

<http://www.pjbs.org>

**PJBS**

ISSN 1028-8880

**Pakistan  
Journal of Biological Sciences**

**ANSI***net*

Asian Network for Scientific Information  
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

## Effects of Methanolic Leaf Extract of *Adansonia digitata* (Linn) on Serum Electrolyte Levels in Normal and Alcohol Fed Rats

Matawalli A. Geidam, Sunday A. Oyesola and <sup>1</sup>Alh. M. Kokori  
Department of Biochemistry, College of Medical Sciences,  
University of Maiduguri, Pmb 1069 Maiduguri, Borno State, Nigeria  
<sup>1</sup>Department of Biological Sciences, Faculty of Science, University of Maiduguri,  
Pmb 1069 Maiduguri, Borno State, Nigeria

**Abstract:** Methanolic leaf extract of *Adansonia digitata* was administered intragastrically to normal and alcohol fed rats to determine the effects of the extract on serum electrolytes and some Biochemical parameters. The leaf extract was administered for two weeks at a dose of 0.75 g kg<sup>-1</sup> body weight. The parameters studied were the major electrolytes (Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup> and HCO<sub>3</sub><sup>-</sup>), glucose, albumin and total protein. Results obtained shows that the leaf extract has no significant effect on these parameters (P<0.05), except albumin. The serum albumin level of normal rats decreased to 29.3±0.72 g L<sup>-1</sup> from 33.8±0.52 g L<sup>-1</sup> when fed with the extract. This effect may result from the reduction in or inhibition of albumin synthesis by the liver. The serum albumin level on administration of the extract to the alcohol fed rats was also significantly reduced; from 29±0.56 to 26.8±0.52 g L<sup>-1</sup> (P<0.05). The hypoalbuminemia that results on the administration of this extract may be due to the possible action of *Adansonia digitata* on liver function that consequently affects the production of albumin. Physiological effects of this are decreases in osmotic pressure and in transportation of some organic molecules carried by albumin. No significant effect is observed in the level of total protein.

**Key words:** *Adansonia digitata*, serum electrolytes, glucose, albumin, hypoalbuminemia

### INTRODUCTION

Every aspect of life and well being of man and some other forms of life depend either directly or indirectly on plants. One of the most important uses of plants is their medicinal use in traditional medicine. The medicinal properties of some plants used since time immemorial, have scientifically, over the years, been proven to be potent in curing the different diseases and ailments that are prevalent in our localities<sup>[1]</sup>. It is against this background that scientific exploration and development of the flora and fauna for benefit of the people of Africa is encouraged by the World Health Organization<sup>[2]</sup>. Quite a number of plants with high potency against various diseases have been documented. Some of these include *Artemisia herba Alba*, which has hypoglycemic activity<sup>[3]</sup>. *Prunus africanus* is used to treat prostrate cancer, *Couboria vitata*, has both hypoglycemic and hypolipidaemic properties<sup>[4]</sup>, *Adansonia digitata* Linn, locally called *kuka*, *kuwa* and *oshe* in Hausa, kanuri and Yoruba languages of Nigeria, respectively is a typical plant found in parts of northern Nigeria, especially Borno and Yobe states, where the leave is eaten as soup

condiment. Its aqueous extract has been found to possess hypocholesteronemic and hemolytic activities<sup>[5]</sup>. But there has been no documented evidence of the action of this plant (methanolic leave extract of *Adansonia digitata* Linn) on normal and alcohol fed rats.

### MATERIALS AND METHODS

**Preparation of plant extract:** The leaves of *Adansonia digitata* were collected in Maiduguri, Borno state of Nigeria. Dr. S. S. Sanusi authenticated the leaves at the Department of Biological Sciences University of Maiduguri. The leaves were washed, room dried and ground into powder. The powdered leaves were subjected to methanolic extraction. This was done by dissolving 4g of the grounded leave in 40 ml of normal saline at room temperature and allowed to stand for 15-20 min to settle. The clear supernatant was carefully separated and by heating, dried the residue. The weight of the dried residue was determined and value was used to calculate the concentration of the filtrate (supernatant). Each prepared extract lasted for 3 days administration.

**Experimental protocol:** Twenty male wistar strain albino rats weighing between 100-200 g were obtained from the animal house unit of the Department of Biochemistry, University of Maiduguri, Nigeria. The rats were divided into four groups of six rats each and fed with the normal diet (ECWA feeds) for two weeks, in addition to daily administration of 3 ml of 30% alcohol and 0.75 g kg<sup>-1</sup> body weight of the leaf extract of *Adansonia digitata*. The animal's in group two were fed on normal laboratory diet in addition to 3 ml of 30% alcohol for two weeks. The administration of the leaf extract and 3 ml of 30% alcohol were done intragastrically by intubations.

The third group was maintained on normal diet for two weeks in addition to 0.75 g kg<sup>-1</sup> body weight of the leaf extract of *Adansonia digitata*. The fourth group, the normal control group, was fed on the normal laboratory diet and water *ad libitum* for two weeks.

On the last day the animals were sacrificed by decapitation and the blood samples collected were centrifuged after clotting. The serum obtained was used to carry out the analysis on glucose, using the glucose oxidase enzymatic method as described by Kaplan *et al.*<sup>[6]</sup>. Protein, using Biuret method and albumin using BCG colorimetric method were determined according to the methods as described by Silverman *et al.*<sup>[7]</sup>. Flame photometric method was used for sodium and potassium analysis<sup>[8]</sup>. The analysis of the other two electrolytes, chloride and bicarbonate were also done by the methods as described by Tietz *et al.*<sup>[8]</sup>.

