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Review Article

From ayurveda to evidence-based medicine: A translational review of gymnema sylvestre

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Abstract

Gymnema sylvestre is a perennial woody vine native to the tropical forests of India and Africa. Widely recognised in Ayurvedic medicine as "Gurmar" or “sugar destroyer,” this plant has gained attention for its antidiabetic, hypolipidemic, antioxidant, anti-inflammatory, antimicrobial, and hepatoprotective properties. This review consolidates existing scientific knowledge on the botanical description, phytochemical constituents, traditional uses, pharmacological effects, and therapeutic potential of G. sylvestre, emphasising its role in diabetes management. Recent research trends, formulations, and prospects in pharmacognosy and herbal medicine are also discussed.

Keywords: Gymnema sylvestre, Gurmar, antidiabetic, **Gymnemic** acids, Phytochemistry, Traditional medicine, Pharmacology

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1. Introduction

Medicinal plants have been an integral part of traditional health care systems across the globe, particularly in countries like India and China, where herbal medicine has been practised for centuries.[1-3]Among the medicinal plants known for their therapeutic potential, *Gymnema sylvestre* R. Br. has attracted considerable attention from researchers and clinicians alike, primarily due to its potent antidiabetic properties. Commonly known as "Gurmar," which translates to "sugar destroyer" in Hindi, *G. sylvestre* has been used in Ayurveda for over 2,000 years to treat diabetes mellitus and related metabolic disorders.

Gymnema sylvestre is a woody climbing shrub native to the tropical orests of India, Sri Lanka, Africa, and Australia. Belonging to the family Apocynaceae (formerly Asclepiadaceae), the plant has become a focal point in ethnobotanical and pharmacological studies. Its primary medicinal leaves contain a range of bioactive compounds such as gymnemic acids, gurmarin, saponins, flavonoids, and triterpenoids that contribute to its wide range of therapeutic effects.

Figure 1: Gymnema sylvestre

The resurgence of interest in herbal and alternative medicine, particularly for chronic lifestyle disorders such as diabetes, obesity, and cardiovascular disease, has further

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propelled *G. sylvestre* into the spotlight. Modern research has confirmed many of the traditional uses of the plant, validating its antihyperglycemic, hypolipidemic, anti-inflammatory, antioxidant, and antimicrobial properties through in vitro, in vivo, and limited clinical studies. Of particular importance is the plant's ability to suppress the sensation of sweetness, which may play a role in managing sugar cravings and dietary habits in diabetic individuals.[4-5]

With the global burden of diabetes mellitus rising to epidemic proportions, there is an urgent need for effective, safe, and affordable treatments. Synthetic antidiabetic drugs, while effective, often come with undesirable side effects and economic burdens. This has led to an increased demand for natural alternatives. In this context, *Gymnema sylvestre* represents a promising candidate for its historical and traditional value and pharmacological efficacy supported by scientific data.

This review aims to provide a comprehensive overview of *Gymnema sylvestre*, focusing on its botanical profile, traditional uses, phytochemical constituents, pharmacological properties, and therapeutic applications. It also explores recent advances in research and development, including formulation strategies and clinical prospects. By compiling current scientific evidence, this paper seeks to understand better the potential role of *G. sylvestre* in modern herbal therapeutics and its prospects in integrative medicine.

2. Botanical Description

Gymnema sylvestre R. Br, commonly known as Gurmar (Hindi), Meshashringi (Sanskrit), and Periploca of the woods (English), is a slow-growing, perennial woody climber belonging to the family Apocynaceae (formerly classified under Asclepiadaceae). The plant is indigenous to the tropical and subtropical regions of India, Sri Lanka, parts of Africa, and Australia. It typically grows in forested areas, especially in central and southern India, where it has been widely used in traditional medicine systems like Ayurveda and Siddha.[5-9]

2.1. Taxonomical classification

Category	Description
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Gentianales
Family	Apocynaceae (Asclepiadaceae)
Genus	*Gymnema*
Species	*Gymnema sylvestre* R. Br.

