International Journal of Pharmacological Research www.ssjournals.com
ISSN: 2277-3312 Journal DOI:10.7439/ijpr

Hepatoprotective effects of *Rauwolfia vomitoria* extract on the liver of aduit wistar rats

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Abstract

This work focuses primarily on investigating hepatoprotective effects of *Rauwolfia vomitoria* extract on the liver of adult wistar rats following oral administration. Twenty wistar rats of weights 195 – 215kg were divided into four groups designated as A,B,C and D. Group A served as the control and were orally administered with 0.4ml of distilled water daily; the experimental groups B,C & D were orally administered with 0.6ml, 0.75ml and 0.81ml of *Rauwolfia vomitoria* extract for twenty eight days. Twenty four hours after the last administration, the animals were weighed, anasthetized under chloroform vapour and dissected. Liver tissues were removed, weighed and trimmed down for histological studies. The final body weight of the experimental groups (B,C &D) increased significantly($P<0.001$) with the control. The relative liver weight of the experimental groups B,C &D statistically increased ($P<0.001$) with the control (A). Histological results showed normal liver architecture in the experimental groups B,C, & D relative to the control (A). This study therefore suggest that consumption of *Rauwolfia vomitoria* extract at different doses did not induce hepatotoxicity in the liver of adult wistar rats.

Key words: Hepatoprotective, Rauwolfia vomitoria, Body weight, Liver weight, Wistar rats

1. Introduction

During the later part of last century, the practice of herbalism became mainstream throughout the world. This was due in part of recognition of the value of traditional medical practice particularly of Asian origin and the identification of medicinal plants from indigenous pharmacopeias. These herbs have been shown to have significant useful medicinal effects ether in their natural state or as the source of pharmaceuticals[1]. One of the plants of medicinal value from the humid tropics is *Rauwolfia.* Over 50 authenticated species of *Rauwolfia* have been named in memory of the great German physician known as Leonhart Rauwolf who presented wealth information on the indigenous medicinal plants of Asia and African[2]. *Rauwolfia vomitoria* is also known as serpent wood, snake root and swizzle stick[3].

Traditionally, it is used against snake bite, fever and nervous disorders. In Nigeria and Ghana, herbalists used it as a emetic and purgative. In the same region, children are treated with this plant for cerebral cramps, jaundice and gastrointestinal disorders[4]. The pharmaceutical derivatives are used mainly as anti-hypertensive and sedative drugs. Its sedative property is attributed to its ability to balance body response to stress and anxiety and to increase oxygen delivery to the brain[5]. Decoctions of leaves of *Rauwolfia vomitoria* have a powerful emetic effect and chopped leaves shewed with animal fat are applied to swellings[6].

The active components of *Rauwolfia vimitoria* as reported by gill[3] are alkaloids reserpine, serpentinine, steroid-serposterol and saponin. Reserpine reduces the cardiac output by negative intropic effect and chronotropic effects thereby reducing sympathetic activity to the blood vessels and relaxing them which lead to reducing total peripheral resistance and blood pressure[7].

Liver is the key organ regulating homeostasis in the body. It is involved with almost all the biochemical pathways related to growth, fight against disease, nutrient supply, energy production and reproduction. The liver is an important target for toxicity produced by drugs, xenobiotics and oxidative stress[8]. More than 900 drugs, toxins and herbs have been reported to cause liver injury. In the absence of reliable liver protection drugs in modern medicine, a large number of medicinal preparations are recommended for the treatment of liver disorders and often claimed to offer significant relief. Attemps are being made globally to get scientific evidence for these traditionally reported herbal drugs. This call for necessity to carry out research in the area of hepatotoxicity[9].

Hence, this study aims at investigating the histological effects of *Rauwolfia vomitoria* extract on the liver cells of adult wistar rats.

2. Materials And Methods

2.1 Breeding of Animals: Twenty wistar rats were purchased from animal house of Anatomy Department, University of Calabar, Cross State, Nigeria. They were bred in the Animal house of University of Uyo Akwa Ibom State. They were allowed for a period of seven days for acclimatization under normal temperature (27^oC – 30^oC) before their weights were taken. They were fed ad libitum with water and guinea feed pallets from Agro feed mill Nigeria Ltd.

2.2 Drug Preparation: *Rauwolfia vomitoria* leaves were collected from Eket in Akwa Ibom state and dried in an oven at a temperature of 50^oC and crushed using laboratory blender. Extraction of the extract was done using ethanol. 300mg of the extract/kg body weight were dissolved in 10mls of distilled water and administered to the animals.