## RESULTS AND DISCUSSION

The values of serum total protein and the electrolytes are not statistically significant when the four groups are compared to one another. But the value of serum albumin of fasted albino rats maintained on normal laboratory diet and water (group 4) for two weeks averaged 33.8±0.52 g L<sup>-1</sup> (Table 1). When this value was compared with that of the normal rats fed on laboratory diet and extract of *Adansonia digitata* (group 3) for the same period (that averaged 29.0±0.56 g L<sup>-1</sup>) there was a lowering of the serum albumin. The 14.2% lowering of the serum albumin in the experimental rats was significant (P<0.05). The albumin level in the group fed on the normal laboratory diet, 3 ml of 30% alcohol, as well as extract of *Adansonia digitata* (group 1) for two weeks averaged 26.8±0.52 g L<sup>-1</sup>. there was thus lowering as compared to groups 2, 3 and 4 and this reduction is significant (P<0.05).

The result from this study shows that the extract of *Adansonia digitata* has a lowering effect on the levels of

Table 1: Effect of two weeks oral administration of methanolic leaf extract of *Adansonia digitata* on serum electrolytes and some biochemical parameters in normal and alcohol fed rats

Parameters	Group 1	Group 2	Group 3	Group 4
Glucose (mmol L <sup>-1</sup> )	68.7±1.16	69.5±3.58	67.8±1.68	64.7±1.83
Total protein (g L <sup>-1</sup> )	68.7±1.16	69.5±3.58	67.8±1.68	64.7±1.83
Albumin (g L <sup>-1</sup> )	26.8±0.52a	29.3±0.72b	29.0±0.56b	33.8±0.52c
Sodium (mmol L <sup>-1</sup> )	136.0±4.31	131.2±4.11	130.8±1.48	142.3±7.33
Potassium (mmol L <sup>-1</sup> )	5.08±0.34	5.2±0.37	4.8±0.08	5.4±0.53
Bicarbonate (mmol L <sup>-1</sup> )	19.8±1.94	19.0±0.48	17.0±0.56a	21.0±2.0b
Chloride (mmol L <sup>-1</sup> )	103.3±3.4	100.0±2.6	100.3±1.43	110.3±6.8

Values are means ± SEM (N=6)

P=Statistical level of significance as determined by Students' t-test

serum albumin in normal and alcohol fed rats, but the mechanism by which this action is elicited is not known. This effect may be due to decrease in production of albumin by the liver.

Since test for albumin is one of the clinical diagnostic tools for liver function test, it is possible that decrease in serum albumin is an indication of liver disorder. It has been reported in chronic alcohol intake, that it leads to delay in secretion of proteins or their retention in the liver. Such proteins include albumin and ferritin<sup>[9]</sup>. It is possible that this extract also has a similar function or effect on the liver.

Values with different superscript letters along the same horizontal columns are statistically significantly different (P<0.05).

In conclusion, the study has shown from the results obtained that intragastric administration of *Adansonia digitata* has no significant effect on serum electrolytes, glucose and protein in both alcohol fed and normal rats.

But the effect of this extract is seen in the lowering of serum albumin leading to hypoalbuminemia that is a basis for decreased osmotic pressure and pH imbalance.

## ACKNOWLEDGMENT

The authors wish to acknowledge with profound gratitude and appreciation the financial contribution of the BUKAR ABBA IBRAHIM FOUNDATION Damaturu, Yobe state Nigeria for the publication of this paper.

## REFERENCES

1. Sofowora, E.A., 1987. The Healing Power of Herbs in Medicinal Plants and Traditional Medicine in Africa. Ibadan. Ibadan University Press, pp: 142-145.
2. Odetola, O.A., 1979. Address to the Pan African Conference on Research into Medinal Plants and the Relationship Between Traditional and Modern Medicine. In: Sofowora, E.A. (Ed). African Medicinal Plants. Ile Ife, University of Ife Press, Nigeria, pp: 3-7.

3. Twajj, H.A.A. and A.A. Al-Badr, 1988. Hypoglycemic activity of *Artimisaia herba Alba*. *J. Ethnophar.*, 24: 123-126.
4. Geidam, MA. and G.I. Adoga, 2002. Hypoglycemic properties of *Couboria vitata* in rats fed sucrose rich and high alcohol diets. *West African J. Biol. Sci.*, 11: 84-91.
5. Sodipo, O.A. and S.L. Mohammed, 1990. Foam forming and hemolytic activities of The extracts of Baobab tree. *Nig. J. Basic Applied Sci.*, pp: 41-52.
6. Kaplan, A., L.L. Szabo and K.E. Opheim, 1988. Disorder of Carbohydrate Metabolism. In: *Clinical Chemistry. Interpretation and Techniques*. 3rd Edn. Philadelphia. Lea and Ferbiger, pp: 63-68.
7. Silverman, L.M., R.H. Christenson and G.H. Grant, 1986. Amino Acids and Proteins. In Silverman, L.M. (Ed) *Text Book of Clinical Chemistry*. Philadelphia W.B. Saunders, pp: 614-704.
8. Tietz, N.W., E.L. Pruden and O. Siggard-Anderson, 1987. Electrolytes, Blood Gases and Acid Base Balance in Tietz, N.W. (Ed) *Fundamentals of Clinical Chemistry*. Philadelphia W.B. Saunders, pp: 614-620.
9. Eastwood, M., 1999. *Principles of Human Nutrition* in Aspen Publishers Inc. Gaithersburg, Maryland, pp: 163-175, 244-260.