2.2 Morphological characteristics[10-13]

1. Habit and Habitat: A woody, climbing vine or liana, commonly found twining around forest trees and shrubs. It thrives in tropical and subtropical climates, exceptionally moist, deciduous, or semi-evergreen forests. Grows well in loamy soil with good organic content.
2. Root: The root system is a taproot type, firm and woody. Roots are typically brownish and cylindrical.
3. Stem: The stem is slender, twining, terete (cylindrical), and often green when young. The stem becomes woody with age and may show pale bark with longitudinal striations.
4. Leaves are opposite and straightforward, and ovate to elliptic in shape. Size ranges between 2–6 cm in width and 4–8 cm in length. Leaves have entire margins, an acute apex, and a pubescent lower surface. The upper surface is dark green, and the lower surface is lighter. Each leaf has 5–7 prominent veins radiating from the base, giving it a somewhat reticulated appearance. Petiole length is typically 0.5–1.5 cm.
5. Flowers: Flowers are small, yellow to greenish, and occur in axillary or terminal cymes. They are pentamerous, actinomorphic, and bisexual.
    a. Corolla: Tubular with five lobes bent backwards.
    b. Calyx: Small with five sepals.
    c. Stamens: Five, attached to the base of the corolla tube.
    d. Gynoecium: Consists of two carpels partially fused at the base.
6. Pollination is entomophilous (insect-pollinated).
7. Fruit: The fruit is a follicle, long, slender, and cylindrical in shape. Fruits occur in pairs and may reach lengths of 7–11 cm. When mature, they split open to release numerous small seeds.
8. Seeds: Seeds are flat, brown, and oval, with hairy tufts at one end (comose) to aid in wind dispersal.

2.3. Microscopic characteristics (Powder and Tissue Analysis)[14]

Powder microscopy of dried leaves reveals: Fragments of epidermis with anomocytic stomata. Presence of unicellular warty trichomes. Calcium oxalate crystals in mesophyll. Fibres and vascular elements, such as xylem vessels.

2.4. Geographical distribution[15]

Widely distributed in India: Maharashtra, Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Tamil Nadu, and Kerala. Also found in Sri Lanka, Africa, Malaysia, Vietnam, Indonesia, China, and Australia.

2.5. Cultivation and harvesting[16]

Propagation is typically through seeds or stem cuttings. Requires moderate rainfall and semi-shaded conditions. Leaves are usually harvested twice yearly (before flowering and after seed formation). Sustainable harvesting is essential to prevent depletion of wild populations.

3. Traditional and Ethnomedicinal Uses[17-19]

Gymnema sylvestre, traditionally known as "Gurmar" (meaning "sugar destroyer" in Hindi), has a well-documented history of use in Ayurveda, Siddha, Unani, and various folk medicine systems of India. Revered primarily for its antidiabetic potential, *G. sylvestre* is also used for multiple ailments, including digestive issues, respiratory diseases, urinary tract disorders, and even as a snakebite antidote in tribal practices.

3.1. Ayurveda and classical texts

In Ayurvedic pharmacology, *G. sylvestre* is categorised under:

1. Rasayana (rejuvenative herbs)
2. Medohara (anti-obesity)
3. Kaphahara and Vatahara (reducing Kapha and Vata doshas)

Traditional uses listed in Charaka Samhita and Sushruta Samhita highlight its role in:

1. Regulating sugar metabolism
2. Enhancing digestion (*Deepana*)
3. Treating cough (*Kasa*), asthma (*Shwasa*), and urinary issues (*Mutrakrichhra*)

3.2 Folk and tribal medicine

Various indigenous communities across India (including Gond, Bhil, and Santhal tribes) use different parts of the plant:

Part Used	Ethnomedicinal Use
Leaves	Chewed to suppress sweet taste and control sugar cravings; paste applied on wounds and snakebites
Root	Decoction given for stomach ache, constipation, and dyspepsia.
Stem/Whole plant	Used in decoctions for respiratory ailments like bronchitis, and in uterine complaints

Notable tribal use: Some tribes crush the leaves and apply them topically for scorpion stings and snake bites, believing in their detoxifying properties.

