
**RAUWOLFIA SERPENTINA: ETHNOMEDICINAL IMPORTANCE,
AYURVEDIC PERSPECTIVE, AND PHARMACOLOGICAL
POTENTIAL**

Dr. Nilofar Korbu*¹, Dr. Deepika Singh¹, Dr. Shalini Varshney²

¹PG Scholar, ² Associate Professor, Department of Drvyaguna, A and U Tibbia College and Hospital, Karol Bagh, New Delhi.

Article Received: 12 September 2026, Article Revised: 21 September 2026, Published on: 12 October 2026

***Corresponding Author: Dr. Nilofar Korbu**

PG Scholar, Department of Drvyaguna, A and U Tibbia College and Hospital, Karol Bagh, New Delhi.

Doi: <https://doi-doi.org/101555/ijarp.8504>

ABSTRACT

Rauwolfia serpentina (L.) Benth. ex Kurz., commonly known as Sarpagandha, is an important medicinal plant of the family Apocynaceae, widely used in traditional systems of medicine, particularly Ayurveda, for the management of neurological, cardiovascular, and mental disorders. Classical Ayurvedic texts describe Sarpagandha as being indicated in Vata-vyadhi, Unmada, Apasmara, Anidra, and Visa, owing to its Tikta rasa, Ruksha guna, Usna virya, and Katu vipaka. Ethnomedicinally, the plant has been used for the treatment of snake bites, insomnia, insanity, hypertension, and various systemic disorders.

Phytochemical investigations reveal the presence of more than eighty indole alkaloids, including reserpine, ajmaline, yohimbine, and serpentine, which are responsible for its wide spectrum of pharmacological activities. Modern experimental and in silico studies have demonstrated antihypertensive, sedative, antipsychotic, cardioprotective, hypolipidaemic, antidiabetic, antimicrobial, antioxidant, anti-inflammatory, antidiarrhoeal, and neuroprotective properties of *Rauwolfia serpentina*. Notably, reserpine established the plant as the world's first plant-derived antihypertensive drug, marking a milestone in cardiovascular therapeutics. This review comprehensively highlights the ethnomedicinal importance, Ayurvedic perspective, phytochemistry, and pharmacological potential of *Rauwolfia serpentina*, supporting its relevance in evidence-based integrative medicine and future phytopharmaceutical development.

KEYWORD: Rauwolfia serpentine, Antihypertensive, Indole Alkaloids, Medicinal plant, Reserpine.

1 INTRODUCTION

The growing global population creates significant obstacles in meeting basic needs such as food, shelter, and clothing. The global demand for medicine is increasing due to rising sickness rates. Pharmaceutical formulations for treating diseases are expensive, ineffective, and have severe hazardous side effects. We really need to employ natural, herbal medicines that are free of adverse effects. Herbal medicine is used by about 80% of the global population for therapeutic purposes, with over 800 plant species exhibiting hypoglycemic action.¹ Long-term insomnia treatments using synthetic hypnotics cause adverse effects, addiction, and abuse. As a result, alternative approaches for safe treatment are increasingly being promoted, including the use of phytopharmaceuticals. Rauwolfia serpentina (Indian Snakeroot) is a promising source of phytopharmaceuticals for treating insomnia, and it is well-known for its therapeutic usage in traditional beverages. Its various alkaloids are responsible for a wide range of pharmacological effects, including the active root alkaloid reserpine. Even psychopharmacological studies have primarily described reserpine for sedation. However, subsequent research indicated that reserpine is a tranquilizer rather than a sleep promoter.² Sarpagandha (*Rauwolfia serpentina*) is a flowering plant from the family Apocynaceae. Rauwolfia species contain over 80 alkaloids, the most significant of which is reserpine.³ The plant is known to possess antidiarrheal, antimicrobial activity apart from using it for the treatment of circulatory disorders, rheumatism, hypertension, insanity, epilepsy, and leaves are used in the removal of opacities of the cornea. Sarpagandha is used in Ayurvedic medicine to treat high blood pressure, sleeplessness, asthma, acute stomach discomfort, and difficult birth, as well as mental illnesses such as neuropsychiatric disorders, psychosis, and schizophrenia. Sarpagandha is derived from Rauwolfia serpentina root. It is also used to treat snake bites, insect stings, mental disorders, gastric tumours, general weakness, goitre, hysteria, insomnia, insanity, lipoma, paraplegia, paratyphoid, piles, pneumonia, splenomegaly, stomach trouble, tonsillitis, traumatic wound, TB, and vertigo.⁴

