

## The Effect of Ethanol Leaf-Extract of *Gmelina arborea* on Liver Enzymes

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**Abstract:** The effect of ethanol leaf-extract of *Gmelina arborea* on liver enzymes was investigated in rats using spectrophotometric methods. Twenty albino rats were grouped into four (A, B, C and D) containing five animals in each. The animals in groups A, B, C and D were administered the extract through oral intubation at the doses (mg/kg) of 200, 400, 600 and 0 respectively for two weeks. The blood samples were collected on the fifteenth day following the last day of administration. The aspartate aminotransferase (AST) activities (u/l) recorded  $30.60 \pm 2.13$ ,  $40.40 \pm 3.70$ ,  $62.82 \pm 3.39$  and  $26.00 \pm 1.41$  for the animals in groups A, B, C and D respectively with corresponding activities (u/l) of alkaline phosphatase (ALP) as  $16.80 \pm 1.21$ ,  $27.40 \pm 1.77$ ,  $39.60 \pm 2.01$  and  $16.30 \pm 1.77$ . The alanine aminotransferase (ALT) activities (u/l) recorded  $2.88 \pm 0.53$ ,  $3.42 \pm 0.44$ ,  $4.64 \pm 0.21$  and  $2.28 \pm 0.49$  for the animals in groups A, B, C and D respectively. The results indicated a dose-dependent significant ( $p < 0.05$ ) increase in the activities of liver enzymes of the animals that received the ethanol leaf-extract of *Gmelina arborea*, hence the ethanol leaf-extract of *Gmelina arborea* could be hepatotoxic.

**Key words:** Leaf-extract • *Gmelina arborea* and liver enzymes

### INTRODUCTION

The use of plants as medicines predates written human history. Many of the herbs and spices used by humans to season foods also yield useful medicinal compounds [1-5]. Medicinal plants have been identified and used which 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 [6-8]. At least 12,000 of such compounds have been isolated so far, a number estimated to be less than 10% of the total [8-12]. Many of the common weeds that populate human settlements such as nettle, dandelion, chickweed and *Gmelina* also have medicinal property [12-15].

*Gmelina arborea* contains a large number of pharmacologically active compounds and has been used for centuries as an effective laxative and diuretic [10]. Digoxin is a purified cardiac glycoside that is extracted from the foxglove plant (*Digitalis lanata*). Digoxin is widely used in the treatment of various heart conditions and sometimes heart failures that cannot be controlled by other medication [2]. *Gmelina arborea* is among both plants known to have both medicinal and therapeutic

effects. The roots and bark are galactogogue, laxative and anti-helminthic. It improves appetite, useful in hallucination, piles, abdominal pains, burning sensations, fevers and urinary discharges [5].

Liver is an organ of paramount importance which plays a pivotal role in regulating various biochemical, metabolic, physiological and biological processes such as storage, metabolism, secretion and control in the body. So it has a surprising role in the maintenance and regulation of homeostasis of the body system. It is evidently crucial in almost all the biochemical pathways to growth, fight against disease, nutrient supply, energy provision and reproduction [14]. A liver enzyme is a protein that helps to speed up the rate of chemical reactions in the liver. Liver function tests are blood tests that are carried to critically evaluate and investigate essential and crucial functions of the liver for example, metabolism, storage, filtration and excretion, which are often performed by liver enzymes. However, not all liver function tests are measures of enzyme function [14].

Since *Gmelina arborea* has been implicated in the treatment of so many diseases, there is need to evaluate its effect on liver, hence this research was aimed at examining the effect of ethanol leaf-extract of *Gmelina arborea* on liver enzymes of albino rats.

## MATERIALS AND METHODS

**Biological Materials:** Twenty albino rats were gotten from the University of Nigeria Nsukka (UNN), Nigeria. Fresh leaves of *Gmelina arborea* were collected in July from Onueke, Ezza South L.G.A of Ebonyi State and South-Eastern region of Nigeria.

**Extraction of Plant Materials:** The leaves were washed, sun-dried and ground into powdered form. The 300g of the powdered leaves was soaked in 1000ml of ethanol and left for 48hours. The solution was squeezed and filtered with a muslin cloth and the filtrate was poured into an evaporation dish. It was then exposed to air and mild heat of the sun until a semi-solid extract was gotten.

**Administration of Plant Extract:** All the animals were acclimatized for one week on rat chow before commencement of the experiment. The control group (D) was fed on rat chow and was not administered the extract. Groups A, B and C were administered with 200mg/kg, 400mg/kg and 600mg/kg body weight of the ethanol extract of *G. arborea* leaves via oral intubation twice a day for two weeks respectively. The animals were fed *ad libitum* with water and rat chow.