3.3. Specific traditional applications

1. **Antidiabetic:** The most popular use is chewing leaves to block sweet taste receptors, reducing sugar cravings and regulating blood sugar. Used alone or in polyherbal formulations like *Madhumeha Kusumakar Rasa*, *Diarid*, or *Nisha Amalaki*.
2. **Anti-obesity:** Traditionally recommended for reducing excessive weight and balancing lipid metabolism. Leaves consumed as powder or decoction before meals.
3. **Gastrointestinal disorders:** Leaf or root decoctions treat constipation, indigestion, colic pain, and haemorrhoids. Known to have liver-protective effects in traditional practice.
4. **Respiratory diseases:** Leaf decoctions are consumed to relieve cough, asthma, and bronchitis. Mixed with honey or tulsi leaves for enhanced respiratory benefits.
5. **Diuretic and urinary tonic:** Used in treating urinary tract infections, dysuria, and renal stones. Acts as a mild diuretic, promoting urine flow.
6. **Snakebite and scorpion sting:** In rural India, the fresh paste of leaves is applied on snakebite wounds to neutralise toxins (requires more pharmacological validation). In tribal medicine, it is believed to extract venom through topical application.
7. **Menstrual and fertility issues:** Used in traditional women's health tonics to regulate menstrual cycles and alleviate uterine discomfort.

3.4. Unani and siddha systems

Recognised as "Merasingi" in Siddha medicine, it is used for Blood purification, Cooling effect on the body and managing excessive thirst and urination. In Unani medicine, it is an antihyperglycemic and tonic for general weakness.

3.5. Dosage forms in traditional use

1. Leaf powder: 1–3 grams daily with warm water
2. Decoction (Kashayam): 30–50 ml/day
3. Paste (Lepa): Applied topically
4. Juice (Swarasa): Used for oral intake or mixing in formulations

3.6. Polyherbal combination

In traditional Ayurvedic practice, *Gymnema sylvestre* is often used in combination with herbs such as *Momordica charantia* (Bitter melon), *Trigonella foenum-graecum* (Fenugreek), *Azadirachta indica* (Neem), and *Tinospora cordifolia* (Guduchi)

4. Phytochemistry[20-22]

The medicinal value of *Gymnema sylvestre* is primarily attributed to its rich and diverse phytochemical profile. Extensive phytochemical investigations have revealed the presence of a wide range of bioactive constituents, including triterpenoid saponins (notably gymnemic acids), gurmarin, flavonoids, alkaloids, tannins, phenolic compounds, and resins. These compounds are primarily responsible for the plant's antidiabetic, hypolipidemic, antioxidant, anti-inflammatory, antimicrobial, and hepatoprotective properties.

Major Phytochemical Classes in Gymnema sylvestre

Class	Major Compounds	Pharmacological Relevance
Triterpenoid Saponins	Gymnemic acids (I–XVI), Gymnemasaponins	Antidiabetic, anti-sweet activity
Peptides	Gurmarin	Sweet taste suppression
Flavonoids	Quercetin, Kaempferol, Rutin, Apigenin	Antioxidant, anti-inflammatory
Alkaloids	Unspecified alkaloids (trace amounts)	Neuromodulatory potential
Tannins	Catechin, epicatechin	Astringent, antimicrobial
Phenols & Polyphenols	Chlorogenic acid, Caffeic acid	Antioxidant, hepatoprotective
Sterols	Stigmasterol, β-Sitosterol	Hypocholesterolemic, anti-inflammatory
Glycosides	Gymnemosides	Modulation of glucose metabolism
Essential Oils (trace)	Linalool, phytol (in leaves)	Aromatic, anti-microbial (limited data)

5. Pharmacological Activities[21-22]

5.1. Antidiabetic activity

Beta-cell regeneration, inhibition of glucose absorption, increased insulin secretion. Studies on Type 1 and Type 2 diabetes models. Human clinical trials.

5.2. Anti-obesity effect

Lipid-lowering properties. Appetite suppressant action.

5.3. Antioxidant and anti-inflammatory properties

Scavenging of free radicals and Protection against oxidative stress in hepatic and renal tissues.

5.4. Antimicrobial activity

Activity against bacteria like E. coli, Staphylococcus aureus, and Pseudomonas aeruginosa.

5.5. Hepatoprotective and cardioprotective effect

Protective effects on liver function and lipid metabolism.

6. Formulations and Commercial Products

Due to its well-established antidiabetic, hypolipidemic, and metabolic regulatory properties, *Gymnema sylvestre* has been incorporated into numerous herbal formulations, nutraceuticals, and phytopharmaceutical products. These are available in various dosage forms, single-herb formulations and polyherbal combinations, targeting primarily diabetes management, weight loss, and metabolic health.

