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A Review On Rauwolfia Serpentina :Reserpine

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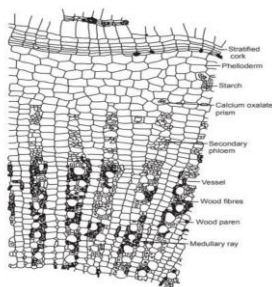
Abstract- The drug Rauwolfia serpentina is known to Indian system of medicine since last many centuries. Because of snake like shape of drug, it has been known as sarpagandha. Rauwolfia serpentina has been used since pre-vedic period for the treatment of snake bite (sarpadansh), insect stings, hypertension (Rakta Capa Vriddhi), insomnia (anidra), psychological disorders (manovikar), gastrointestinal disorders (Amashay gata roga), epilepsy (apasmar), wounds (vrana), fever (jwara), and schizophrenia (unmada). It is a large glabrous herb or shrub, belonging to family Apocynaceae, and found in the Assam, Pegu, Himalayas, Java, Tennasserim, Deccan, Peninsula, Bihar, and the Malay Peninsula. . Sarpagandha root is still in wide use. The present review focuses mainly on Mechanism of Action, Side effects, Chemical composition, Pharmacological Effect and Antihypertensive effect of Rauwolfia Serpentina. The plant is provide safe and effective effect on Blood Pressure.

Keywords : Reserpine, Sarpagandha, Medicinal plant, Antipsychotic, Hepatoprotective, Hypotension.

Introduction: Rauwolfia consist of dried roots of the plant known as Rauwolfia serpentina Benth belonging to family Apocynaceae, more than 100 species are included in the Rauwolfia genus and they are native to tropical and subtropical Region of world including Europe, Africa, Australia, Asia and central and south Americas. In India it is cultivated in Utter Pradesh, Bihar, Orissa, Tamilnadu, West Bengal, Karnataka, Maharashtra and Gujarat. The plant is large climbing or twinning herb or shrub, has pale green leaves that are elliptical or lanceolate shaped and occur in whorls of 3-5 leaves. The fruits of this plant are shiny, black or purple, round and are approximately 0.5 cm in diameter. Roots of plant reaches a length 30-50 and diameter between 1.2-2.5 cm. Hindus used this plant for centuries as an antidote to the bite of poisons snake.²The active principles differ from plants to plant due to their biodiversity and they produce a definite physiological action on the human body. Calixto³ *R. serpentina* has been used since pre-Vedic period for the treatment of snake bite (sarpadansh), insect stings, hypertension (Rakta Capa Vriddhi)⁴In Ayurvedic medicines, the roots of *R. serpentina* is used as a remedy for curing hypertension, insomnia, mental agitation, gastrointestinal disorders, excitement, epilepsy, traumas, anxiety, excitement, schizophrenia, sedative insomnia and insanity.⁵According to WHO (World Health Organization), any plant or its parts containing substance that can be used therapeutically or can be used as raw material for chemical or pharmaceutical synthesis is classified as a drug.⁶

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

Table 1 : Vernacular Names²¹



Taxonomical classification ²

Kingdom- Plantae

Phylum- Angiosperms

Subphylum- Eudicots

Order- Gentianales

Family- Apocynaceae

Genus- Rauvolfia

Species- Serpentina

Chemical Constituents:

Three types of alkaloids are present in Rauwolfia serpentina.

1. Weakly basic Indole Alkaloids: The principal alkaloids are Reserpine, Rescinnamine, desipridine and these are tertiary Indole Alkaloids.
2. Indoline Alkaloids of intermediate basicity: Reserpiline, Ajmaline, Iso- Ajmaline, rauwolfinine are tertiary Indoline alkaloids.
3. Strong Anhydronium Bases: Serpentine, serpentinine and alsotonine are strongly basic anhydronium alkaloids⁷

R. serpentina is a rich source of different varieties of chemical constituents. Alkaloids identified in Rauwolfia include ajmalicine, reserpine, serpentinine, ajmaline, ajmalimine, deserpidine, indobidine, reserpiline, rescinnamine, rescinnamidine, serpentine, and yohimbine.¹²