2.3 Experimental Protocols: The twenty animals were weighed and allocated into four groups of five animals each. The groups were designated as A,B,C & D. Group A served as the control and received 0.4m of distilled water. Experimental groups B,C & D received0.6ml, 0.75ml and 0.8ml of *Rawolfia vomitoria* extract respectively for twenty eight days. On the 29^{th} day, the animals were weighed and recorded. Twenty four hours after the last administration, the animals were anaesthetized under chloroform vapour and dissected. Liver tissues were removed from the animals and weighed. The tissues were trimmed down to a size of 3mm x 3mm thick and fixed in zenkers fluid for four hours for histological studies.

2.4 Tissue Processing: For easy study of sections under microscope the tissues passed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and staining. Fixation was carried out in zenkers fluid. The tissues remained in the fluid for four hours. After fixation, the tissues were washed over night under a stream tap water. Dehydration of the fixed tissues was carried out in different percentages of alcohol 50%, 70% and 90% absolute. After dehydration, tissue were cleared in zylene for two hours after which infiltration was done in molten paraffin wax at a temperature of 60^oC for two hours each in two changes and then sectioned. Haematoxylene and eosine method was used.

3. Results

3.1 Morphometric Analysis of Body Weight.

Table1: Comparison of mean initial and final body and weight change in all groups (A, B, C & D)

	Group A	Group B	Group C	Group D	F-Ratio	PROB. OF SIG
Initial Body Weight.	196.20 ± 4.30	198.70± 5.20	199.80± 7.20	206.40± 6.30	69.240	<0.001
Final Body Weight	219.40± 6.40	225.30± 7.60	228.10± 5.70	231.40± 4.70	42.440	<0.001
Weight Change	23.00± 6.70	27.10± 5.50	29.50± 3.60	25.60± 4.20	20.150	<0.001

(Mean ± SEM given for each measurement)

The final body weight for the experimental groups B, C & D increased significantly (<0.001) relative to the control (A).

3.2. Morphometric Analysis of Liver Weights

Table 2: Comparison of mean relative liver weight of group A (control) and experimental groups B, C & D.

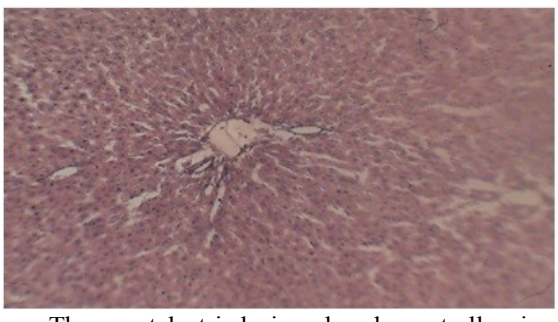
	Group A	Group B	Group C	Group D	F-Ratio	PROB. OF SIG
Liver Weight	**4.90± 0.201**	**5.10± 0.161**	**5.60± 0.420**	**5.98± 0.700**	**56.90**	**<0.001**

(Mean ± SEM given for each measurement)

The relative liver weights for the experimental groups B, C, & D increased significantly (P<0.001) relative to the control (A).

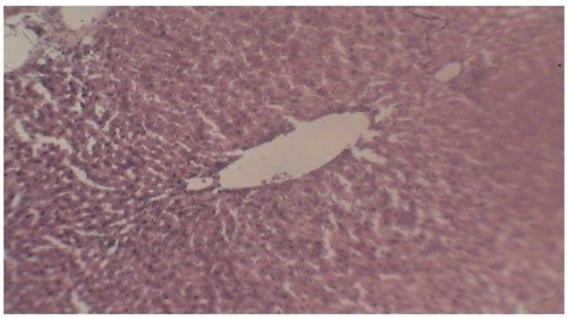
3.3: Histopathological Findings

Fig. 3.1: Photomicrograph1 Group A (Control)



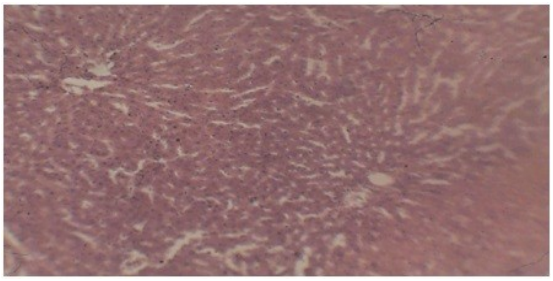
The portal triad is placed centrally in this photomicrograph. It is composed of the branches of the portal vein, hepatic artery and bile duct.