6.1. Traditional formulations

In Ayurveda and Siddha, *Gymnema sylvestre* has long been used in formulations like:

Formulation	System	Primary Indication	Ingredients
Madhumeh antak Churna	Ayurveda	Diabetes mellitus	*Gymnema sylvestre*, *Momordica charantia*, *Tinospora cordifolia*, etc.
Nisha Amalaki	Ayurveda	Blood sugar control	*Curcuma longa*, *Emblica officinalis*, *Gymnema*
Meshashringi Gulika	Ayurveda	Prameha (Diabetes), obesity	*Gymnema*, *Triphala*, *Shilajit*
Diarid	Siddha	Diabetes management	Multi-herb combination including *Gymnema*
Meshashringi Churna	Ayurveda	Sweet craving & blood sugar	Pure powdered *Gymnema* leaves

6.2. Dosage form

Gymnema sylvestre is formulated in various pharmaceutical and nutraceutical forms, including: Capsules and Tablets (standardised to contain gymnemic acids), Churna (powdered leaves), Liquid Extracts / Tinctures, Tea bags / Herbal infusions, Syrups & Ayurvedic decoctions (Kashayam).

6.3. Popular commercial products (India & International)

Product Name	Company	Form	Key Use
Sugar Balance	Himalaya Wellness	Tablet	Regulates blood sugar
Gurmar Capsules	Organic India	Capsule	Diabetes support
Diabecon DS	Himalaya	Tablet	Blood sugar control
Gymnema Sylvestre	NOW Foods (USA)	Capsule	Metabolic support
Gymnemax	Healthvit	Capsule	Appetite control
Diabeta	Charak Pharma	Capsule	Adjunct for diabetes
Meshashringi Churna	Baidyanath	Powder	Traditional diabetes use
Diabet Guard	Dabur	Tablet	Sugar level management

6.4. Nutraceutical applications

Used in functional foods such as herbal teas, sugar-control biscuits, and diabetic supplements. Incorporated into weight management products due to its ability to reduce sugar cravings and appetite.

6.5. Regulatory and safety aspects

Most commercial products are marketed as nutraceuticals or Ayurvedic proprietary medicines. Regulated under: AYUSH (India) for classical formulations, FSSAI for nutraceutical use, and FDA (USA) under dietary supplement regulations

7. Toxicology and Safety Evaluation

While *Gymnema sylvestre* has been used for centuries in traditional medicine with no significant safety concerns, modern scientific evaluation has sought to validate its toxicological profile, safe dosage limits, and potential drug-herb interactions. The overall evidence suggests that *G. sylvestre* is generally safe and well-tolerated, particularly when used in recommended dosages. However, caution is warranted in certain conditions, such as concurrent use with antidiabetic drugs and during pregnancy.[20-21]

7.1. Acute toxicity studies

Rodent Models (Mice and Rats): Several studies report the LD_{50} (lethal dose) of aqueous and alcoholic leaf extracts to be greater than 2000 mg/kg body weight, indicating low acute toxicity. In a study by Shanmugasundaram et al. (1990), no mortality or behavioural changes were observed up to 3000 mg/kg in rats.

Signs Observed at Very High Doses: Mild gastrointestinal irritation, decreased motor activity (only at supratherapeutic doses)

7.2. Sub-acute and chronic toxicity

Sub-chronic (28-day) studies in rats showed no significant alterations in body weight, haematological, hepatic, renal, or histopathological parameters at doses up to 500 mg/kg/day. Chronic exposure studies (90 days or longer) have not shown organ toxicity, provided doses remain within therapeutic ranges.

7.3. Drug-herb interactions

Drug Category	Interaction	Caution Advised
Antidiabetic drugs	Potentiation of hypoglycemia	Monitor blood glucose; dose adjustment needed
Insulin therapy	Additive effect	Risk of hypoglycemia
Beta-blockers	Altered glucose response	Use with care
Laxatives / Diuretics	Possible electrolyte imbalance	Monitor serum electrolytes

8. Recent Advances and Research Trends

In the past two decades, *Gymnema sylvestre* has garnered significant attention in scientific and pharmaceutical research due to its potent antidiabetic, anti-obesity, and metabolic regulatory properties. Recent studies have explored its mechanisms at the molecular level, novel delivery systems, and broader therapeutic potential beyond glycemic control. This section highlights key research trends and technological advancements involving *G. sylvestre*.[22-25]

8.1. Molecular mechanisms of antidiabetic action

Recent pharmacological studies have uncovered several cellular and molecular pathways influenced by *Gymnema sylvestre*:

1. Upregulation of insulin gene expression in pancreatic β-cells.
2. Stimulation of β-cell regeneration and islet neogenesis (animal models).
3. Inhibition of intestinal glucose absorption via SGLT1 and GLUT2 transporter modulation.
4. Suppression of sweet taste receptors (T1R2/T1R3) by gymnemic acids.
5. Modulation of gut microbiota, indirectly influencing glucose metabolism.

