



International Journal of Agriculture and Nutrition

ISSN Print: 2664-6064
 ISSN Online: 2664-6072
 Impact Factor: RJIF 5.2
 IJAN 2022; 4(2): 98-101
www.agriculturejournal.net
 Received: 02-07-2022
 Accepted: 06-08-2022

Shubham Bhosale
 Department of Pharmacology,
 HSBPVT, GOI, College of
 Pharmacy, Kashti, Shrigonda,
 Maharashtra, India

Aniket Lendal
 Department of Pharmacology,
 HSBPVT, GOI, College of
 Pharmacy, Kashti, Shrigonda,
 Maharashtra, India

Kishor Godage
 Department of Pharmacology,
 HSBPVT, GOI, College of
 Pharmacy, Kashti, Shrigonda,
 Maharashtra, India

Mahesh Gawade
 Department of Pharmacology,
 HSBPVT, GOI, College of
 Pharmacy, Kashti, Shrigonda,
 Maharashtra, India

Corresponding Author:
Shubham Bhosale
 Department of Pharmacology,
 HSBPVT, GOI, College of
 Pharmacy, Kashti, Shrigonda,
 Maharashtra, India

Rauwolfia serpentine (Linn) an herb with health benefits & pharmacological therapeutic effects

Shubham Bhosale, Aniket Lendal, Kishor Godage and Mahesh Gawade

DOI: <https://doi.org/10.33545/26646064.2022.v4.i2b.85>

Abstract

Ayurvedic literature and contemporary science both describe the medicinal herb sarpagandha, *Rauwolfia serpentina*. The presence of alkaloids, carbohydrates, flavonoids, glycosides, phlobatannins, phenols, resins, saponins, sterols, tannins, and terpenes in the plant is recognised for its ability to treat a variety of illnesses. With particular emphasis on the plant's role in treating high blood pressure and hypertension, this review focuses on the use of *Rauwolfia* as a treatment for many diseases, as well as its botany, chemistry, and mode of action. We also critically examine its unfavourable side effects, toxicology, and carcinogenicity. The objective of the current review is to assess the numerous pharmacological, phytochemical, and therapeutic qualities of *R. serpentina* as a result of all these characteristics. When negative side effects including cancer and depression were linked to it, its popularity declined. Let used to be deemed the greatest treatment for hypertension. Its root contains an alkaloid whose pharmacological activity is thought to be anti-hypertensive.

Keywords: *Rauwolfia Serpentina*, Reserpine, Medicinal Plant, Indole Alkaloids, Antihypertensive

Introduction

Global population growth creates significant challenges in providing the need for food, shelter, and clothing. The demand for medicine has increased as millions of People are effected with common ailments globally. For the treatment of diseases, there are a number of pharmacological formulations available in the market, but they are complicated, insufficient, and unreliable variety of adverse effects ^[1]. Accordingly, it is necessary that we utilize alternative, naturally occurring medications or herbal products that do not show any adverse effects. The presence of various chemical compounds in medicinal plants, including alkaloids, hydrogen, carbon, nitrogen, glycosides, volatile oils, fatty acids, resins, and gums, is visible. And tannins are responsible for treat many different types of diseases ^[2]. Recently, the pharmacological, agricultural, cosmetics, and fragrance industries more than 150 different of aromatic and medicinal plants globally ^[3]. *Rauwolfia fiaserpentina*, also known as *Rauwolfiaserpentina* (Linne) Bentham ex Kurz, is the dried root. Belongs to the Apocynaceae family. It is an elongated shrub with cylindric stems that can reach a height of 3 feet. These stems are made of viscous light-colored latex and have pale bark. Alternatively to being simple and parallel, *Rauwolfia serpentina* leaves are typically grouped in whorls of 4 to 6. In apical and lateral cymes, white or pale rose flowers are arranged. A solitary, 2-lobed drupe, the fruit matures to a purplish-black colour. Muller Schiltter and Bein isolated reserpine for the first time in 1952 using the formula 33 H40 O9 N2 ^[4]. As per the inscription, Sarpagandha and Chandra, two Ayurvedic medications, are how *Rauwolfiaserpentina* is described in Sanskrit. The term "antidote for snake-bite" refers to using sarpagandha, a snakes smell or repellent ^[5].

