taxonomy of *G. sylvestre*⁸

Botanical Name	:	<i>Gymnemasylvestre</i>
Family	:	Asclepiadaceae
Synonyms	:	<i>Meshashringi, Gudmaar, Ajashringi</i>
English Name	:	Periploca of the wood
Hindi Name	:	Gudmaar

Table no.2 – Showing pharmacodynamics of *G. sylvestre*⁹

Rasa	:	Tikta, Kashaya
Guna	:	Laghu, Ruksha
Virya	:	Usna
Vipaka	:	Katu
Dosh karma	:	Kaphahara, Vatahara

Phytochemistry

The leaves of *G. sylvestre* contain triterpene saponins belonging to oleanane and dammarene classes. Oleanane saponins are and gymnema saponins, while dammarene saponins are gymnemsides¹⁰. The leaves also contain resins, albumin, chlorophyll, carbohydrates, tartaric acid, formic acid, butyric acid, anthraquinone derivatives, inositol alkaloids, organic acid (5.5%), parabin, calcium oxalate (7.3%) lignin (4.8%), and cellulose (22%).¹¹ The gymnemic acid contain several acylated (tigloyl, Methylbutyryl etc.) derivatives of deacylgymnemic acid (DAGA) which is a 3-0-β-glucuronide of gymnemagenin (3β, 16β, 21β, 22 β, 23, 28- hexahydroxy-olean-12-ene). The individual gymnemic acids (saponins) include gymnemic acids 1-VII, gymnemosides A-F, gymnemasaponins. The presence of gymnemic acids (+) quercitol, lupeol, (-) amyirin, stigma sterol etc. have

been reported from *G. sylvestre*. A new flavonol glycoside namely kaempferol 3-0-beta-D-glucopyranosyl-(1-->4)-alpha-l-rhamnopyranosyl- (1-->6)-beta-D-glucurono-pyranoside has also been found in aerial parts of *G. sylvestre*. Four new triterpenoid saponins, gymnemasins A, B, C and D isolated from the leaves of *G. sylvestre* were identified as 3-0-[beta-D-glucopyranosyl (1-->3)-beta-D-glucuronopyranosyl] -22-0 tiglyolgymnemanol, 3- 0-[beta-D-glucopyranosyl-22-0-tigloyl-gymnemanol and 3-0-beta-D-glucopyranosyl-gymnemanol respectively. The glycone, gymnemanol, which is a new compound, was characterized as 3 beta-22-alpha- 23-2-8-pentahydroxyolean-12-ene. Gymnestrogenin, a new penta-hydroxytriterpene from the leaves of *G. sylvestre* has been reported¹².

CLINICAL AND EXPERIMENTAL EVIDENCES

Various clinical and experimental studies document the antidiabetic effect of the *G. sylvestre*.

Mechanism of action of *G. sylvestre* (Gymnemic Acid)

G. sylvestre leaves have been found to cause hypoglycemia in laboratory animals and shown a use in herbal medicine to treat diabetes mellitus in adults. When leaf extract of plant, administered to a diabetic patient, there is stimulation of pancreas by virtue of which there is an increase in insulin release. These compounds have also been found to increase fecal excretion of cholesterol¹³. There are some possible mechanisms by which the leaves extract of *G. sylvestre* or (Gymnemic acid) possess its hypoglycemic effects are:

1. It promotes regeneration of islet cells.
2. It increase secretion of insulin.
3. It causes inhibition of glucose absorption from intestine.
4. It increases utilization of glucose as it increases the activities of enzymes responsible for utilization of glucose by insulin dependent pathways. An increase in phosphorylase activity, decrease in gluconeogenic enzymes and sorbitol dehydrogenase¹⁴.

Antidiabetic Effect

The first scientific conformation of *G. sylvestre* in human diabetics was demonstrated that the leaves of *G. sylvestre* reduce urine glucose in diabetics¹⁵. In an animal study¹⁶ investigated the sakkarakkolli leaf powder had positive and encouraging effects over blood glucose levels. No adverse effect was observed on the health status of subjects and thus, it can be concluded that the sakkarakkolli powder is effective in lowering the fasting as well as post prandial blood glucose levels. Clinical and experimental study revealed that saponin fraction and five triterpene glycosides derived from methanol extracts of *G. sylvestre* has proved to be have antihyperglycemic action¹⁷.

Administration of *Gymnema sylvestre* extract decreased serum glucose concentration in dexamethasone induced hyperglycaemic animals. The effects were comparable to the standard corticosteroid-inhibiting drug, ketoconazole¹⁸.

Hypolipidemic Effect

Preliminary animal studies indicate *Gymnema* may be beneficial for lowering blood lipids. When fed to rats on either high-or-normal-fat diet for 10 weeks,

Gymnema sylvestre suppressed body weight gain and liver lipid accumulation to the same extent as chitosan in those on a high-fat diet. In a three week study in rats, *Gymnema* feeding decreased total cholesterol and triglycerides and increased fecal fat elimination¹⁹.

Antiobesity Effect

G. sylvestre helps to promote weight loss possibly through its ability to reduce cravings for sweets and control blood sugar level. It has been reported that the gumar in peptide, block the ability to taste sweet or bitter flavors and thus reduces sweet cravings²⁰. A standardized *G. sylvestre* extract in combination with niacin-bound chromium and hydroxycitric 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 *G. sylvestre* extract and hydroxycitric acid, niacin bound chromium can serve as an effective and safe weight loss formula that facilitate a reduction in excess body weight and BMI while promoting healthy blood lipid level²¹.

DISCUSSION AND CONCLUSION

Diabetes is now becoming a common disease through the world and a lot of new drugs are being synthesized for the same. Prevention and treatment involve maintaining a healthy diet, regular physical exercise, a normal body weight, and avoiding use of tobacco. Control of blood pressure and maintaining proper foot care are important for people with the disease. Type 1 Diabetes mellitus must be managed with insulin injections. Type 2 Diabetes

mellitus may be treated with medications with or without insulin. Insulin and some oral medications can cause low blood sugar. Many Indian herbs are being used in traditional practices to cure diabetes, *G. sylvestre*, has an important place among such antidiabetic medicinal plants. *G. sylvestre* extracts have been examined for their antidiabetic properties in an attempt to recognize alternative treatment strategies that pose less of a hazard for diabetics. It possesses hypoglycemic and hypolipidemic activity in long term treatment and is also capable of regenerating β -cells and hence it could be used as a drug for treating diabetes mellitus. Because it has regenerating ability of β -cells, at least the people in the earliest stages of the disease could be treated to delay or prevent full-blown clinical diabetes.

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