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Effect of Ethanol Leaf-Extract of *Annona Muricata* on Liver Enzymes of Albino Rats

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Abstract: *Effects of ethanol leaf-extract of Annona muricata on liver enzymes were investigated in albino rats using spectrophotometric methods. Sixteen albino rats were divided into four groups (A, B, C and D) of four rats each. The animals in groups A, B, C and D were administered ethanol leaf-extract of Annona muricata through oral intubation at the doses of 200mg/kg, 400mg/kg, 600mg/kg, and 0mg/kg respectively for fourteen days. The alkaline phosphatase activities (u/l) recorded 45.00±1.49, 42.00±1.45, 39.00±1.40 and 57.00±1.52 for animals in groups A, B, C and D respectively with corresponding activities (u/l) of aspartate aminotransferase as 65.00±1.95, 60.00±1.85, 50.00±1.80 and 80.00±2.85. The alanine aminotransferase activities (u/l) recorded 24.00±0.45, 22.00±0.40, 18.00±0.35 and 25.00±0.50 for the animals in groups A, B, C and D respectively. Results revealed a significant ($p<0.05$) decrease in the activities of aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase of the animals that received the ethanol leaf-extract of Annona muricata. Thus ethanol leaf-extract of Annona muricata could be hepato-protective.*
Key words: *Annona muricata leaves, liver enzymes and albino rats*

I. Introduction

Medicinal plants have been identified and used throughout human history. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions and to defend against attack from predators such as insects, fungi and herbivorous mammals (Nwogu *et al*., 2010). Chemical compounds in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work (Akah *et al*., 2009). This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects. The use of plants as medicines predates written human history. Ethno-botany is recognized as an effective way to discover future medicines. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies including aspirin, digitalis, quinine, and opium. The use of herbs to treat diseases is almost universal among non-industrialized societies and is often more affordable than purchasing expensive modern pharmaceuticals (Korkina *et al.,* 2013). Herbal medicine is the use of medicinal plants for prevention and treatment of diseases: it ranges from traditional and popular medicines of every country to the use of standardized and titrated herbal extracts (Fabio and Luigi, 2007). Traditional medical system may indicate safety, but not efficacy of treatments, especially in herbal medicine where tradition is almost completely based on remedies containing active principles at low and ultra low concentrations, or relying on magical-energetic principles (Owolabi *et al*., 2013).

Soursop (*Annona muricata*) is an evergreen tree native to Mexico, Cuba, Central America, the Caribbean, and the northern South America, primarily Colombia, Brazil, Peru, and Puerto Rico. It is in some parts of Africa, especially in Eastern Nigeria, Southeast Asia and the pacific (Evans, 2011). *Annona muricata* has medicinal uses lowering elevated blood pressure (Sushmita *et al.,* 2012).

Liver is a vital and largest organ of the human body that has a wide range of metabolic functions. The liver is necessary for survival; there is currently no way to compensate for the absence of liver function in the long term, although new liver dialysis techniques can be used in the short term (Uboh *et al*., 2010). The highly specialized tissues in the liver regulate a wide variety of high-volume biochemical reactions including the synthesis and breakdown of small and complex molecules, many of which are necessary for normal vital functions (Nwogu *et al*.., 2010).

Enzymes are proteins found in the body that increase the rate of chemical reactions. Liver has enzymes which perform these actions within the liver. The most common liver enzymes are Aspartate aminotransferase (AST), Alanine aminotransferase(ALT) and Alkaline Phosphatase (ALP) which are useful biomarkers of liver injury in a patient with some degree of intact liver function (Ezejindu *et al.*,2014). Tests are performed on patient's blood sample, some of which are associated with functionality of the liver (e.g. albumin) and cellular integrity (e.g. transaminase) while some are associated with conditions linked to the biliary tract (gamma-glutamyl transferase and alkaline phosphatase) (Wang *et al.,* 2012). Several biochemical tests are useful in the evaluation and management of patients with hepatic dysfunction. These tests can be used to detect the presence

of liver diseases, distinguish among different types of liver disorders, gauge the extent of known liver damage, and follow the response to treatment. Liver enzyme tests are commonly used to assess liver functions or liver injury (Ezejindu *et al.*, 2014). An initial step in detecting liver damage is a simple blood test to determine the level of certain liver enzymes (proteins) in the blood. Under normal circumstances, these enzymes mostly reside within the cells of the liver. But when the liver is injured for any reason, these enzymes are spilled into the bloodstream (Sushmita *et al.*, 2012).

