A Review: Use of Rauwolfia Serpentina for Antihypertensive Activity

Deepali Namdeo Tapre¹, Dr. Sheelpriya R. Walde²

Abstract: The root of sarpgandha is a species of flowering plant in the family Apocynaceae has been traditionally used in Ayurveda for many years to treat the variety of diseases of that at been traditionally upper to bear little similar to one another. Rauwolfia Serpentina is a safe and effective treatment of hypertension. This author reviews the scientific literature with regard to the use of Rauwolfia and the treatment of hypertension. Much smaller dose of reserpine is required to obtain the antihypertensive activity. The present review focuses mainly on chemical composition, pharmacology, mechanism of action, side effect and toxicity and antihypertensive effect of Rauwolfia alkaloids. The plant provide clinician with a safe and effective adjunct to high blood pressure.

Keywords: reserpine, hypertension, serpgandha, rauwolfia serpentina

1. Introduction

Rauwolfia serpentina is the dried root of rauwolfia serpentine (linne) bentham ex kurz.( family: Apocynaceae). It is an erect shrub that grows 1 meter in the height and has cylendric stems. These stem have pale bark and consist of light colored viscous latex. [1,2]

2. Chemical Composition

Rauwolfia contains many different phytochemicals, including alcohols, suger and glycosides, fatty acids, flavonoids, phytosterols, oleoresins, steroids, tannins and alkaloids. The most important alkaloid found in the plant are indole alkaloids, with more than 50 of those alkaloids having been isolated in the plant.[8]

Indole alkaloids are a group of nitrogenous compounds that are derived from the amino acid tryptophan. They share a common 5 and 6 carbon heterocyclic ring structure with 1 nitrogen molecule.[9]

All part of the plant, including the stem and leaves, contain indole alkaloids, but they are found in highest concentration in the bark of the root. [11] The the identified indole alkaloid include ajmalidine, ajmaline, ajmalinine, aricine, canescine, coryanthine, deserpidine, isoajmaline, isoserine, isoserpilnine, lankanesine, raucaffricine, rauhimbine, rauwolfinine, recanscine, rescinamine, reserpine, rserpine, thebaine, yohimbine, and yohimbinin. [11, 12]

The exact concentration of alkaloids varies. One study concentration of alkaloids varies. One study found that the yield of total alkaloid ranged from 0.8% to 1.3% of the dry weight of the plant. [10] Another study put the total yield of alkaloids between 0.7% to 0.3% of the root content. [4] The maximum alkaloid content detected in regenerated root was

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membranes of
did well documented. Reserpine bind to protein receptors called
The mechanism of action of reserpine is well researched and
well documented. Reserpine bind to protein receptors called vesicular monamine transporters (VMATs) in the organelle membranes of specialized secretory vesicles of presynaptic neurons. [19,20] Reserpine prevents intracellular neurotransmitters from binding to VMAT proteins and stops secretory vesicles from uptaking neurotransmitters. [21]

Ultimately, use of reserpine provide that no or few neurotransmitter are released from the presynaptic neuron. As a result, no or only slight promulgation of the nerve impulse occurs in the postsynaptic neuron.

Two isoforms of vesicular transport protein are called VMAT1 and VMAT2. VMAT1 is mainly found in the neuroendocrine cells of the peripheral nervous system, particularly in the chromaffin granules in the adrenal medulla, sympathetic neurons, and platlets. VMAT2 is mainly found in the brain, sympathetic nervous system, mast cells and cells containing histamine in the gut and pancreas. Reserpine has an affinity for VMAT1.[22,23] It has strong affinity and bind almost irreversibly to specific receptors on VMAT, particularly VMAT2.[21]