**Collection of Blood Samples:** The blood samples of the animals were collected by heart puncture into labeled EDTA bottles. The content of each tube was rocked to mix and thereafter centrifuged at 1500Xg for 15 minutes to separate the plasma which was used for the analysis.

**Determination of Liver Enzymes:** The aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) activities were determined by the methods of Reitman and Frankel (1957).

**Measurement of Body Weights:** The weights of rats were measured using weighing balance.

**Statistical Analysis:** Results are expressed as the means  $\pm$  standard deviation. The differences among means were analyzed by one-way ANOVA to check the level of relationship between the treated and control variables. A value of  $p < 0.05$  was considered as statistically significant (Hinkelmann and Kempthorne, 2012).

## RESULTS AND DISCUSSION

The effect of ethanol leaf-extract of *Gmelina arborea* in rats indicated that there was a dose-dependent significant ( $p < 0.05$ ) increase in the activities of aspartate aminotransferase (AST) in serum (Fig. 1). Dial (2010) on clinical pathological evaluation of the liver recorded an increase in AST activity in the muscles and livers of the rats that received the ethanol leaf-extract of *Gmelina arborea*. Aspartate aminotransferase (AST) also recorded an increased activity in the liver when administered with *Cocos nucifera* water [8]. Aspartate aminotransferase (AST) occurs in a wide variety of tissues, but with high concentrations in muscular tissues and in liver [3].

Alkaline phosphatase (ALP) activity in the rats showed a dose-dependent significant ( $p < 0.05$ ) increase when treated with ethanol leaf-extracts of *G. arborea* (Fig. 2). Thabrew *et al.* (1987) on comparative study of efficacy of *Paetta indica* and *Osbeckia octandra* in the treatment of liver dysfunction reported an increased alkaline phosphatase (ALP) activity. Amadi *et al.* (2010) reported that *Gmelina arborea* increased the alkaline phosphatase (ALP) activity and explained that the serum levels of transaminases returned to normal with the healing of hepatic parenchyma and regeneration of hepatocytes. In this view, the decrease in activity of ALP is an indication of stabilization of plasma membrane as well as repair of hepatic tissue damage as reported by Thabrew *et al.* [13].

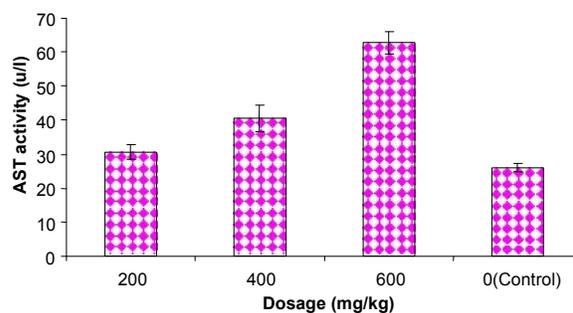


Fig. 1: AST activities (u/l).

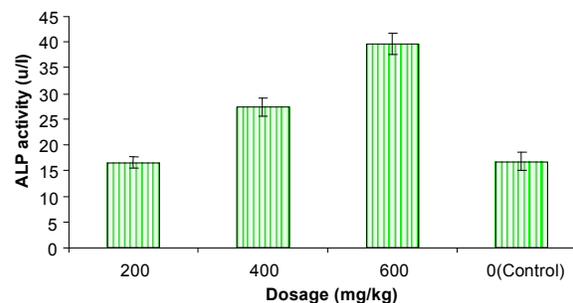


Fig. 2: ALP activities (u/l).

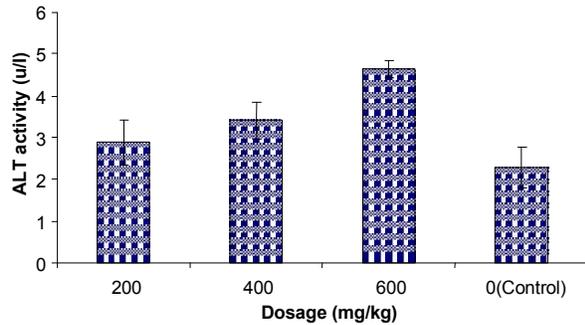


Fig. 3: ALT activities in albino rats administered with ethanol leaf-extract of *Gmelina arborea*.

Alanine aminotransferase activity recorded a significant ( $p < 0.05$ ) increase (Fig. 3). Kim and Wycoff [6] recorded an increase in alanine aminotransferase activity of rat treated with *Gmelina arborea* and that ALT is present in tissues throughout the entire body of the animal, but is particularly concentrated in the liver, bile duct, kidney, bone and the placenta. The increase in activity is probably because there was damage to the animals' organs.

In conclusion, ethanol leaf-extract of *Gmelina arborea* increased the activities of liver enzymes (AST, ALP and ALT) in albino rats, hence the extract could be hepatotoxic.

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