Since *Annona muricata* leaves could be used in the treatment of diseases, there is a need to examine the its hepatotoxicity, hence this work examined the effects of ethanol leaf-extract of *Annona muricata* on the liver enzyme activities of albino rats.

Fig. 1: *Annona muricata* (Mathew and Abraham, 2010)

II. Materials And Methods

Materials

Sixteen albino rats (*Rattus norvegicus*) were purchased from the Department of Biochemistry, College of Medical Sciences, University of Nigeria, Nsukka. Fresh leaves of *Annona muricata* were collected from Abakaliki in the month of December. The chemicals and reagents were of analytical standard.

Methods

Extraction of the plant materials

Annona muricata fresh leaves were air-dried at room temperature. The dried sample was ground with electric blender to powdery form. 500g of the ground sample was soaked with 1200ml of ethanol and left for 48hours. Muslin cloth was used to filter the solution and the filtrate was then allowed to evaporate under room temperature to obtain the sticky extract of *Annona muricata*.

Administration of plant extract

Sixteen albino rats were grouped into four (A, B, C and D). The rats in groups A, B, C and D received ethanol leaf-extract of *Annona muricata* at doses of 200mg/kg, 400mg/kg, 600mg/kg and 0mg/kg body weights respectively through oral intubation for 14 days.

Collection of blood samples

Blood samples were collected from the rat through cardiac puncture into labeled clean tubes.

Determination of liver enzyme activities

The methods of Reitman and Frankel (1957) were used to determine the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT**)** and alkaline phosphatase (ALP).

Measurement of body weights

The body weights of all the rats were measured on daily basis with a weighing balance.

Statistical analysis

Results are expressed as mean± standard deviation. The difference among means was analyzed by T-test. A value of $p<0.05$ was considered significant (Oyeka, 1996).

III. Results

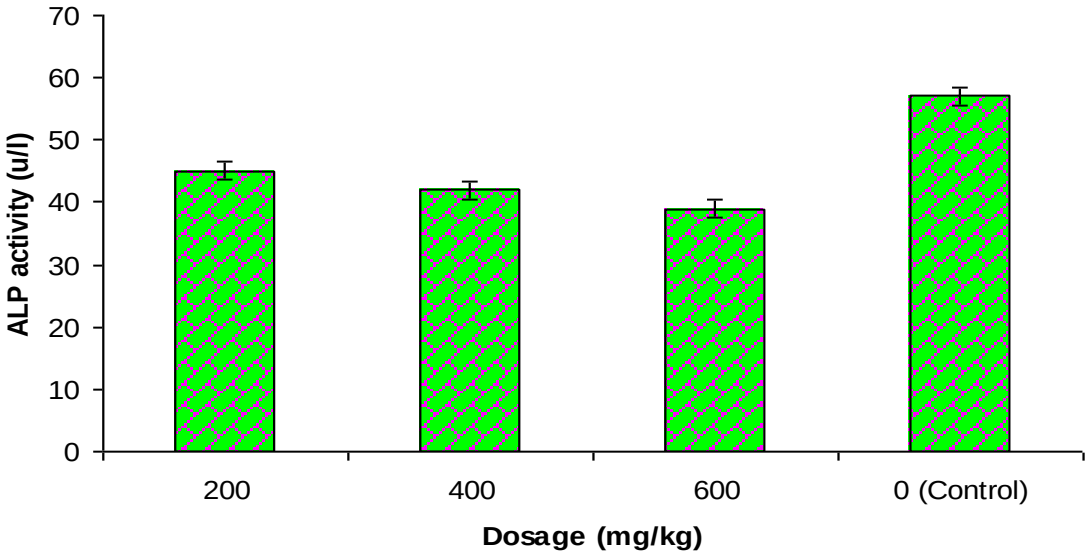

Fig. 2: Alkaline phosphatase (ALP) activities in albino rats administered with ethanol leaf- extract of *Annona muricata*

