African Journal of
Clinical Medicine and Pharmacy Research

ISSN : 3434-2990

Index: Harvard, Boston, Sydney University, Dimensions, Lens, ResearchGet Scilit, Semantic, Google Scholar, Base etc

https://doi.org/10.58578/AJCMPR.v1i1.3838

The Comparative Study of the Phytochemicals of *Andrographis Paniculata* and *Rauvolfia Vomitoria* for Their Medicinal Function in the Treatment of Some Ailment

Audu H[1], Ajibade G. A[2], and Abdulsalami M. O[3]
[1]Federal College of Education Okene, Kogi State, Nigeria
[2,3]Nigerian Defence Academy, Kaduna, Nigeria
hajaraanubeaudu@gmail.com

Article Info:

Submitted:	Revised:	Accepted:	Published:
Aug 15, 2024	Aug 28, 2024	Sep 9, 2024	Sep 14, 2024

Abstract

This study was carried out to compare the phytochemicals in the leave, stem and root of both *Andrographis paniculata* and *Rauvolfia vomitoria* as well as to determine and compare the quantity of alkaloid in the leave extract due to their numerous medicinal values and difference in their origin. Medicinal Plants are sources of important therapeutic aid for alleviating human ailments. *Andrographis paniculata* (Nees) and *Rauvolfia vomitoria* Afzel belong to the family of Apocynaceae.The genus are evergreen trees and shrubs. Research has shown that different parts of *Andrographis paniculata* indigenous to India are used for various diseases such as fever, dysentery, snake and insect bite, boils, hypertension etc while *Rauvolfia vomitoria* indigenous to Africa is traditionally used as an emetic, purgative and in the treatment of jaundice, gastrointestinal diseases, psychiatric disorders etc. The aqueous plant extracts were subjected to qualitative and quantitative screening using standard procedure. The result showed that *paniculata* contains more phytochemical than *vomitoria* but both plants contain the same amount of alkaloid in the leave extract which is said to

AJCMPR Journal is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

be the active ingredient for the treatment of several ailments. Hence, there is the need to propagate their growth and standardize drugs from both plants.

Keywords*: Phytochemicals, Rauvolfia, Medicinal*

INTRODUCTION

The connection between human race and their search for drugs in nature dates as far back as the existence of man of which there are enormous evidence from difference sources (Akhileshwar, 2018). Phytochemicals are chemical compounds that occur naturally in plants. The term is generally used to refer to those chemicals that may have biological significance but are not established as essential nutrients. Scientists estimate that there may be as many as 10,000 different phytochemicals having the potential to affect diseases such as cancer, stroke, diabetes, e t c (US, FDA, 2002).

There are about 121 pure chemical substances extracted from about 130 species of higher plants in the modern pharmacotherapy throughout the world. Out of which 89 plant derived drugs currently used in modern medicines were originally discovered through the study of traditional cures and folk knowledge of indigenous people (Alves and Rosa, 2007). Although, certain phytochemicals are available as dietary supplements, Scientists speculate that maximum benefits of phytochemicals can be derived from the consumption of the whole meals. Phenolic compounds, Organosulfides, Terpenes, etc are some examples of phytochemicals with different properties and effect like anti-oxidant, anti-inflammatory, anti-hypertensive and analgesic (US, FDA, 2000)

Andrographis paniculata (Indian snake root plant) belongs to the family Acanthaceae. and *Rauvolfia vomitoria (*swizzle stick) belongs to the family of Apocynaceae. The genera are evergreen trees and shrubs and are mainly found in tropical regions. *Andrographis paniculata* is small shrub native to the orient from India to Sumatra. It is used as an antidote for snake bite and different parts of it is said to be used in the treatment of Hypertension, Insanity, excitement, fever, stomach pain, menstruation problem, cuts, boil, wounds and animal bite (Rahmatullah et al. 2010). It was found to be used very commonly by many tribes in Asia indicating the authenticity of their usefulness.

Rauvolfia vomitoria on the other hand is a shrub or small tree found naturally in the forest native of Nigeria, Cameroon, Congo, Ghana, Liberia, Senegal, Sudan and Uganda. Kutalek and Prinz, (2007) reported that *Rauvolfia vomitoria* is used as an emetic and purgative. Also, children with cerebral cramps jaundice and gastro intestinal diseases are treated with the plant. The plant can also be used for the treatment of psychiatric disorders.