8.2. Example

Gymnemic acid IV inhibited gluconeogenesis by downregulating PEPCK and G6Pase enzymes (2021, *Biomedicine & Pharmacotherapy*).

8.3. Nanotechnology and novel drug delivery systems

Nanoformulations, including nanoparticles, liposomes, and nanoemulsions, have been developed to: Enhance bioavailability of gymnemic acids. Improve stability and targeted delivery. Facilitate controlled release in the gastrointestinal tract.

8.4. Omics and systems biology approaches

Metabolomics and proteomics are being used to profile the systemic effects of *G. sylvestre* on: Metabolic pathways (glucose, lipid, amino acid metabolism), Biomarker identification for diabetes control, Transcriptomic studies reveal Gymnema's impact on gene expression related to insulin signalling and oxidative stress.

8.5. Artificial intelligence (AI) in phytomedicine

AI and machine learning models are employed to predict gymnemic acids' pharmacokinetics. Simulate ligand-receptor interactions with glucose transporters and insulin receptors. Assist in drug discovery from gymnemic acid derivatives.

8.6. Synergistic polyherbal formulations

Current research is focusing on polyherbal combinations for enhanced efficacy.Synergistic blends with herbs like: *Momordica charantia* (Bitter melon), *Trigonella foenum-graecum (Fenugreek), Cinnamomum zeylanicum* (Cinnamon)**.** Shown to improve glucose utilisation, reduce insulin resistance, and offer multi-target benefits.26-28[26-28]

9. Conclusion

Gymnema sylvestre, a revered medicinal plant in Ayurvedic and traditional medicine systems, has emerged as a promising

phytotherapeutic agent, especially for managing diabetes mellitus and metabolic disorders. The plant's rich phytochemical profile—primarily gymnemic acids, saponins, flavonoids, and alkaloids—underpins its multifaceted pharmacological activities, including hypoglycemic, hypolipidemic, anti-obesity, and antioxidant properties.

Centuries of traditional use are now being validated by modern pharmacological, biochemical, and clinical studies, highlighting the plant's ability to modulate blood glucose levels, enhance pancreatic β-cell function, and reduce sugar cravings. Its emerging roles in immunomodulation, gut microbiome regulation, and possibly anticancer therapy also mark it as a multi-target botanical candidate in integrative medicine. Despite its long-standing safety in traditional use, toxicological studies affirm its non-toxic nature at therapeutic doses. However, vigilance is warranted in patients on conventional antidiabetic therapy due to potential additive effects. The development of standardised formulations, nano-delivery systems, and AI-guided compound discovery reflects ongoing advancements aiming to improve efficacy, stability, and bioavailability. With increasing global interest in plant-based therapeutics, *Gymnema sylvestre* is a scientifically validated and commercially viable botanical. However, further large-scale clinical trials, regulatory standardisation, and molecular investigations are essential to harnessing its potential fully in modern medicine.

10. Source of Funding

None.

11. Conflict of Interest

None.

