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THE HISTOLOGICAL EFFECTS OF *RAUWOLFIA VOMITORIA* EXTRACT ON MERCURY INDUCED HEPATOTOXICITY IN ADULT WISTAR RATS

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ABSTRACT

Histological effects of *Rauwafia vomitoria* extract commonly used as medicinal plant was studied on mercury induced hepatotoxicity in adult wistar rats weighing between 120 – 210g were used. The rats were divided into four groups of five animals each. Group A served as the control and received 0.5ml of distilled water. Experimental Groups B,C and D received different doses of drugs as follows: group B received 0.6ml 0f extract, group C received 0.5ml of mercury while group D received 0.6ml of extract and 0.5ml of mercury. The oral administration lasted for thirty four days. Twenty four hours after the last administration, the animals were weighed, anaestathized under chloroform vapour and dissected. The liver tissues were removed, weighed and trimmed down for histological studies. The liver of the animals in group C was significantly higher ($P<0.001$)than group A(control) and groupB and D. The result from this study shows that extract of rauwafia vomitoria contain hepatoprotective agents against mercury induced hepatotoxicity.

Keywords: Rauwafia vomitoria, Hepatotoxicity, Liver weight, Wistar rats and Mercury.

INTRODUCTION

The plant *Rauwolfia vomitoria* belongs to the family Apocynaceae [1]. It is mostly found in the forest part of southern Nigeria. The plant is also called serpent wood, serpent or snake root and swezzle stick as well as asofeyeje, ira, ira-igbo in Yoruba, wadda in Hausa, akata in Benin and Mmoneba and utoenyin in Efik [2].

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. Because of its unique metabolism and relationship to the gastrointestinal tract, the liver is an important target for toxicity produced by drugs, xenobiotics and oxidative stress [3]. More than 900 drugs, toxins and herbs have been reported to cause liver injury and drugs account for 20–40% of all instances of fulminant liver failure [4].

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The parts mostly used are the roots and leaves. From 1931, Indian doctors researched on possible utilization of *Rauwolfia vomitoria* in neuro-psychiatry. The extract from this plant was first extracted by Swiss chemists in 1952 and becomes the first natural neuroteptic. Today, this plant is still the source of a lot of drugs used in psychiatry [5]. In traditional medicine, the roots and leaves of *Rauwolfia vomitoria* are brewed as tea and used in humans for treatment of hypertension, insanity, snakebite and cholera [6].

Mercury is a toxic heavy metal which is widely dispersed in nature. Most human exposure results from fish consumption or dental amalgam known to induce liver damage. Hence, this study aims at painstakingly investigating the effects of *Rauwolfia vomitoria* extract on liver enzymes of mercury induced hepatotoxicity in adult Wistar rats.

MATERIALS AND METHODS

Breeding of Animals

Twenty four Wistar rats were obtained from the animal house of the Pharmacy Department, Nnamdi

Azikiwe University Agulu, Anambra state, Nigeria and bred in the Animal house of Nnamdi Azikiwe University, Nnewi campus, Anambra State, Nigeria. They were allowed for a period of ten days for acclimatization under normal temperature (27^0C -30^0C) before their weights were taken. They were fed with water and guinea feed pallets from Agro feed mill Nigeria Ltd.

Drug Preparation

Rauwolfia vomitoria leaves were collected from Eket in Akwa Ibom State and was dried in an oven at a temperature of 50^oC and crushed using laboratory blender. Extraction was done using ethanol. Ethanol was poured into the grinded leafs of *Rauwolfia vomitoria* and was allowed to stay for twenty four hours. It was filtered into a stainless basin with a white cloth and placed in a water bath so as to dry up the ethanol. 300mg of this extract /kg body weight was dissolved in 10mls of distilled water and administered to the animals.

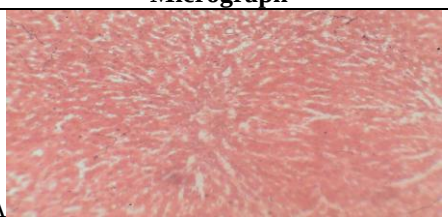
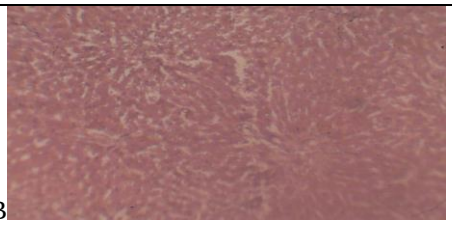
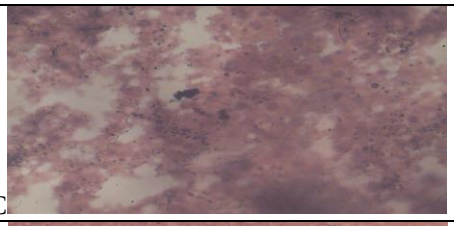
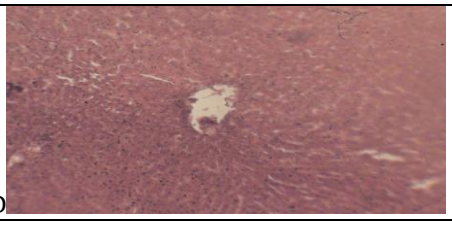
Mercury was obtained from the Department of Industrial chemistry, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.