Distribution

The family has 50 species, which are spread out. Globally in the Hilly region, Indian peninsula, Sri Lanka, the Indochina, Burma, and is Belongs to Bangladesh, India, and other regions of Asia. A traditional medicinal plant, sarpagandha, grows up to an altitudes of 1300-1400 metres in the Himalayan Mountains. It can be found primarily in moist deciduous forests between sea level-1,200 metres above sea level. It is in the Deccan, Linked to bamboo groves ^[7].

Morphological features

The *Rauwolfia* plant grows to a maximum height of 60 cm, is a perennial shrub, and is glabrous. Tuberos roots with light brown cork are present. The slender, three-whorled leaves are oblong to rectangular to ovate, below brilliant green, and above dark green. It has white blooms in irregular corymbose cymes that are commonly stained with violet. According to Indian conditions, the blossoming period runs between March to May. The fruits are requirement, single or did ymous, gorgeous black, with red pedicles, a calyx, and a white corolla on the flowering [8].

Table 1: Scientific Classification [6]

Kingdom	Plantae
Phylum	Angiosperms
Subphylum	Eudicots
Class	Asteroids
Order	Gentianales
Family	Apocynaceae
Genus	<i>Rauwolfia</i>
Species	serpentina

Table 2: Vernacular Names [9]

Hindi	Chandrabhaga, Chota-chand, sarpagandha.
English	Rauwolfia /Indian snakeroot
Latin	<i>Rauwolfia serpentine</i>
Sanskrit	Sarpagandha
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

Chemical constituents

Reserpine, which ranges in concentration from 1.7 to 3.0%, is the main alkaloid found in the plant's root, stem, and leaves. More than 90% of the total alkaloids are found in the root bark [10]. The *Rauwolfia serpentina* plant has three different types of alkaloids.

1. Weakly basic in dole Alkaloids: The main alkaloids are tertiary Indo le Alkaloids like despiridine, reserpine, and rescinnamine.
2. Indo line Alkaloids of Intermediate Basicity: Tertiary Indo line Alkaloids include Reserpiline, Ajmaline, Iso-Ajmaline, and Rauwolfine.
3. Strong Anhydronium Bases: The anhydronium alkaloids serpentine, serpentinine, and also to nine are all very basic [11].

Reserpine was first isolated in 1952 and its chemical Formula was found to be C₃₃ H₄₀ O₉ N₂. [12]Reserpine has a yield that ranges between 1.5 to 2.8%.The roots barks contain about 90% of the alkaloid found in the root [13].

The geographical location from which the plant is harvested, as well as the time of year, affect the percentage of alkaloid. Assam samples usually include more alkaloid (2.50%) than samples from other regions, and December is the ideal month for collecting samples to obtain more alkaloid [14]. Various species in Instead of, the *Rauwolfia* genus has been utilised. *Rauwolfia vomitoria*, a type of R serpentina, and *Rauwolfia* African cocoa, *Rauwolfia*

heterophyllus la, and South and Central American *Rauwolfia tetraphylla*. Woodson and co [15].

Cultivation

Land preparation: The plant needs medium to deep, fertile, slightly acidic to neutral soils for richer, better growth. Rich in organic material are appropriate for commercial farming.

Planting: The most effective way to grow commercial plantations is by seed propagation. Seeds, stem cuttings, and root cuttings can all be used to spread the plant.

By stem cutting: In the nursery beds during the month of June, hard wooden stem cuttings measuring 14 to 20 cm are closely planted. Moisture is preserved continuously.

By root cutting: During the spring, carefully spaced nursery beds are planted with root cuttings that are nearly 6 cm long. Watering is used to maintain the moisture in the beds [16].

Mechanism of Action

Reserpine's mechanism of action has been extensively studied and recorded. Reserpine binds to vesicular monoamine transporters, which have been protein receptors. (VMATs) in specific organelle membranes Presynaptic neuron secretory vesicles [17]. Reserpine blocks the binding of cytoplasmic neurotransmitters to VMAT proteins and the absorption of neurotransmitters by secretory vesicles [18].

Vesicular transport proteins come in two isoforms, VMAT1 and VMAT2. VMAT1 is mostly present in peripheral nervous system neuroendocrine cells, especially in sympathetic nervous system, thrombocytes, and chromaffin granules in the adrenal medulla. VMAT2 is mostly present in the brain, sympathetic nervous system, mast cells, and histamine containing cells in the pancreas and genitourinary tract. Reserpine has a 2-3 times stronger affinity for VMAT2 than it does for VMAT1 [19, 20]. It has a high affinity for some VMAT receptors and binds to them practically irreversibly, specifically VMAT2 [21].