2 HISTORY

Rauwolfia serpentina has a very interesting story. Ancient writings, such as those by Charaka (c. 1000–800 B.C.), mention the plant and refer to it by its Sanskrit name, Sarpagandha, as a helpful remedy for insect stings and snake bites. Numerous folktales exist regarding

rauvolfia. For example, before fighting a cobra, a mongoose would first eat its leaves to build up its strength. Another person claims that its leaves, when freshly pulverised and placed to the toes, may act as a snake toxin counteragent. According to a third, eating the root's fragments will help the mentally ill individual get over his insanity. Due of its purported ability to treat insanity, The plant is also known as "Pagal-ki-dawa" in India due to its purported ability to treat insanity.⁵

3 BOTANICAL CLASSIFICATION OF RAUVOLFIA SERPENTINA

Rank	Taxon
Kingdom	Plantae
Unranked	Angiosperms
Unranked	Eudicots
Unranked	Asterids
Order	Gentianales
Family	Apocynaceae
Genus	Rauvolfia
Species	R. serpentina

4 VERNACULAR NAMES ⁶

Table no 1.

Hindi	Chandrabhaga, Chota-chand, Sarpagandha
English	Rauvofia / Indian snakeroot
Lattin	Rauvofia serpentine
Sanskrit	Sarpaghangha
Tamil	Chevanamalpodi, Sarpagandha
Kannada	Keramaddinagaddi
Telugu	Patalaguni, Patalagandha, Sarpagandha
Malayalam	Churannavilpori, Suvapavalporiyam
Marathi	Harkaya, Harki, Hadaki/Adakai
Assamese	Arachoritita
Bengali	Chandra
Kannada	Sutranabhi
Chinese	Lu fu mu

5 MORPHOLOGY

Rauwolfia serpentina is a climbing evergreen perennial shrub that can reach a height of 60 cm and has a cylindrical stem.

Its **roots** are tuberous and made of pale brown cork.

Plant **leaves** have three whorls and are elliptic, lanceolate, or obovate, with a tapering base and slender shape.

Flowers form irregular corymbose cymes.

The **fruits** are Drupe, single or double, glossy black.

The **inflorescence** has red pedicels, calyx, and white corolla.

The corolla is longer than the calyx, with a slender tube that swells slightly above the middle, three lobes, and an elliptic-oblong shape.

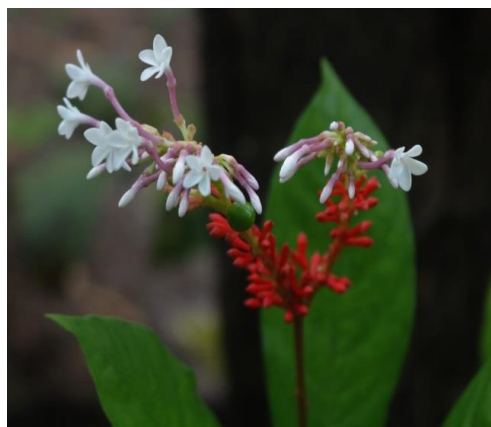
Flowering occurs from March to May under Indian conditions.

The root segments are subcylindrical to tapering, tortuous or curved, rarely branching, and occasionally develop twisted rootlets. The thicker regions of the roots are larger, more plentiful, and more inflexible and woody. The root odour is vague, earthy, and evocative of stored white potatoes. The flavour is bitter.