Experimental Protocols

The twenty animals were weighed and allocated into five groups of four animals each. The groups were designated as groups A, B, C, and D. Group A animals served as the control and received 0.5ml of distilled water. The experimental groups B, C and D received different doses of drugs as follows: Group B received 0.6ml of extract of *Rauwolfia vomitoria*, Group C received 0.5ml of mercury, Group D received 0.6ml of extract + 0.5ml of mercury. The drugs were administered once in a day between the hours of 12-3.30pm for a period of thirty four days. The drugs were administered orally using intubations method. After the twenty first day, the animals were weighed and their weight recorded.

Twenty four hours after the last administration, the animals were anesthetized under chloroform vapour and were dissected. The liver tissues were removed, and fixed in zenker's fluid for histological studies. The tissues were transferred into an automatic processor where they went through a process of dehydration in ascending grades of alcohol (ethanol) 70, 80, 95% and absolute alcohol for 2 changes each. The tissues were then cleared in Xylene and embedded in paraffin wax. Serial sections of 5 micron thick were obtained using a rotary microtome. The tissue sections were deparaffinised hydrated and stained using the routine haematoxylin and eosin staining method (H&E). The stained sections were examined under the light microscope.

RESULT AND DISCUSSION

Micrograph	Dosage
 A	Group A served as the control and received 0.5ml of distilled water. It indicates essentially normal liver histology.
 B	Group B received 0.6ml 0f *Rauwafia vomitoria* extract. It indicates essentially normal liver histology.
 C	Group C received 0.5ml of mercury. It shows necrosis and abnormalities in the hepatocyte.
 D	Group D received 0.6ml of extract and 0.5ml of mercury. There is considerable protective effect of the extract as against the distorting effect of the mercury.

DISCUSSION

Mercury has toxicological effect on the liver, kidney and other visceral organs. The liver showed necrosis, infiltration by inflammatory cells, and congestion of the central vein and distortion of liver cell structure.

It was also observed that the group in which the rats were treated with *Rauwolfia vomitoria* extract + mercury (i.e. group D) tolerated mercury in their system. There was no histological difference in the liver compared with the control. This may have contained antioxidant properties which protected the animals against the toxic effect of mercury.

Observation of the body weight difference in groups reveals gradual increase in weight of animals for the control group A. This could have been physiological as the only substance they were exposed to was water and food. Comparing the results of weight difference reveals severe loss of weight by the mercury exposed group (C). This is probably as a result of loss of appetite by the animals in the group.

The groups that were treated with extract of *Rauwolfia vomitoria* only (B), extract of *Rauwolfia vomitoria* + mercury (D), showed increase in weight which is similar to the control group. Extract of *Rauwolfia vomitoria* in this instance functions primarily as a dietary supplement enhancing growth. Previous researches cited in literatures of *Rauwolfia vomitoria* did not state pre and post experimental weight, hence weight changes were not determined in their works.

The relative organ weights also showed significant differences in groups. There was relative increase in liver weight for the mercury exposed animals compared to the control and groups B and D animals. This organ weight increase was irrespective of the fact that there was total body weight loss. This could have been pathological and one may deduce that the increase in liver weight was not growth but inflammation. Antioxidant properties of *Rauwolfia vomitoria* could have been responsible for the control or prevention of inflammation in the groups treated with it.

Administration of extract of *Rauwolfia vomitoria* alone did not cause weight loss to the animals compared with the animals in control group. By this observation, one may deduce that administration of extract of *Rauwolfia vomitoria* may boost the tolerance capacity for mercury induced toxicity.

Thus, the protective effect of extract of *Rauwolfia vomitoria* against induced liver damage recorded in the present study is attributed to their antioxidant properties.

CONCLUSION

The extract of *Rauwolfia vomitoria* did not induce any histopathological lesions in the liver tissues of the rats. Rat tissues are very similar in many aspects to those of human. The findings of this study suggests that *Rauwolfia vomitoria* administered to individuals exposed to mercury poisoning could provide some tissue protectivity and perhaps reduce the effects of mercury toxicity on the liver.

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