

## Toxicological Studies of the Aqueous Leaves Extracts of *Combretum micranthum* on Rats

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### Abstract

In order to assess the toxicity of aqueous leaves extract of *C. micranthum* against liver disease, extracts of 500 mg/kg and 1500 mg/kg were administered orally to rats in two groups respectively, and a third group was used as control. Administration of the aqueous extracts for the determination of acute toxicity did not produce any mortality in the rats for dosages of up to 5000 mg/kg. The rats treated with a daily dose of 500 mg/kg for seven days had serum liver enzyme activities significantly higher than those in control rats whereas those treated with a daily dose of 1500 mg/kg for seven days had serum liver enzymes activities even higher than those treated with 500 mg/kg dose rats. Thus, both 500 and 1500 mg/kg doses for seven days induce liver toxicity.

**Keywords:** *C. micranthum*, toxicity, liver enzymes, mortality

### INTRODUCTION

Over many centuries, man have been using fruits, leaves, stems or roots of variety of plants to cure various diseases including wounds by rural folks [8]. But there was improper utilization of various parts of the plants for treating different types of diseases due to inadequate knowledge of the toxic potential of the plants. A common example is *Combretum micranthum*.

*Combretum micranthum* is a shrubby or tree plant widely distributed in savannah regions and some places near coast such as west Africa, south Africa, France, Russia

and Asia (3,5). It belong to the family Combretaceae, may grow up to 10 metres in height, has acuminate leaves and its flowers are borne as auxiliary clusters on scaly stalks with small, scaly and four winged fruits [4].

The phytochemical constituents of the *Combretum micranthum* include flavonoids, tannins, carbohydrates, saponins and alkaloids [9].

*Combretum micranthum* is beneficial for management of pain and inflammation [1], diarrhea [2], cure many ailments in Africa and Asia [3] and has been used as potent antibacterial agent in traditional medicine [10]. This research investigated and assessed the toxicity of the aqueous leaf extract of *Combretum micranthum* on liver of experimental rats.

## RESULTS AND DISCUSSION

The extract was completely soluble in distilled water. The results of the both acute toxicity (LD<sub>50</sub>) and sub-acute toxicity (activities of liver enzymes i.e. Aspartate Amino Transferase [AST], Alanine Amino Transferase [ALT] and Alkaline Phosphatase [ALP]) were summarized in table 1 and 2 respectively.

**Table 1:** Result of Oral LD<sub>50</sub> Determination of the Aqueous Leaf Extract of *Combretum micranthum* on Rats

### Phase I

Dose	Mortality	% Mortality
10mg/Kg	0/3	0
100mg/Kg	0/3	0
1000mg/Kg	0/3	0

### Phase II

Dose	Mortality	% Mortality
1250mg/Kg	0/1	0
1750mg/Kg	0/1	0
2500mg/Kg	0/1	0
3500mg/Kg	0/1	0
5000mg/Kg	0/1	0

**Table 2:** Serum Enzyme Activities of the Rats after Oral Administration of the Aqueous Leaf Extract of *Combretum micranthum* for Seven (7) Days

Treatment	AST (U/L)	ALT (U/L)	ALP ( U/L)
Control ( n = 4 )	10.00 <sup>a</sup> ± 2.45	11.00 <sup>c</sup> ± 2.00	32.00 <sup>e</sup> ± 12.27
500mg/Kg ( n = 4 )	14.50 <sup>a,b</sup> ± 1.70	15.00 <sup>c,d</sup> ± 2.50	50.00 <sup>e,f</sup> ± 0.49
1500mg/Kg ( n = 4 )	19.25 <sup>a,b</sup> ± 1.87	26.25 <sup>c,d</sup> ± 5.50	51.75 <sup>e,f</sup> ± 1.53

*n* = Number of rats

Values were expressed as mean ± standard deviation

Values with the same superscript in the same column are significantly different ( *P* < 0.05 )

## **DISCUSSION**

In this research, the effect of aqueous leaf extract of *Combretum micranthum* was analyzed for acute toxicity and liver function enzymes. The result of acute toxicity studies (LD<sub>50</sub>) of aqueous leaf extract of *Combretum micranthum* in rats indicated that the extract was less toxic and can be used as medicine by comparing with that of Lorke, 1983(6). The administration of the extract up to 5000mg/Kg caused 0% death. This showed that the extract is relatively safe upon administration for short period of time. The mean serum activities of ALT, AST and ALP of the rats treated with 500mg/Kg and 1500mg/Kg for seven days were significantly higher than that of control rats (P<0.05), this showed that the *Combretum micranthum* treatment induces liver damage. Similarly, the mean serum activities of the liver enzymes of rats treated with 1500mg/Kg of the extract for seven days were significantly higher (P<0.05) than in those which treated with 500mg/Kg of the extract ( the higher dosage 1500mg/Kg cause more liver cells injury compared with the lower dosage 500mg/Kg ). This was signified that the effect of the extract on the liver is dosage dependant. Moreover, it was reported that a high level of serum AST does not always indicate the liver problem as it is found in many organs beside liver which include kidney, muscle and heart(7).