The **bark** easily peels from the wood when scraped. The wood is hard and rather low in density. The plant thrives in hot and humid parts of South and South-East Asian countries, including Ceylon, Burma, Indonesia, and India.⁷



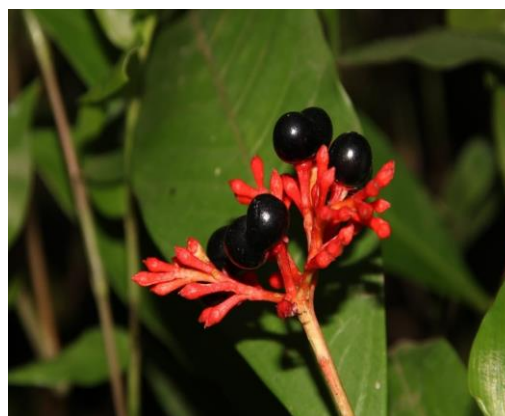
Sarpaghangha Plant



Flower



Root



Fruit

6 MICROSCOPIC

The root is made up of a stratified cork with roughly eight to twelve layers of smaller, suberised, and unlignified cells, while the remaining layers have large, suberised, and lignified cells; the phelloderm is parenchymatous, with some cells packed with starch grains, prismatic, and calcium oxalate crystals in clusters; the secondary phloem tissue is made up of sieve cells, companion cells, and parenchymatous cells that contain calcium oxalate crystals and starch grains; phloem fibres are absent, and the phloem parenchyma is occasionally filled with granular materials; The majority of starch grains are simple, although compound granules with two to four components can also exist; isolated, spherical, 5–15 µm-diameter granules having a distinct, simple or split hilum in a radiating pattern; Unlike several other species, including *R. canescens*, *R. micrantha*, *R. densiflora*, *R. perakensis*, and *R. vomitoria*, there are no stone cells; The secondary xylem is traversed by well-developed, lignified medullary rays that are between one and five cells wide, though uniseriate rays are more noticeable; vessels can be found alone or in pairs; the xylem parenchyma cells are lignified; fibres are present; the thick-walled cells of the medullary rays are also packed with calcium oxalate prisms and starch grains.⁸

7 AYURVEDIC PHARMACODYNAMIC PROPERTIES

Rasa – Tikta

Guna – Ruksha

Veerya – Ushna

Vipaka – Katu

Table no 2.

S.No.	Nighantu	Gana	Rasa	Guna	Veerya	Vipaka
1	Bhavprakash Nighantu	Haritakiadi Varga	Katu , Tikta ,Kashya	Ushna	Ushna	-
2	Madanpal Nighantu	Abhayadi Varga	Tikta	Ruksha	Ushna	Katu
3	Raj Nighantu	Mulakadi Varga	Katu , Tikta	Ushna	Ushna	Katu
4	Kaiyadeva Nighantu	Aushadhi Varga	Katu, Tikta , Kashya	-	-	-
5	Dhanvantri Nighantu	Karveeradi Varga	Katu , Tikta	-	Ushna	-
6	Priya Nighantu	Shatpushpadi Varga	Tikta	-	Ushna	-

8 TYPES/ BHEDA (VARIETIES) OF SARPAGANDHA

Some Vaidyas say Ishvara moola - *Aristolochia indica* Linn. as Sarpagandha.

Raja Nighantu mentions Ishvaramoola as one of the synonyms of Sarpagandha.