Medicinal Uses of Rauwolfia

The following pharmacologic effects of *Rauwolfia serpentina* have been observed [22].

1. By exerting a depressive effect on the cerebral canthers, it calms the entire nervous system.
2. By acting on the vasomotor centre, it causes broad vasodilatation and lowers blood pressure [23].

1. High blood pressure

The *Rauwolfia* plant is the greatest medication for high blood pressure, and most nations' medical communities have adopted it. It contains isolated alkaloids that have a direct impact on hypertension and are frequently employed by current medical professionals. However, they have several undesirable side effects that the medicine does not have when taken in its unadulterated form. Its powder, when taken three times daily, at a ½ dose, effectively lowers blood pressure [24].

2. Antipsychotic [25]

Reserpine has traditionally been used to treat tardive dyskinesia and mental illness. An ascending plant with a smooth stem is called *Rauwolfia*. It is used as a medication to reduce fever or as a febrifuge [26].

3. In insanity

The *Rauwolfia* herb is very helpful in treating of schizophrenia. Take 240 ml of sweetened goat's milk 2 times day with one gram me of powdered root. Using sweet

candies. Low blood sugar levels should not use it. People with high blood pressure, depression, and hypotension [27].

4. Anti-hypertensive

It has been adopted by the medical community in the majority of nations and is also utilised in the treatment of high blood pressure. Practitioners of contemporary medicine frequently employ these isolated alkaloids, which have a major effect on hypertension. It decreases urticaria itching [28].

5. Prostate cancer

One of the leading causes of cancer-related fatalities in males is thought to be prostate cancer. Patients with prostate cancer have not had any appreciable survival advantages from contemporary treatments like radiation or chemotherapy [29]. Compared to chemotherapy and radiation, natural products have shown to be a significant source for the identification of bioactive substances used in the treatment of a range of illnesses and disorders, including cancer. Traditional Chinese medicine has employed various components of this plant for thousands of years to cure a wide range of illnesses, including fever, general weakness, digestive infections, liver issues, and mental difficulties [30]. According to investigations of the gene expression patterns of prostate cancer cells treated with the plant extract, the extract's anti-prostate cancer action in both in vitro and in vivo model systems may be influenced by its effects on signalling pathways for cell cycle regulation and DNA damage [31].

6. In Hysteria

Hysteria can be helped by *Rauwolfia*. Three times, one gramme of the powdered root can be taken with milk. The course of treatment should be followed until a full recovery is achieved [32].

7. In itching skin

It reduces urticaria itching. You can consume one gramme of powdered root with water [33].

8. Other uses

It is employed as an antidote to snake and other venomous reptile bites. Dysentery and other excruciating intestinal conditions are also treated with it. Serpentine's root also has antibacterial qualities. The roots' infusion, decoction, and extract are used to treat fever, colic, diarrhoea, dysentery, cholera, and painful bowel disorders as well as to increase uterine contractions for the expulsion of the foetus. The root was advised for usage in difficult childbirth situations because it was thought to induce uterine contraction. The juice of the leaves has been employed as a treatment for corneal capacity (Wealth of India) [34].