Alcohols, sugars, and glycosides, fatty acids, flavonoids, phytosterols, oleoresins, steroids, tannins, and alkaloids are some of the phytochemicals found in Rauwolfia. The most important alkaloids identified in the plant are indole alkaloids, which account for more than 50 of the plant's alkaloids.¹⁰

The major alkaloid present in root, stem and leaves of the plant is Reserpine varies from 1.7 to 3.0 %. The root barks has more than 90% of the total alkaloids in roots. The minor alkaloids present in the plant are Ajmalicine, ajmaline, isoajmaline, ajmalinine, chandrine, rauwolfinine, renoxidine, rescin-namine, reserpiline, reserpin, reserpinine, sarpagine, serpentine, serpentinine, tetraphyllicine, yohimbine, 3-epi-ayohimbine. The root contains ophioxylin, resin, starch and wax.¹

Mechanism of Action :-

Reserpine's mechanism of action has been extensively studied and recorded. Reserpine binds to vesicular protein receptors. VMATs (vesicular monoamine transporters) are transporters of monoamines in the brain. Membranes of specific Secretory Organelles Presynaptic neuron vesicles. Reserpine hinders the release of intracellular neurotransmitters interacting to VMAT proteins and inhibiting secretory function vesicles formed by neurotransmitter uptake. Finally, the usage of reserpine ensures that there are no or few side effects. Only a few neurotransmitters are released by the brain. presynaptic neuron is a type of presynaptic neuron. As a result, there is no or only one option. Nerve impulse propagation is modest. The postsynaptic neuron is where this happens. VMAT1 and VMAT2 are two vesicular transport protein isoforms. VMAT1 is mostly located in the brain's neuroendocrine cells. particularly in the peripheral nerve system. In the adrenal medulla, there are chromaffin granules. platelets, sympathetic neurons. VMAT2 is mostly located in the brain and spinal cord. system of the sympathetic nervous system. Mast cells, as well as, In the stomach, histamine-containing cells can be discovered. pancreas. Reserpine is attracted to VMAT2 is three times more powerful than VMAT1. VMAT1 is a protein with which it has a strong affinity and attaches to certain targets nearly irrevocably platelets' receptors.^{8,9}

Side Effect And Toxicity: Lethargy, sedation, psychiatric depression, hypotension, nausea, vomiting, abdominal cramping, gastric ulceration, nightmares, bradycardia, angina-like symptoms, bronchospasm, skin rash, itching, galactorrhea, breast enlargement, sexual dysfunction, and withdrawal psychosis are some of the adverse side effects of reserpine. Nasal congestion was the most prevalent side effect reported by all patients, with % to 15% of them experiencing it.¹¹

PHARMACOLOGICAL EFFECTS OF RAUWOLFIA ALKALOIDS: Rauwolfia serpentina is said to have the following pharmacologic attributes¹³:

1. By action on the vasomotor centre, it leads to generalized vasodilatation, with a lowering of blood pressure.
2. By depressant action on the cerebral centers, it soothes the general nervous system¹⁴.
3. It stimulates the bronchial musculature.

4. The comparative Pharmacological actions of Rauwolfia serpentina root and its individual alkaloids have been investigated from time to time ¹⁵.

1.Antihypertensive activity: Rauwolfia serpentina is the most likely known to be as an antihypertensive drug due to presence of alkaloid called Reserpine. Reserpine is a major alkaloids present highest in root and leaves and also in lowest part of stem¹⁶. Alka et al. evaluated antihypertensive activity of polyherbal compound M - Sarpagandha Mishran on 41 patients of essential hypertension without any comorbid illness. The patients were administered M - Sarpagandha Mishran for 8 weeks and blood pressure was monitored at 2nd, 4th, 6th, and 8th week. Changes in diastolic, systolic, and mean arterial blood pressure were analyzed. A significant fall in blood pressure was found in all the patients¹⁷.

Rauwolfia's main uses are High blood pressure: The Rauwolfia herb is the best remedy for high blood pressure and it has been adapted by medical fraternity in most countries. Those alkaloids which have a direct effect on hypertension have been isolated in it and are widely used by the practitioners of modern medicine. But they have certain unpleasant side effects which the drug taken in its raw form, does not have¹⁸. The root of the plant is used in high blood pressure, mental agitation, insomnia and sedative^{19,20}.

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