## **CONCLUSION**

The results obtained from this study have shown that the aqueous leaf extract of *Combretum micranthum* is relatively safe especially for short term (single use) and however, it induces liver damage when used for over long period of time. Hence its use should be with caution as if it is over May consequently resulting in liver toxicity.

## **MATERIALS AND METHODS**

### **Preparation of the Leaves Extract**

Fresh leaves of *Combretum micranthum* obtained from Tofa L.G.A, Kano Nigeria, were air dried under the shade at room temperature (32<sup>0</sup>C) for 30 days and grounded by pestle and mortar into fine powder. About 600g of the powder was soaked in 2 liters of distilled water for 48 hours. The extract was filtrated and the residue was dried in oven in order to get standard concentration (stock).

### **Animals**

26 Albino rats (weighing 180-200g) obtained from Animal House of Faculty of Biological Science, Bayero University Kano, Nigeria were used for this experiment. The rats were kept in a ventilated room, fed with a pelletized grower mash (vital) and pure water was provided. However, they were administered with extract orally using small syringe.

### **Determination of LD<sub>50</sub>**

The study was conducted in two phases. In the first phase, the rats were divided into three groups of three rats each. After overnight fast, the animals were treated with 10,

100 and 1000mg/Kg respectively, of the aqueous leaf extract of *C. micranthum*. While in the second phase, the rats were divided into five groups of one rat each and treated with 1250, 1750, 2500, 3500 and 5000mg/Kg respectively of the extract (6).

### Toxicity to the Liver

In this case, the rats were grouped into three of four rats each and treated with dose of the extract at 500 and 1000mg/Kg once daily up to seven days while the third group served as control. Liver function enzymes (ALT, AST and ALP) for each rat as well as mean  $\pm$  standard deviation for each group were determined.

However, insulin syringes fitted 18mL gauge needle with blunt end were used to administer the extract orally.

### REFERENCES

- [1] Abdullahi, M.H., Anuka, J.A., Yaro, A.H., and Musa A. (2014): Analgesic and Anti-inflammatory Effects of Aqueous leaf extract of *Combretum micranthum* G. Don (Combreceae): *Bayero Journal of Pure and Applied Science*.7(2): 78-82.
- [2] Abdullahi, M.H., Anuka, J.A., Yaro, A.H., and Musa A. (2014): Effects of Aqueous leaf extract of *Combretum micranthum* G. Don (Combreceae) on Gastro Intestinal Smooth Muscle: *Bayero Journal of Pure and Applied Science*, 7(2): 21-25.
- [3] Ahmed AS, McGaw, L J, Elgorashi EE, Naidoo V and Eloff JN (2014): Polarity of extracts and fractions of four Combretum (Combretaceae) species used to treat infections and gastrointestinal disorders in southern African traditional medicine has a major effect on different relevant in vitro activities: *journal of ethno pharmacology*: [www.ncbi.nlm.nih.gov/pubmed/24681040](http://www.ncbi.nlm.nih.gov/pubmed/24681040).
- [4] Burkill, H.M. (1985): Useful plants of West Tropical Africa. Vol. 2<sup>nd</sup> edition Royal Botanic Gardens, Kew England.
- [5] Eloff JN, Katerere DR and McGaw L J (2008): The biological activity and chemistry of the southern African Combretaceae: *journal of ethno pharmacology*: [www.ncbi.nlm.nih.gov/pubmed/8805474](http://www.ncbi.nlm.nih.gov/pubmed/8805474).
- [6] Lorke, D. (1983): A new Approach to Practical Acute Toxicity Testing. *Archives of Toxicology Journal*. 54:275 – 287.
- [7] Mayne, P.D., (1993): Clinical Chemistry in Diagnosis and Treatment. 6<sup>th</sup> edition pp 202-203.
- [8] Sofora, A. (1993): plants constituents. In: sofowora, A. (Ed). Medicinal Plant and Traditional Medicine in Africa. Second editions, Polygraphin Venture Limited Ibadan, Nigeria.

- [9] Trease, G.E. and Evans, W.C. (1997): Photochemical. In Trease, G.E. and Evans, W.C. (Eds). Pharmacognosy Textbook. 4<sup>th</sup> edition, Harcourt Brace and Company Asia PTE Limited India.
- [10] Udo I.P., Nworu C.S, Eleazar C.I, Onyemelukwe F,N, Esimone C.O (2012): Antibacterial profile of extracts of *Combretum micranthum* G. Don against resistant and sensitive nosocomial isolates: *Journal of Applied pharmaceutical Science*: [www.japsonline.com](http://www.japsonline.com).

## APPENDIX