Andrographis paniculata



Rauvolfia vomitoria

MATERIALS AND METHODS

Collection, Identification and Authentication of Plant

The leaves, stem and roots of *Andrographis paniculata* were sourced from homes known to keep them for horticultural purpose in Kaduna State, while *Rauvolfia vomitoria* were collected from Obafemi Awolowo University, Ile-Ife, Osun state, Nigeria. The plant was authenticated and voucher specimen deposited at the herbarium of the Department of Biological Sciences, Nigerian Defence Academy, Kaduna, Nigeria.

Extraction

Ethanol Extraction Procedure

The plant materials were cleaned, rinsed, air dried and carefully powdered in a grinder and kept in air tight containers. 50g of each sample was extracted with 300ml of ethanol in a Soxhlet extractor. The extract was concentrated to dryness under controlled temperature using a vacuum rotary evaporator type 349/2. The ethanolic extract of *Rauvolfia vomitoria* yielded a brown sticky mass while *Andrographis paniculata* yielded a green sticky mass.

Aqueous Extraction Procedure

About 50g of the leave powder of *Andrographis paniculata* and *Rauvolfia vomitoria* were soaked in 500ml of water. The mixture was warmed and allowed to stand for 24 hours and then filtered using filter paper. The filtrate was then evaporated to dryness using a water bath and the extract weighed. The percentage yield of the extract was calculated and crude extracts were used for further investigation.

Phytochemical Analysis

Andrographis paniculata and *Rauvolfia vomitoria* leaves, stem and root extracts were subjected to phytochemical tests for presence of bioactive compounds like Alkaloids, Flavonoids, Saponins, Tannins, Cyanogenic glycosides and Terpenoids by standard methods as described by Odebiyi and Sofowora (1978), Trease and Evans (1979).

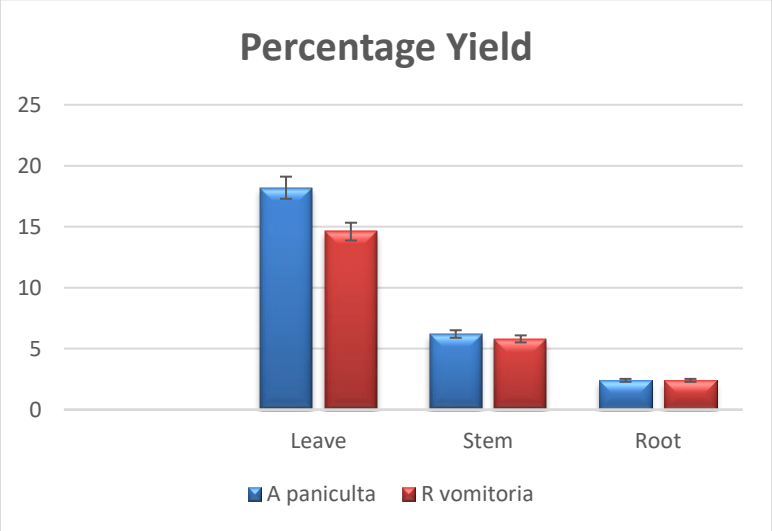
Quantitative Evaluation of Alkaloids

Standard procedure was followed in determining the quantity of alkaloid in the different parts of the plants.

RESULTS

Table 1: Percentage yield of Ethanolic Extract

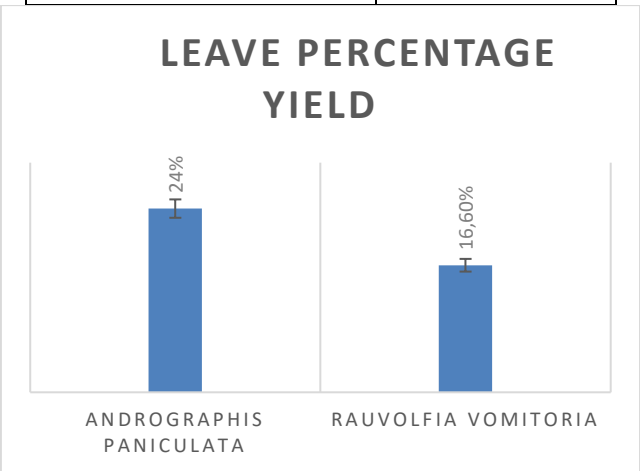
Plant	Leaf	Stem	Root
Andrographis paniculata	18.2%	6.2%	2.4%
Rauvolfia vomitoria	14.6%	5.8%	2.4%



Ethanolic extraction of *Andrographis paniculata* yielded 18.2% for the leaf, 6.2% for the stem and 2.4% for the root. While that of *Rauvolfia vomitoria* yielded 14.6% for the leaf, 5.8% for the stem and 2.4% for the root.