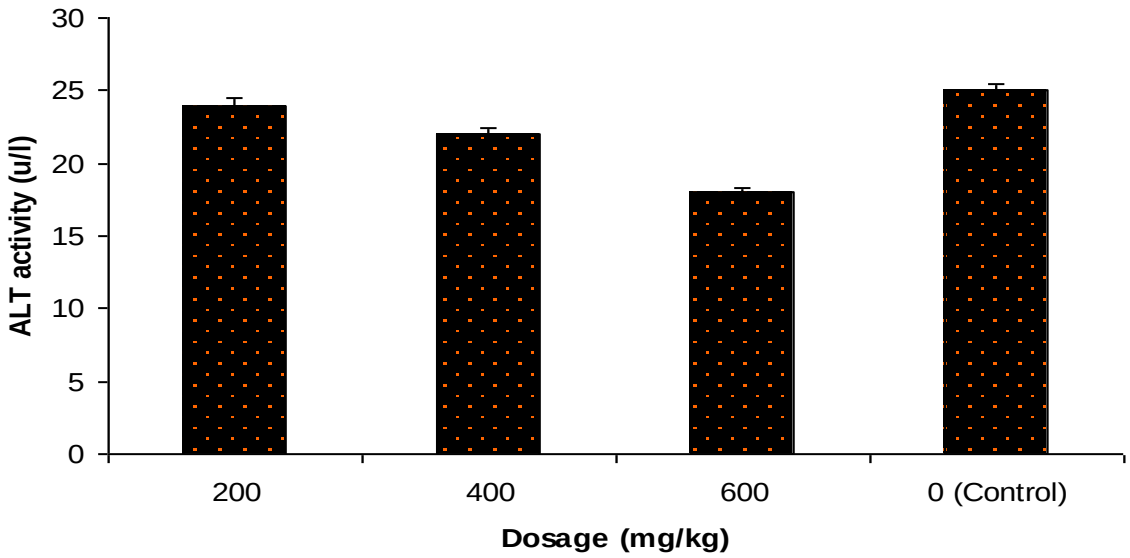

Fig. 3: Alanine aminotransferase (ALT) activities in albino rats administered with ethanol leaf-extract of *Annona muricata*

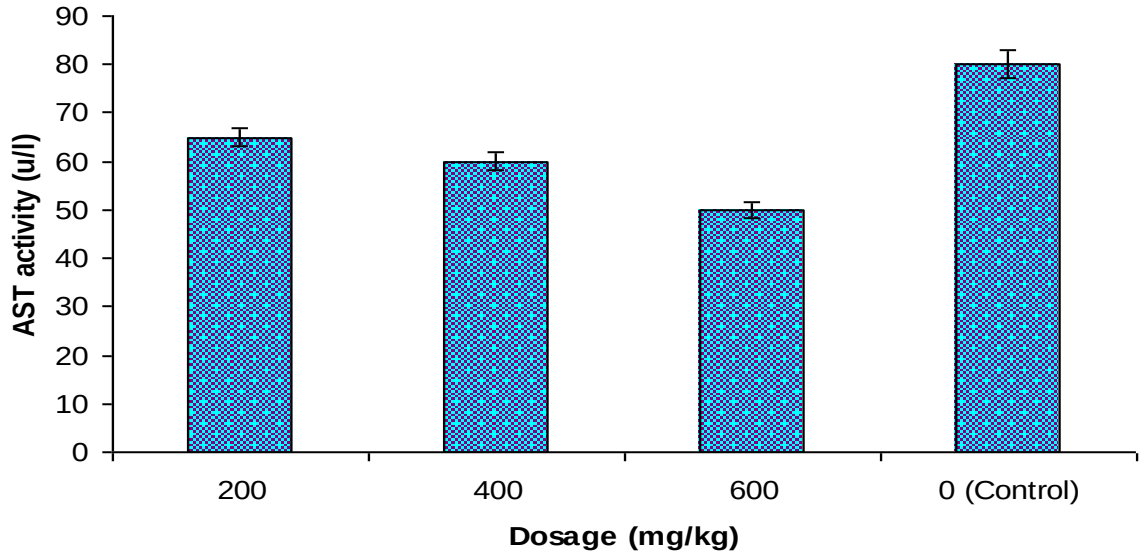

Fig. 4: Aspartate aminotransferase (AST) activities of albino rats administered with ethanol leaf-extract of *Annona muricata.*