Dhanwantari Nighantu

- 2 Types

1. Nakuli- *Rauwolfia serpentina* Benthex Kurz.
2. Gandhanakuli - *Ophiorhiza mungos* Linn.

Raj Nighantu

- 2 types

1. Nakuli
2. Mahasugandha

9 THERAPUETIC EFFECT

Sarpagandha acts as a sedative, hypnotic, and cardiodepressant. It treats hypertension, sleeplessness, sexual aggressiveness, and vertigo. The medicine is commonly used to treat schizophrenia and diseases associated with evil spirits (bhutawadha). The classical text of Indian medicine mention about drug, Sarpagandha is included in Aparajit Gana which is indicated in mental disorder (susruta uttartantra 60/47). Sarpandha is also included in Ekasar Gana (susruta kalpa 5/84) useful against visha and for treatment of musaka visha (susruta kalpa 7/29). Also use in treatment of Visuchika (vrindamadhava 6/26). In modern era Sarpagandha is used as an effective Antihypertensive and it is World's Frist Antihypertensive Drug.⁹

10 PHARMACOLOGICAL ACTIVITIES

10.1 ANTIHYPERTENSIVE (ANIMAL STUDY)

The study was designed to investigate the antihypertensive and antihyperlipidemic therapeutic responses to *Rauwolfia serpentina* dosages in albino rats by assessing blood pressure, biochemical data, and the histological architecture of liver and kidney tissues. Thirty albino rats were divided into five groups (n = 6) as follows: G1 (normal control) received a normal diet, G2 (positive control) received only 8% NaCl added diet (high salt diet), G3 was given atenolol (standard drug control) at a dose of 50 mg/kg body weight, and G4 and G5 groups were given methanolic plant extract at a dose of 100 mg/kg body weight and 200 mg/kg body weight daily along with a high salt diet for four weeks, respectively.

Rauwolfia serpentina significantly ($P < .05$) reduced blood pressure in G4 and G5 groups vs G2 and G3. A significant ($P < .05$) influence was detected on serum lipid profile and serum proteins, as well as hepatoprotective and renoprotective potential when evaluating tissue sections under microscope, in animal groups administered herbal extract as compared to control groups. It might be inferred that *Rauwolfia serpentina* has a therapeutic impact on hypertension and hypercholesterolaemia, most likely by protecting the liver and renal structures.¹⁰

10.2 IN MANAGEMENT OF NACROLEPSY (IN SILICO)

The effective phytochemicals of *Rauwolfia serpentina* that may function as Orexin 2 receptor (OX2R) agonists were screened and identified in this study using a variety of bioinformatics technologies. Numerous in silico techniques have been used, including molecular docking, molecular dynamics simulation, drug-likeness assessment, ADMET analysis, protein-ligand interaction analysis, and biological activity prediction. Tetraphylline and yohimbine were the two most promising therapeutic candidates among all the screened phytochemicals from *R. serpentina* because of their positive ADMET profiles, high docking scores, blood-brain barrier permeability, and notable RMSD, RMSF, Rg, and SASA values. However, as the study is only based on in silico research, experimental studies in vitro and in vivo are recommended to confirm the effectiveness and potency of these drugs.¹¹

10.3 HYPOLIPAEDIMIC ACTIVITY

The hypolipidaemic action of *Rauwolfia serpentina* benth was studied to isolate the active principle and prove its application in treating hyperlipidaemia, a leading cause of cardiovascular disease globally. A 12-day trial administered *Rauwolfia serpentina* root powder (30 mg/kg) and distilled water (1 ml/kg) orally to rabbits as test and control groups. *Rauwolfia serpentina* root powder has been shown to have hypotriglyceridemic and hypocholesterolemic effects, with no adverse effects on liver or heart function.¹²

10.4 ANTIBACTERIAL AND ANTIPROLIFERATIVE

The study examined the phytochemical analysis of *Rauwolfia serpentina* and its various biological activities. Plant leaves and roots were extracted using solvents such as ethanol. The leaf extract had higher levels of jmalicine, whereas the root extract included more reserpine, ajmaline, and yohimbine. Antimicrobial activity was assessed using the well diffusion assay, MIC, and MBC. The study found that root extract was effective against *S. typhii*, making it a promising choice for future medication development. The ethanolic root and leaf extracts of

Rauwolfia serpentina were tested for antiproliferative activity on malignant HeLa cell lines. The leaf extract was shown to be more effective, with an IC₅₀ value of 196 µg/ml.¹³