Rauwolfia and Hypertension
In 1949, Vakil reported on a study of 50 patients with essential hypertension who were treat with Rauwolfia.[26] In that study, 85% of patients experienced a drop in systolic blood pressure, and 81% patient experienced a drop in diastolic blood pressure.
In 1952, Vida in Germany and Australia reported a blood pressure drop in 25 patient with hypertension .[26] Arnold and Bach showed a good response in 37 and 50 patients in whom systolic pressure dropped an average of 30mm Hg and diastolic pressure dropped 15mm Hg.[26] In 1953, Meissner reported Rauwolfia was to be effective in 90% of a study participant, with a lowering of systolic blood pressure between 15 and 40 mm Hg.[26] In 1953, Loffler in Switzerland reported a lowering of blood pressure in 51 Swiss workers with hypertension. In 1954, Goto in Japan reported lower blood pressure in 12 of 15 patient with hypertension. In 1954, Doyle and smirk in Zealand reported that reserpine produced a striking fall in blood pressure within 4 to 8 hours of administration. It has been further reported that Rauwolfia was the best hypertensive remedy used in India throughout the 1950s.[26] it was reported to be used by 90% of all physicians or more than 60,000 doctors throughout the country.[26] one manufacturer claimed to have sold 94 million tablets of dried root in 1954, and it was exported to more than 17 countries throughout the world.

In a clinical trial of R. serpentina in essential hypertension, Vakil treated 50 patients with initial blood pressure greater than 160/95 mm Hg.[26] The study included 30 male and 20 females ranging in age from 39 to 76 years. Thirty-nine of 48 patients who completed the study showed a drop of both systolic and diastolic blood pressure at 1 week after starting the medicine. After 4 week taking medicine, systolic blood pressure dropped between 2 to 54 mm Hg for those patients. To 47 patients (1 dropped out of the study) showed a moderate drop in systolic blood pressure, from 10 to 24 mm Hg. Thirteen of the 47 patient showed a drop in diastolic blood pressure of between 4 to 34 mm Hg. With an average drop of 11 mm Hg. Twenty-seven patient showed a moderate drop of diastolic blood pressure of between 5 and 14 mm Hg, and 7 patient showed a drop greater than 15 mm Hg. The hypertensive action of drug was perceptible at 2 weeks after stopping the drug in 91% of patients and at 4 weeks after discounting the drug in 75% of patients. No serious adverse side effects were noted.

Side effect and Toxicology
Adverse side effect of reserpine include lethargy, sedation, psychiatric depression, hyponension, nausea, vomiting, abdominal cramping, gastric ulceration, nightmares, bradycardia, angina-like symptoms, bronchospasm, skin rash, itching, galactorrhea, breast enlargement, sexual dysfunction, and withdrawal psychosis in 1 case. The most common side effect noted in all patients was nasal congestion, occurring in 5% to 15% of all patients.[17] after
several month of use, mental depression can occur and may persist. With extremely large doses, Parkinson-like symptoms, extrapyramidal reactions, and convulsion can occur. Allergic reactions to Rauwolfia, including asthma, are rare.

Adequate doses of reserpin that produce decreased blood pressure will not cause reserpine include gastric ulcerations. [37] It has been observed to cause a slight edema in some patients. [38] Possible interaction with other drugs include cardiac glycosides, ephedra, alcohol, antipsychotic drug, barbiturates, diauretics, ephedrine, levodopa, monamine oxidase inhibitors, propranolol, stimulant drug, and tricyclic antidepressants. Rauwolfia may interact with the following lab tests, including tests for corticosteroids, bilirubin, catecholamines, gastric acidity, norepinephrine, prolactine, thyroxine, and vanilmandelic acid. [37]

3. Conclusion

Based on the review of the literature, rauwolfia appears to be the safe and effective treatment of hypertension used in appropriate low doses. These review is proved to be true in case of sarpaganda as reserpine has helped also human population have a drug resistance resulting in discontinuation of reserpin in hypertension management whereas sarpaganda root is still in wide use. An equivalent dose of pure rauwolfia alkaloids, also known as reserxylon extract or pure reserpin, can also be used to treat hypertension. The author has found the LDR can be safely recommended to patients who have been screened to be of benefit from the treatment.

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