

Comparative Phytochemical analysis of stem and root extracts from *Rauwolfia serpentina*

Virendra Vaishnav¹ and Debasish Sahoo²

^{1,2} Nitza Bioventure, Hyderabad
Telangana, INDIA

Abstract

The aim of this study was to comparatively phytochemical analysis of stem and root extracts (acetone and chloroform) of *Rauwolfia serpentina*. It is also called sarpagandha, member of Apocynaceae family. It was admired from olden times used as an antidote of the snake and insects bites. Primary phytochemical analysis of root and stem extracts (acetone and chloroform) of *Rauwolfia serpentina* indicates the occurrence of alkaloids, tannins, flavonoids, phenols, carbohydrates, glycosides and terpenoids.

Keywords: *Flavonoids, Sarpagandha, Apocynaceae, Glycosides, phytochemical.*

1. Introduction

India has a wealthy heritage of Ayurvedic medicines and currently rush in require for plant-based drugs. Plants have showed a important role in managing human health and improving human life (Pandey *et al.* 2013). *Rauwolfia serpentina* (Linn.) is a medicinal shrub or herb, from Apocynaceae family. *Rauwolfia serpentina* one of the well-known antipsychotic and tranquilizer herb of India for schizophrenia and paranoia treatment as well as also control hypertension and high blood pressure. *Rauwolfia serpentina* generally called 'snake root' or Sarapgandha as well as called as a "Wonder drug of India". Sarapgandha has been more than a few years ago that the drugs of plan origin are using to cure of the diseases in man & animals.

In Ayurvedic description, the powdered root of *Rauwolfia serpentina* has been used for the feverish illnesses as well as treatment of snake bites and mental illness (Chopra, R.N *et al.*, 2002). *Rauwolfia serpentina* also shown pharmaceutical importance such as antidiarrhoeal, antimicrobial, anticancerous, tranquillizing activity, anti-inflammatory, antioxidant, antiproliferative, antidiuretic, antiarrhythmic, anticholinergic, antidiarrhoeal, antihypertensive, anticontractile, antifibrillar and sympathomimetic (Arts, I.C. *et al.*, 2005; Scalbert,

A. *et al.*, 2005; Harisaranraj, R *et al.*, 2009; Ezeigbo, I.I. *et al.*, 2012; Yu, J. *et al.*, 2013; Rathi, P. *et al.*, 2013).

The *Rauwolfia serpentina* is abundant source of alkaloids presence of 1.7% to 3.0 % in roots. Root and bark are rich alkaloidal source. It is contents 90% of the total alkaloids. Sarpagandha also a significant medicinal plant in the pharmaceutical industries presence of its colossal beneficial properties for curing diseases due to the presence of flavonoids, alkaloids, phenols, glycosides, tannins, phlobatannins, resins, sterols, saponins and terpenes (Harisaranraj, R *et al.*, 2009).

The root, stem and leaves are medicinally significance and paying attention of researchers because of secondary metabolites contained mostly in the roots and rhizomes (Mittal B *et al.*, 2012; Poonam *et al.*, 2013). Scientists have been working on the phytochemical analysis of the plant due to its medicinal importance. It has been used as anthelmintic and anti-hypertensive drugs.

The present study was comparatively phytochemical analysis of *Rauwolfia serpentina* stem and root extracts and qualitative analysis of their different bioactive compounds which were presence in root and stem extracts.

2. Materials and Methodology

2.1 Plant Materials

The *Rauwolfia serpentina* stem and root were collected from Kanker district of Chhattisgarh, India. The collected stem and root were washed and surface sterilized and dried in shade. After drying samples were grinded with the help of mortar pestle.

2.2 Chemicals

All the chemicals used in this examination were of analytical reagent grade and procured from sigma, Merck etc.

2.3 Preparation of Extracts

10 grams of grinded stem and root of *Rauwolfia serpentina* were dissolved in 100 ml of solvents (Acetone and Chloroform) and kept for 24 hours in an orbital shaker at 28°C. The extracts were filtered and filtrate extracts were evaporated and obtained residues were resuspended to their respective solvents.

2.4 Phytochemical Screening

The root and stem extracts of *Rauwolfia serpentina* were tested for primary screening of phytochemicals includes alkaloids, carbohydrates, flavonoids, Tannins, steroids, phenols. (Tiwari P. et al.,2011; Rathore S. K. et al.,2012)

Test for Alkaloids (Wagner's Test)

1ml of extracts was added few drops of Wagner's reagent. Formation of reddish brown precipitate indicated the presence of alkaloids.

Test for Carbohydrates (Molisch's Test)

1 ml extracts was added 3-5 drops of molisch's reagent along with added 1 ml con. H₂SO₄. Allowed the mixture to stand for 3-4 minutes. Observed red or dull violet colour at the interface of the two layers showed the presence of the carbohydrates.

Test for Flavonoids (Alkaline Reagent Test)

1 ml extract was treated with 3-5 drops of 20% sodium hydroxide solution. Observed formation of intense yellow colour, which became colourless on addition of dilute acid, indicated the presence of flavonoids.

Test for Saponins (Foam Test)

1 ml extract was shaken with 2 ml of water. If foam produced persists for 10-15 minutes then that indicates the presence of saponins.

Test for phenols (Ferric Chloride Test)

1 ml of extract was taken and 5-6drops of aqueous FeCl₃ was added. The formation of deep blue colour indicated the presence of phenols.

Test for Tannins (braymer's Test)

1 ml of extract treated with 1 ml of 10% alcoholic ferric chloride. Formation of blue and greenish colour indicated the presence of tannins.