10.5 ANTIATHEROGENIC AND CARDIOPROTECTIVE (ANIMAL STUDY)

The study aimed to assess the phytochemistry and impact of *Rauwolfia serpentina*'s methanolic root extract (MREt) in alloxan-induced diabetic Wister male mice. Mice were divided into control (distilled water at 1 mL/kg) and alloxan-induced diabetic mice, which were further divided into diabetic (distilled water at 1 mL/kg), negative (0.05% dimethyl sulfoxide at 1 mL/kg), positive (glibenclamide at 5 mg/kg), and three test groups (MREt at 10, 30, and 60 mg/kg). All therapies were administered orally for 14 days. MREt enhances the glycaemic, antiatherogenic, coronary risk, and cardioprotective parameters in alloxan-induced diabetic mice.¹⁴

The current study aims to assess the impact of *Rauwolfia serpentina* methanolic root extract (MREt) on arteriosclerosis, glycosylation indices, and atherogenic dyslipidaemia in mice with type 1 diabetes produced by alloxan. Following a single intraperitoneal injection of 150 mg/kg of alloxan monohydrate, 42 mice were divided into three test dose groups (MREt 10, 30, and 60 mg/kg), a diabetic control group (1 ml distilled water), a negative control group (0.05% DMSO 1 ml/kg), and a positive control group (5 mg/kg glibenclamide). The results showed that MREt might be used therapeutically to reduce the risk of arteriosclerosis, glycosylation, and atherogenic dyslipidaemia in mice with diabetes produced by alloxan.¹⁵

10.6 ANTIOXIDANT

Studies have shown that extracts of *Rauwolfia serpentina* possess antioxidant properties, which can help neutralize free radicals and prevent cellular damage. It also exhibits antibacterial and antifungal characteristics.¹⁶

10.7 ANTIPSYCHOTIC ACTIVITY

Historically, Sarpagandha was one of the first effective treatments for certain psychiatric disorders. Reserpine is the main component with antipsychotic properties.

By depleting monoamine neurotransmitters (dopamine, norepinephrine, and serotonin) from presynaptic vesicles, reserpine reduces the over-activity of these neurotransmitter systems, which are often implicated in conditions like schizophrenia and psychosis. While its use has been largely replaced by newer, safer antipsychotic drugs, its historical significance and mechanism of action are crucial for a comprehensive review.¹⁷

In higher doses, reserpine's profound and long-lasting depletion of dopamine and serotonin can be effective in treating severe mental disorders like schizophrenia. This mechanism was a breakthrough in the mid-20th century, providing a means to control agitation and psychotic symptoms. While newer, safer antipsychotics have largely replaced it, reserpine is still used as an adjunct therapy in some cases to reduce the required dosage of other drugs.¹⁸

10.8 ANTI-INFLAMMATORY AND ANALGESIC EFFECTS

While traditionally used for pain, recent studies are beginning to explore the underlying mechanisms.

The anti-inflammatory and analgesic properties are likely due to a combination of its alkaloid content. Some studies suggest that the plant's compounds can inhibit the synthesis of pro-inflammatory mediators such as prostaglandins and bradykinin. The sedative properties also contribute to pain relief by calming the nervous system, which is especially effective for nerve-related pain (neuropathic pain).¹⁹

10.9 ANTIMICROBIAL AND ANTIFUNGAL ACTIVITY

Sarpagandha extracts have been shown to have broad-spectrum activity against various bacteria and fungi. The antimicrobial properties are attributed to its alkaloids and other phytochemicals like phenols and flavonoids. Reserpine, in particular, has been found to inhibit bacterial efflux pumps, which are a major mechanism for antibiotic resistance. By disabling these pumps, Sarpagandha could make bacteria more susceptible to antibiotics.²⁰