Table 2: Percentage yield of Aqueous Leaf Extract

Plant	Leaf
Andrographis paniculata	24%
Rauvolfia vomitoria	16.6%



The aqueous extraction of *Andrographis paniculata* yielded 24% for the leaf while that of *Rauvolfia vomitoria* is 16.6%.

Qualitative Phytochemical Constituents of *Andrographis paniculata and Rauvolfia vomitoria*

Table 3: Results of Phytochemical screening

Phytochemicals	Leaf		Stem		Root	
	Ap	**Rv**	**Ap**	**Rv**	**Ap**	**Rv**
Alkaloids	+	+	+	+	+	+
Tannin	+	+	+	-	-	-
Saponin	-	+	+	-	+	+
Terpenoids	+	-	+	+	+	+
Flavonoid	+	+	+	+	+	+
Cyanogenic Glycosides	+	-	-	-	+	-
Steroid	-	-	-	-	-	-
Number of Classes	5	4	5	3	5	4

Key: + = Present, = ~~Ab~~sent

The result of the phytochemical screening above showed that *Andrographis paniculata* and *vomitoria* contains alkaloid, tannin and flavonoid in the leaf extract, alkaloids, terpenoids and flavonoid in their stem and root extracts but differ in tannin, saponin steroid and cyanogenic glycoside.

Quantitative Analysis of Alkaloid Constituents of *Andrographis paniculata* and *Rauvolfia vomitoria*

Table 4: Quantity of Alkaloids in the Leaves

Plant	Total Alkaloid (mg)	Percentage yield
Andrographis paniculata	100mg	1%
Rauvolfia vomitoria	100mg	1%

From the quantitative result, both *Andrographis paniculata* and *Rauvolfia vomitoria* leaves contains the same amount of alkaloid.

Table 5: **Quantity of Alkaloids in the Stem**

Plant	Total Alkaloid (mg)	Percentage yield
Andrographis paniculata	30mg	0.3%
Rauvolfia vomitoria	0.0mg	0%

The stem of *Andrographis paniculata* however was seen from the result to contain 0.3% alkaloid while *vomitoria* had 0% amount of alkaloid.

DISCUSSION

From the result obtained from both the ethanolic and aqueous extraction, it could be observed that the yield of the crude extract for the aqueous extraction of leaf is relatively higher than the ethanolic extract of both *Andrographis paniculata* and *Rauvolfia vomitoria*. i.e. ethanolic extraction of *Andrographis paniculata* leaf gave a percentage yield of 18.2% while the aqueous extraction gave a percentage yield of 24%. And the ethanolic percentage yield for *Rauvolfia vomitoria* was 14.6 while the aqueous extract yielded 16.6%. This may be due to the presence of hydrophilic compounds present in the plants. Also, *Andrographis paniculata* stem extraction gave a slightly higher percentage yield of 6.2% than *Rauvolfia vomitoria* which yielded 5.8% and both Andrographis paniculata and *Rauvolfia vomitoria* gave the same percentage yield of 2.4%.

The result obtained from the phytochemical screening of both plants indicated the presence of alkaloids, Tannin and flavonoids in the leave of both plants but differ in saponin, terpenoids and cyanogenic glycosides in that Saponin is absent in *Andrographis paniculata* but present in vomitoria, Terpenoid is present in *paniculata* but absent in *vomitoria* and Cyanogenic glycoside is present in *paniculata* but absent in *vomitoria*. Steroid is absent in both plant leaves. The work of Sarika *et al, (*2012) and Hariharan et al., (2021) also indicates the presence of all phytochemicals tested in the leaves of *paniculata* in this study but differ in that saponin was also present. This could be due to regional difference in the place the leaves were sourced. Flavonoids are known for their antioxidant, anti-inflammatory, anti-cancer, anti-allergic, and anti-viral health benefit. Antimicrobial effect, accelerating blood clotting, reduce blood pressure, modulation of immunoresponses are physiological effects of tannin (Chung et al,1998). Saponin is believed to have a favourable effect on cholesterol, it can boost immune system, have antioxidant effect, support bone strength, encourage

normal detoxification and support digestion by accelerating the body's ability to absorb calcium and silicon. (Edward, F. 2016) while terpenoids have anti-cancer and anti-malaria effect, regulate metabolism etc.