References

- VP K. Herbal medicine, Current Science; c2000. p. 35-51.
- Harisaranraj SKSS, Evaluation R. Of the chemical composition *Rauwolfia serpentina* And Ephedra Vulgeris, Advances in Biological Research; c2009.p. 174-178.
- Robber TV, JM Pharmacognosy Pharma co biotechnology, Williams and Wilkins, Baltimore; c1996. p. 1-14
- Vakil RJ, *Rauwolfia serpentina* in the treatment of High Blood Pressure: Review of the literature, circulation; c1995. p. 220-229.
- Monachino J. *Rauwolfia serpentina*-its history, botany and medical use. Economic botany. 1954 Oct;8(4):349-65.
- Medical plant *Rauwolfia serpentina*.
- Vakil R. *Rauwolfia Serpentina* in the treatment of high blood pressure, American Heart association; c1955.
- Sen BK, *Rauwolfia G, Serpentina a. new*. Indian drug for insanity and Hypertension, Indian M. World; c1931.
- Ministry of Health & Family Welfare Regional, Research Laboratory Journal of Indian Medical; c1942.
- Vakil RJ, *Rauwolfia Serpentina* in the treatment of high blood pressure. American Heart association; c1955.
- Tyler BLRJ, Pharmacognosy, Lea and Febiger, Philadelphia; c1988. p. 222-224.
- Muller JM, Reserpine, Der Sedative Wirkstoff aus *Rauwolfia Serpentina* (Benth), Experientia; c1952.
- Herbal Monograph, the Himalaya Drug Company; c2016.
- Herbal Monograph, the Himalaya Drug Company.
- YHSESJ Woodson RE, *Rauwolfia IA: Botany, Pharmacognosy, Chemistry and Pharmacology*, Boston, MA: Little, Brown and company; c1957.p.32-33.
- Sen G, *Rauwolfia Serpentina a New Indian drug for insanity and Hypertension*, Indian M. World; c1931.
- LYER. Schuldiner S, Reserpine binding to a vesicular amine transporter expressed in Chinese hamster ovary fibroblasts, J Biol Chem; c1993. p. 29-34.
- SMRA Gopalakrishnan A, Identification of the substrate bind-Ing region of vesicular monoamine transporter-2 (VMAT-2) using iodoami-Noflisopolol as a novel photoprobe, Mol Pharmacol; c2007.p. 1567-1575.
- WK Vesicular monoamine transporters: structure-function, phar-Macology, and Medicinal chemistry, Med Res Rev; c2011. p. 483-519.
- SMWESB. Eiden LE, The vesicular amine transporter Family (SLC18): amine/proton antiporters required for vesicular accumula-Tion and regulated exocytotic secretion of monoamines and acetylcholine. Pflugers Arch; c2004. p. 636-640.
- SMRA Gopalakrishnan A, Identification of the substrate bind-Ing region of vesicular monoamine transporter-2 (VMAT-2) using iodoami-Noflisopolol as a novel photoprobe. Mol Pharmacol; c2007. p. 1567-1575.
- Vakil RJ, clinical A. trial of *Rauwolfia serpentina* in essential Hypertension, Brit Heart J; c1949. p. 350-355.
- WG The central control of the blood Pressure, Indian M. Gaz; c1953. p. 88-111.
- CJGPKABR. Bemis DL, Antiprostata cancer activity of a beta-Carboline alkaloid enriched extract from *Rauwolfia Vomitoria*, International Journal of Oncology; c2006. p. 1065-1073.
- MS Poonam Agrawal S, Physiological, biochemical and modern Biotechnological approach to improvement of *Rauwolfiaserpentina*, J Pharm Biol Sci; c2013. p.73-78.
- SASA. Singh P, Somatic embryogenesis and in vitro Regeneration of an endangered medicinal Plant sarpghandha (*Rauwolfia serpentina*. L), Life Sci. J; c2009. p. 74-79.

27. CJGPKABR. Bemis DL. Antiprostata cancer activity of a beta-Carboline alkaloid enriched extract from *Rauwolfia Vomitoria*, International Journal of Oncology. 2009. p.1065-1073.
28. BK Sen G. *Rauwolfia Serpentina*, a New. Indian drug for insanity and Hypertension, Indian M. World, 1931.
29. American Cancer Society, Cancer Facts and Figures; c2006.
30. BM Beljanski M, Three alkaloids as Selective destroyers of cancer cells in mice, synergy with classic anticancer drugs, Oncology; c1986. p. 198-203.
31. CJGPKABR. emis DL, Antiprostata cancer activity of a beta-Carboline alkaloid enriched extract from *Rauwolfia Vomitoria*, International Journal of Oncology; c2006. p. 1065-1073.
32. MSAGV Mittal B, Phytochemical and pharmacological activity of *Rauwolfia serpentina*: A review, International Journal of Ayurvedic & Herbal Medicine; cv. p. 427-434.
33. MSAGV Mittal B, Phytochemical and pharmacological activity of *Rauwolfia serpentina*: A review, International Journal of Ayurvedic & Herbal Medicine; c2012. p. 427-434.
34. MSAGV Mittal B, Phytochemical and pharmacological activity of *Rauwolfia serpentina*: A review, International Journal of Ayurvedic & Herbal Medicine; c2012. p. 427-434.
35. LYER. Schuldiner S. Reserpine binding to a vesicular amine transporter expressed in Chinese hamster ovary fibroblasts J Biol Chem; c1993. p. 29-34.