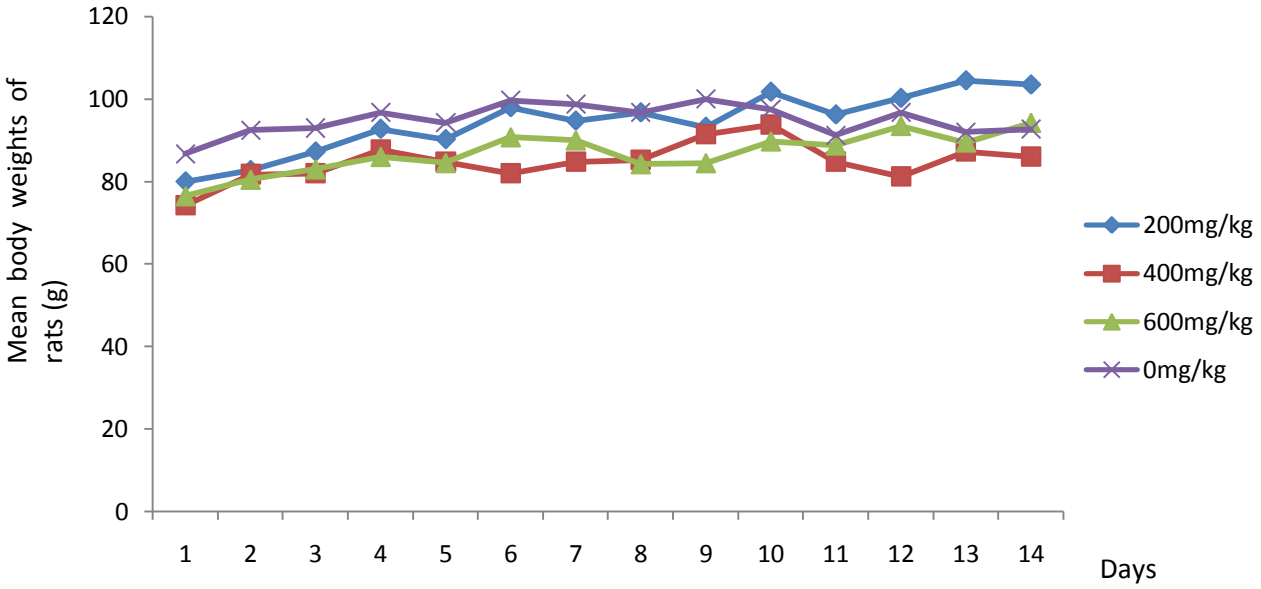

Fig. 5: Graphical representation of the average body weights of the rats within the period of administration of the extract.

IV. Discussion And Conclusion

There was a significant ($p<0.05$) decrease in the activities of alkaline phosphatase (ALP) in the albino rats administered with the ethanol leaf-extract of *Annona muricata* (Fig. 2). Nwogu *et al*. (2010) reported that *Annona muricata* leaf-extracts at 250 and 500mg/kg body weight significantly reduced the elevated serum levels of ALP in acute liver damage induced by different hepato-toxins. The higher doses of the extract (500mg/kg) prevented the increase in liver weight when compared with hepato-toxin treated control, while the lower dose was ineffective except in the paracetamol induced liver damage (Nwogu *et al*., 2010). *Cocos nucifera* water significantly and dose-dependently reduced the ALP activities (Offor *et al*., 2014). There was no significant difference in the levels of serum ALP between rat groups treated with *Annona muricata* and *Zizyphusspina-christi* aqueous leaf-extract (Owolabi *et al.,* 2013).

Ethanol leaf-extract of *Annona muricata* significantly ($p<0.05$) and dose dependently reduced the activities of alanine aminotransferase (ALT) in albino rats (Fig. 3). Owolabi (2013) recorded that treatment of albino rats with *Annona muricata* aqueous leaf-extracts significantly reduced the elevated activities of the

alanine aminotransferase. Liver function tests showed significant differences in alanine aminotransferase (ALT) in treated groups as compared to control (Evans, 2011). The extract from *Vernonia amygdalina* had no significant effect on ALT activity at 200mg/kg, but significantly increased it at 400 and 600mg/kg body weight (Offor and Aja, 2014). In the acute liver damage induced by different hepato-toxins, *Annona muricata* leaf-extracts prevented the increase in liver weight when compared to hepato-toxin treated control, while the lower dose was ineffective except in the paracetamol induced liver damage (Begum *et al*., 2012).

There was a significant ($p<0.05$) decrease in the activities of aspartate aminotransferase (AST) in the albino rats administered with the ethanol leaf-extract of *Annona muricata* (Fig. 4). Treatment of albino rats with *Annona muricata* and *Zizyphusspina-christii* aqueous leaf-extracts significantly reduced the elevated levels of AST towards the respective normal values indicating stabilization of plasma membrane as well as repair of hepatic tissue damage induced by paracetamol (Owolabi *et al*., 2013). *Annona muricata* leaf-extracts significantly reduced the elevated serum levels of AST (Nwogu *et al.*, 2010).

The ethanol leaf-extract of *Annona muricata* exerted a significant increase in the weights and physical activities of the albino rats administered with the extract (Fig. 5) Nwogu *et al.* (2010) observed that there was significant increase in body weights of rats treated with aqueous extract of *Annona muricata* leaves.

In conclusion, the ethanol leaf-extract of *Annona muricata* decreased the activities of liver enzymes in albino rats which is suggestive of its hepato-protective tendency. It also encouraged body weight gain.

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