Test for Cardiac Glycosides (Legal's Test)

1 ml extracts was treated with sodium nitropruside in pyridine and sodium hydroxide. Observed the formation of pink to blood red colour indicates the presence of cardiac glycosides.

3. Results and Discussion

R. serpentina has been a well-known field for study because of its various bioactive compounds those were used in herbal and dietary supplements as a capable source of helpful drugs for the healing of many diseases (Kumari, R et al., 2013). The results of phytochemical screening of stem and root extracts (Acetone and Chloroform) of *Rauwolfia serpentina* shown in table 1. Acetone root extract was shown positive results includes alkaloids, flavonoids, phenols, carbohydrates, tannins, protein, terpenoids and glycosides while saponins and anthroquinon were absent whereas Acetone stem extract showed positive results includes alkaloids, flavonoids, phenols, carbohydrates, tannins, protein, terpenoids, glycosides saponins and anthroquinon.

On other hand chloroform root extract of *Rauwolfia serpentine* was shown presence of phytochemical such as alkaloids, flavonoids, carbohydrates, glycosides and terpenoids while phenols, tannins, saponins, protein and anthroquinon were absent in the extract and chloroform stem extract observed presence of phytochemicals like alkaloids, flavonoids, carbohydrates, terpenoids and anthroquinon as well as phenols, tannins, saponins, glycosides, and protein were shown absent in chloroform stem extract.

Table 1. Primary Phytochemical Screening of *Rauwolfia serpentina* Stem and Root Extracts.

Phytochemicals	Acetone Root Extract	Acetone Stem Extract	CHCl ₃ Root Extract	CHCl ₃ Stem Extract
Alkaloids	+	+	+	+
Flavonoids	+	+	+	+
Phenols	+	+	-	-
Carbohydrate	+	+	+	+
Tannins	+	+	-	-
Saponins	-	+	-	-
Glycosides	+	+	+	-
Terpenoids	+	+	+	+
Proteins	+	+	-	-
Anthroquinon	-	+	-	+

4. Conclusions

Phytochemical investigation of root and stem extracts (Acetone and Chloroform) of *Rauwolfia serpentina* indicates the presence of alkaloids, flavonoids, terpenoids, glycosides and carbohydrates. In acetone root extract saponins was absent while acetone stem extract indicates positive result for saponins. On other hand chloroform root extract was shown positive result for glycosides but chloroform stem extract was recorded absent. Therefore, the occurrence of high level of alkaloids in the stem and root extracts of *Rauwolfia*

serpentina may be dependable for the biological activity of the nutritional supplementation. Evid Based samples. Thus, this study evaluated that the *Rauwolfia* Complement Alternat Med. 2013; 2013:376327. *serpentina* plant could be used as a natural medicinal agent. Poonam, Agrawal S and Mishra S, *Journal of Pharmacy and Biological Science*, 2013, 6(2), 73-78.

5. Reference

1. Arts, I.C.; Hollman, P.C. Polyphenols and disease risk in epidemiologic studies. *Am. J. Clin. Nutr.*, 2005, 81(1)(Suppl.), 317S-325S. [PMID: 15640497]
2. Chopra, R.N.; Nayar, S.L.; Chopra, I.C. *Glossary of Indian Medicinal Plants*. NISCIR; CSIR: Delhi, 2002.
3. Ezeigbo, I.I.; Ezeja, M.I.; Madubuike, K.G.; Ifenkwe, D.C.; Ukwani, I.A.; Udeh, N.E.; Akomas, S.C. Antidiarrhoeal activity of leaf methanolic extract of *Rauwolfia serpentina*. *Asian Pac. J. Trop. Biomed.*, 2012, 2(6), 430-432.
4. Harisaranraj, R.; Suresh, K.; Babu, S.S. Phytochemical based strategies for pathogen control and antioxidant capacities of *Rauwolfia serpentina* Extracts. *Recent Res. Sci. Technol.*, 2009, 1, 67-73.
5. Kumari, R.; Rathi, B.; Rani, A. Bhatnagar, S. *Rauwolfia serpentina* L. Benth. ex Kurz. Phytochem. Pharmacological and Therapeutic Aspects. *Int. J. Pharm. Sci. Rev. Res.*, 2013, 23(2), 348-355.
6. Mittal B, Meenakshi, Sharma A and Gothecha V K, *International Journal of Ayurvedic & Herbal Medicine*, 2012, 2(3), 427-434.
7. Pandey MM, Rastogi S, Rawat AK. Indian traditional ayurvedic system of medicine and
9. Rathi, P.; Kumari, R.; Chatrasal, S. Therapeutic characteristics of *Rauwolfia serpentina*. *Int. J. Pharm. Pharm. Sci.*, 2013, 2(2), 1038-1042.
10. Scalbert, A.; Manach, C.; Morand, C.; Rémésy, C.; Jiménez, L. Dietary polyphenols and the prevention of diseases. *Crit. Rev. Food Sci. Nutr.*, 2005, 45(4), 287-306.
11. Tiwari P, Kumar B, Kaur M, Kaur G and Kaur H, *Internationale Pharmaceutica Scientia*, 2011, 1(1), 98- 106.
12. Rathore S K, Bhatt S, Dr. Dhyani S and Jain A, *International Journal of Current Pharmaceutical Research*, 2012, 4(3), 160-162.
13. Yu, J.; Ma, Y.; Drisko, J.; Chen, Q. Antitumor activities of *Rauwolfia vomitoria* extract and potentiation of carboplatin effects against ovarian cancer. *Curr. Ther. Res. Clin. Exp.*, 2013, 75, 8-14.