Fig. 3.2: Photomicrograph 2 Group B (Treated with 0.6ml of *Rauwolfia vomitoria* extract)



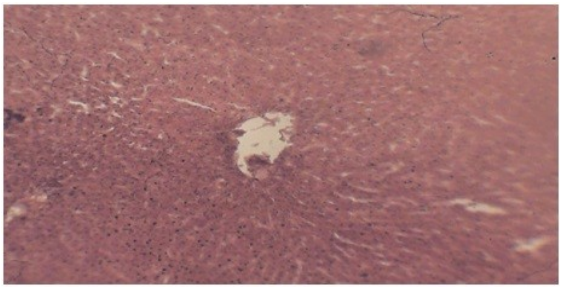
Central vein centrally placed, no abnormality seen

Fig. 3.3: Photomicrograph 3 Group B (Treated with 0.75ml of *Rauwolfia vomitoria* extract)



No abnormality in cytoarchitecture seen.

Fig. 3.4: Photomicrograph 4 Group B (Treated with 0.8ml of *Rauwolfia vomitoria* extract)



No abnormality seen.

3. Discussion

Liver is an organ involved in many metabolic functions and is prone to xenobiotic injury because of its central role in xenobiotic metabolism[10]. Hepatotoxic drugs cause damage to the liver[11].

In the present study, the mean initial and final body weight change indicated that the body weight of the experimental groups treated with *Rauwolfia vomitoria* extract increased significantly($P<0.001$) relative to the control.

The extract of *Rauwolfia Vomitoria* in this instance functions primarily as a dietary supplement enhancing growth. Previous researches cited in literature of *Rauwolfia vomitoria* did not state pre and post experimental weight, hence weight changes was not determined in the works.

The relative organ weights also showed that the experimental groups treated with extract of *Rauwolfia vomitoria* were statistically similar with the control.

Histopathological findings of this study showed that *Rauwolfia vomitoria* consumption in low and high doses did not distort the liver architecture when compared with the control.

Administration of extract of *Rauwolfia vomitoria* did not cause weight loss to the experimental animals compared with the control. By this observation, one may deduce that administration of *Rauwolfia vomitoria* may boost the tolerance capacity against toxic compounds. Thus the protective effect of extract of *Rauwolfia vomitoria* recorded in the present study is attributed to its antioxidant properties.

4. Conclusion

The extract of *Rauwolfia vomitoria* did not induce any histopathological lesions in the liver tissues of the rats. Rats tissues are very similar to those of human. The findings of this study suggests that *Rauwolfia vomitoria* administered to individuals exposed to toxic compounds could provide some protection and perhaps ameliorate its toxic effects on the liver.

References

1. Mercury EL. Should we be concerned about herbal remedies. *J. Ethnopharmacol* 2001; 75(2): 141-164.
2. Malik A. Studies in the chemical constituents of *Rauwolfia vomitoria* Afzuelia a PhD Thesis,. University of Karach, Kadtachi 1997.
3. Gill LS. Ethromedical uses of plants in Nigeria. Benin: Uniben Press, University of Benin 1992.
4. Zahara Y, Uriel B. Handbook of medicinal plants. Harworth Press 2005.
5. Oliver Bever B.. Medicinal plants in Tropical West Africa. Plant acting on cardiovascular system. *J. Ethnopharmacol* 1982; 5: 1-17.
6. Burkill HM. Useful plants in West Tropical Africa Families E-I Royal Botanical, Kwe 1994.
7. Walker AF. Hearts and herbs, *Biologist* 1996; 43:177 – 180.
8. Principle P. The economic significance of plants and their constituents as drugs. In Wagner H, Hikino H, Famsworth NR (Eds). Economics and Medicinal Reaserch. Academic Press London 1989 Vol 3; Pp 1 – 17.
9. Anusha MM, Venkateswarlu V, Prabhakaram IS, Shareen TB Pushpa Kumari and D. Renganayakulu. Hepatopotective activity of aqueous extract of portulaca oleracea in combination with lycopene in rats. *Indian journal of Pharmacology* 2011; 43 (5) 563..
10. Ujah OF, Ujah IR, Johnson JT, Ekam VS, and Udenze. *J.Nat Prod. Plant Research* 2013; 3(2) 15 – 22.
11. Kumar G, BG Sharmila, PP Vanitha, M Sundarajan and PM Raja Sekara. Hepatoprotective activity of Triantherma Portulacastrum L against Paracetamol and thioacetamide intoxication in albino rats. *J. Ethnopharmacol* 2004; 92:37-40.
12. Sturgill MG, Lambert GH. Xenobiotics induced hepatoxicity. Mechianesm of liver injury and method of monitoring hepatic function. *Clin. Chem*.1997; 43:1512-1526.