For the Stem, *Andrographis paniculata* contains Alkaloid, Tannin, saponin, Terpenoids and flavonoids but cyanogenic glycoside and steroid gave a negative result while *Rauvolfia vomitoria* stem contains Alkaloids, Terpenoid and flavonoid but tannin, saponin, cyanogenic glycoside and steroid gave a negative result.

The root of *Andrographis paniculata* indicated the presence of Alkaloid, saponin, terpenoids, flavonoid and cyanogenic glycoside but absence of tannin and steroid while for *Rauvolfia vomitoria,* Alkaloids, saponin, terpenoid and flavonoid are present but tannin, cyanogenic glycoside and steroid are absent. Again, there is similarity and difference in the result of phytochemical screening of the work of Sarika *et al*, (2012) where saponin and tannin was present in the root of *paniculata*. The difference may be due to the different places that the plant was sourced.

Generally, the result of the phytochemical screening shows that *paniculata* and *vomitoria* have some phytochemical in common and differ in few though *paniculata* contains a phytochemical more than *vomitoria* by cumulating.

Again, the quantitative analysis of alkaloid of the plant leaves revealed that both *Andrographis paniculata* and *Rauvolfia vomitoria* contains the same amount of alkaloid, but the stem showed that *paniculata* gave a yield of 0.3% alkaloid while that of *vomitoria* yielded 0%. This may be due to the woody nature of the stem as such a large amount may be needed to obtain something from it.

CONCLUSION

Since both *Andrographis paniculata* and *Rauvolfia vomitoria* contain the same amount of alkaloid in the leave extract and have common phytochemicals in different parts, standardization of drugs from Rauvolfia vomitoria indigenous to Africa in respect of their active ingredients should be encouraged for the treatment of ailments affecting humanity.

Recommendations

- Attempt should be made to conserve this threatened and endangered plant by *insitu, exsitu* or *invitro* conservation strategies.

- Owing to the presence of Alkaloids, Flavonoid and other important phytochemicals, attempt should be made in Standardizing and Manufacturing drugs from the plants.

REFERENCES

Akhileshwar, K. S. (2018). Synthesis of Medicinal agents from Plants. Elsevier Ltd.

Alves, R.R.N., and Rosa, I.L., (2007) Biodiversity, traditional medicine and public health: Where do they meet? *Journal of ethno biology and ethno medicine.*Vol.3:14-44.

Chung, K. T, Wong TY, Wei CI, Huang YW, Lin Y. (1998). Review of food science and Nutrition.38(6):421-64

Edward, F. (2016). what are saponins? Discovering their health benefit group

DC, DACBN) global healing center)

Kutalek, R & Prinz, A, (2007). Africa medicinal plants in Yanicv Z and U. Bachrach (eds); Handbook of medicinal plants: New Delhi, CBS publishers.

Hariharan, T., Vasan P and Gopalakrishna, TR. (2021). Phytochemical Analysis of Andrographis paniculata whole plant powder. *The Pharm Innovation Journal*; 10(7): 842-845.

Odebiyi, O.O & Sofowora, E. A (1978). Phytochemical Screening of Nigeria medicinal plants. Lloydia 4: 234.

Rahmatullah, M, Jahan, R, Azad, A.K, Seraj, S, Rahman, M.M, Chowdhury, A.R, Bedum, R, Nasrin, D, Khatun, Z, Hossain, M.S, Miajee, Z (2010), Medicinal Plants Used by Folk Medicinal Practitioners in three villages of Natore and Rajshahi districts, Bangladesh. ***Am Eurasian journal,*** Sustain. Agric, 4 (2), pp 211-218.

Sarika R, Dhanashree, S. A. and Bhausaheb, A. P. (2012). Extraction & Evaluation of Indole Alkaloid from *Andrographis paniculata* for their antimicrobial & antiproliferative activities. *International Journal of Pharmacy & Pharmaceutical Sciences***.** Vol 4, suppl 5.

Trease, G. E. & Evans, W. C. (1989). Pharmacognosy. 11th Edition. London: Bailliere Tindall ltd.

United States Food Drug Administration (2002). Guidance for Industries: Evidence based review system for the scientific evaluation of health claims.