10.10 ANTIDIABETIC ACTIVITY

Traditional use of Sarpagandha for diabetes is gaining scientific support. Some studies show that its root extracts can reduce blood glucose levels in diabetic animals. The proposed mechanisms include an increase in insulin sensitivity, improved glucose utilization, and a possible protective effect on pancreatic beta cells. These effects may be due to the presence of flavonoids and other antioxidant compounds in the plant.²¹

10.11 ANTIPYRETIC ACTIVITY

The antipyretic effect is likely related to its central nervous system-depressing action. The alkaloids can influence the hypothalamus, the brain's temperature-regulating center, helping to lower an elevated body temperature.²²

10.12 ANTIDIARRHEAL ACTIVITY

The study has been performed to assess the antidiarrheal properties of a methanol extract of the leaves of *Rauwolfia serpentina* in mice with castor oil-induced diarrhoea. Dosages of 100, 200, and 400 mg/kg R. To assess antidiarrhoeal activity, *serpentina* leaf methanol extracts were administered to castor oil-induced diarrhoea mice. Results shows all doses of the extract and the reference medication atropine sulphate (3 mg/kg, i.p.) resulted in a dose-dependent reduction in intestinal weight and fluid volume. In the charcoal meal test, the extracts considerably slowed intestinal transit when compared to diphenoxylate HCL (5 mg/kg, p.o.). The findings indicate that the extract of *Rauwolfia serpentina* leaves has strong antidiarrhoeal efficacy, supporting its traditional usage in herbal therapy.²³

11 CONCLUSION AND FUTURE PROSPECTS

Rauwolfia serpentina (Sarpagandha) is a well-established medicinal plant with significant ethnomedicinal, Ayurvedic, and pharmacological importance. Classical Ayurvedic texts describe its use in Vata disorders, Unmada, Apasmara, Anidra, and Visa, while modern research validates its antihypertensive, sedative, antipsychotic, cardioprotective, antidiabetic, antimicrobial, and antioxidant activities, mainly attributed to indole alkaloids such as reserpine. Its recognition as the world's first plant-derived antihypertensive drug highlights its global therapeutic relevance.

Future research should focus on clinical validation, standardization of extracts, molecular mechanism studies, conservation strategies, and development of safer phytopharmaceutical formulations to enhance its role in integrative and evidence-based healthcare.

REFERENCES

1. Kumari R, Rathi B, Rani A, Bhatnagar S. *Rauwolfia serpentina* L. Benth. ex Kurz.: phytochemical, pharmacological and therapeutic aspects. *Int J Pharm Sci Rev Res*. 2013 Nov;23(2):348-55.
2. Paul S, Thilagar S, Nambirajan G, Elangovan A, Lakshmanan DK, Ravichandran G, Arunachalam A, Murugesan S. *Rauwolfia serpentina*: a potential plant to treat insomnia disorder. *Sleep and Vigilance*. 2022 Jun;6(1):31-40.
3. Soni R, Jaiswal S, Bara JK, Saksena P. The use of *Rauwolfia serpentina* in hypertensive patients. *J Biotechnol Biochem*. 2016 Jun;2(5):28-32.
4. CT S, CK J, Unnithan JK, KM P, Balachandran I. Identification of suitable substitute for Sarpagandha (*Rauwolfia serpentina* (L.) Benth. ex Kurz) by phytochemical and