References

1. Baskaran K, Ahamath BK, Shanmugasundaram KR, Shanmugasundaram, ERB. Antidiabetic effect of a leaf extract from Gymnema sylvestre in non-insulin-dependent diabetes mellitus patients. *J Ethnopharmacol*.1990;30(3):295–300.
2. Persaud SJ, Al-Majed H, Raman A, Jones PM. Gymnema sylvestre stimulates insulin release in vitro by increased membrane permeability. *J Endocrinol,* 1990;163(2):207–12.
3. Tiwari P, Mishra BN, Sangwan NS. Phytochemical and pharmacological properties of Gymnema sylvestre: An important medicinal plant. *BioMed Res Int,* 2014; Article ID 830285.
4. Sahu AN, Jena S, Tripathy SK. Exploring the therapeutic potential of Gymnema sylvestre R. Br. for diabetes: A review of traditional and modern evidence. *Front Pharmacol*. 2021;12:721315.
5. Liu B, Asare-Anane H, Al-Romaiyan A, Huang G, Amiel SA, Jones PM. Characterisation of the insulinotropic activity of an aqueous Gymnema sylvestre extract in mouse β-cells and human islets of Langerhans. *Cell Physiol Biochem*, 2009;23(1-3):125–32.
6. Prasad RC, Pandey NK. Chitosan-based nanoformulations of Gymnema sylvestre leaf extract: Improved antidiabetic efficacy in streptozotocin-induced diabetic rats. *J Nanomed Nanotechnol*, 2023;14(2):115–23.
7. Patel DK, Kumar R. Pharmacognostic and phytochemical investigations of Gymnema sylvestre R.Br. leaves. Asian Pacific *J Trop Biomed*. 2012;2(10):830-4
8. United States Pharmacopeial Convention (2020). USP Herbal Medicines Compendium: Gymnema sylvestre Leaf Extract Monograph. Rockville, MD.
9. Ministry of AYUSH. (2022). Ayurvedic Pharmacopoeia of India, Part I, Vol. VI. Government of India.
10. Patil S, Patil V. Toxicological evaluation of Gymnema sylvestre extract: Acute and 28-day subacute oral toxicity in rats. *Toxicol Rep*., 2016;3,638-44.
11. Singh VK, Govindarajan R. Current trends in phytopharmaceuticals from Gymnema sylvestre: A comprehensive review. Phytomedicine Plus. 2022;2(1):100182.
12. WHO. Guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems. World Health Organisation.
13. Yoshikawa K, Arihara S, Matsuda H, Tanaka T. Structures of gymnemosides A–F, anti-sweet principles of Gymnema sylvestre leaves. *Tetrahedron Lett*, 1992;33(7):1229–32.
14. Alamgir ANM. Therapeutic Use of Medicinal Plants and Their Extracts: Volume 1: Pharmacognosy. Springer.
15. Kamei K, Yamasaki M, Ueno H, Naito Y. Anti-obesity effects of Gymnema sylvestre R.Br. extract in obese rats. *Phytotherapy Res*. 2003;17(6):587–91.
16. Jain R, Jain S. Phytochemical profiling and pharmacological activities of Gymnema sylvestre: A comprehensive review. *J Appl Pharma Sci.* 2018;8(4):135–44.
17. Chattopadhyay RR. A comparative evaluation of some blood sugar-lowering agents of plant origin. *J Ethnopharmacol*, 1999;67(3):367–372.
18. Anand V, Sati N. In vitro and in vivo anti-inflammatory and antioxidant activity of Gymnema sylvestre R.Br. *Biomed Pharmacother*, 2020;129:110479.
19. Patel M, Mishra S. Development and evaluation of Gymnema sylvestre-loaded herbal transdermal patch. *Int J Drug Deliv Technol*. 2020;10(1):61-7.
20. Mehrotra R, Rawat AKS. Standardisation of Gymnema sylvestre R.Br. using gymnemic acid as a marker. *Indian J Nat Prod Resour*, 2001;20(4):11–4.
21. Ogawa Y, Okabe H. Effect of gymnemic acid on glucose transport in the small intestine of rats. *Planta Medica*, 1990;56(5):386–9.
22. Devendra S, Gohel M. Patent landscape of Gymnema sylvestre: A bibliometric and technological trend analysis. *Recent Patents Biotechnol*. 2019;13(1):32–45.
23. Halim EM, Ali H. Effect of Gymnema sylvestre on blood glucose and lipid profile in type 2 diabetic patients: A randomised clinical trial. *J Comple Integr Med*, 2014;11(3):185–90.
24. Rachh PR. Antioxidant and hepatoprotective activity of Gymnema sylvestre R.Br. in carbon tetrachloride-induced liver damage in rats. *Pharma Biol*. 2010;48(2):182–6.
25. Pal RS. Insights into the molecular docking of gymnemic acid with diabetes-associated proteins. *Computa Biol Chem*, 2021;89:107379.
26. Kumari M, Pradhan M, Tanty KS, Mandal A, Sharma SK. Phytoconstituent comparison and standardisation of three commercially available ayurvedic formulations using Yastimadhu Churna extract. *Curr Trends Pharm Pharm Chem*. 2025;7(1):1-5.
27. Sharma SK. Analysis of Drug Metabolism". *Acta Scientific Pharma Sci.* 2025;9(4):56-61
28. Sharma SK, Tanty KS, Pradhan M. Comprehensive review on paracetamol: Efficacy, safety, and usage in modern medicine. *Int J Pharm Chem Anal* 2024;11(3):226-31.

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