- pharmacological evaluation. Beni-Suef University Journal of Basic and Applied Sciences. 2020 Oct 13;9(1):42.
5. Chauhan PS, Chaurasiya RK, Chand P. Chapter-6 Sarpagandha: An Overview. Chief Editor. 2019;141.
6. Malviya A. An International Journal of Research in AYUSH and Allied Systems THE PHYTOCHEMICAL AND PHARMACOLOGICAL PROPERTIES OF SARPAGANDHA: RAUWOLFIA SERPENTINA.
7. Singh M. Evaluating the therapeutic efficiency and drug targeting ability of alkaloids present in Rauwolfia serpentina. International Journal of Green Pharmacy (IJGP). 2017 Sep 14;11(03).
8. Singh SK. Standarization & Identification of Sarpagandha (Rauwolfia serpentina).
9. Bunkar AR. Therapeutic uses of Rauwolfia serpentina. Int J Adv Sci Res. 2017;2(2):23-6.
10. Shah SM, Naqvi SA, Munir N, Zafar S, Akram M, Nisar J. Antihypertensive and antihyperlipidemic activity of aqueous methanolic extract of Rauwolfia serpentina in albino rats. Dose-Response. 2020 Jul 23;18(3):1559325820942077.
11. Yadav P, Azram M, Faraz M, Abbas K, Mustafa M, Alam M, Khan S. In Silico Screening of Rauwolfia Serpentina Phytochemicals as Orexin Receptor-2 Agonists for the Management of Narcolepsy. International Journal of Biochemistry Research & Review. 2025 Feb 3;34(1):76-102.
12. Qureshi SA, Udani SK. Hypolipidaemic activity of Rauwolfia serpentina Benth. Pakistan Journal of Nutrition. 2009 Jun 15;8(7):1103-6.
13. Deshmukh SR, Ashrit DS, Patil BA. Extraction and evaluation of indole alkaloids from Rauwolfia serpentina for their antimicrobial and antiproliferative activities. Int J Pharm Pharm Sci. 2012;4(5):329-4.
14. Azmi MB, Qureshi SA. Methanolic root extract of Rauwolfia serpentina benth improves the glycemic, antiatherogenic, and cardioprotective indices in alloxan-induced diabetic mice. Advances in Pharmacological and Pharmaceutical Sciences. 2012;2012(1):376429.
15. Azmi MB, Qureshi SA, Rais S, Sultana S. Methanolic root extract of Rauwolfia serpentina lowers atherogenic dyslipidemia, arteriosclerosis and glycosylation indices in type 1 diabetic mice. Journal of Applied Pharmaceutical Science. 2015 Aug 28;5(8):061-7.

16. Naikodi, M. A. R. (2021). "A Comparative Antibacterial, Antioxidant, and Antineoplastic Potential of Rauwolfia serpentina (L.) Leaf Extract with Its Biologically Synthesized Gold Nanoparticles (R-AuNPs)." *Evidence-Based Complementary and Alternative Medicine*, 2021, Article ID 8617663.
17. DrugBank Online - Reinforces its use to treat "severe agitation in patients with mental disorders.
18. Kline, N. S. (1954). Use of Reserpine in Neuropsychiatric Conditions. *Annals of the New York Academy of Sciences*, 59(1), 107–132.
19. Kumar, S., & Singh, A. K. (2022). Phytochemical composition, medicinal applications, and pharmacological insights: A comparative review of *Rauwolfia serpentina* and *Rauwolfia tetraphylla*. *ResearchGate*. This review discusses the anti-inflammatory and other properties, citing several sources.
20. Suresh, K. M., et al. (2015). Antimicrobial Screening of Various Extracts of *Rauwolfia serpentina*. *International Journal of Advanced Research in Science and Technology*, 1(2), 36-39.
21. Azmi, M. B., & Qureshi, S. A. (2013). *Rauwolfia Serpentina* Ameliorates Hyperglycemic, Haematinic and Antioxidant Status in Alloxan-Induced Diabetic Mice. *Journal of Applied Pharmaceutical Science*, 3(07), 136-141
22. Amole, O. O., & Onabanjo, A. O. (1999). Preliminary studies on the anti-inflammatory and antipyretic properties of the leaves of *Rauwolfia serpentina* (L.) Benth. *Indian Journal of Pharmacology*, 31(1), 58-61.
23. Ezeigbo II, Ezeja MI, Madubuike KG, Ifenkwe DC, Ukwani IA, Udeh NE, Akomas SC. Antidiarrhoeal activity of leaf methanolic extract of *Rauwolfia serpentina*. *Asian Pacific Journal of Tropical Biomedicine*. 2012 Jun 1;2(6):430-2.