

The Effects of Ethanol Leaf-Extract of *Gmelina arborea* on Total Protein and Albumin Concentrations in Albino Rats

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Abstract: The effects of ethanol leaf-extract of *Gmelina arborea* on total protein and albumin concentrations were investigated in albino rats using standard methods. Twenty-four albino rats were grouped into four (A, B, C and D) containing six rats each. The animals in groups A, B, C and D were administered the ethanol leaf-extract of *Gmelina arborea* by oral intubation at the doses of 200mg/kg, 400mg/kg, 600mg/kg and 0mg/kg body weight respectively for two weeks. Blood samples were collected on the fifteenth day following the last day of administration. There were significant ($p < 0.05$) dose-dependent reductions in both serum total protein and albumin concentrations.

Key words: Leaf-extract • *Gmelina arborea* • Total protein • Albumin and albino rats

INTRODUCTION

Gmelina arborea of the family *verbenaceae* is a fast growing deciduous tree, occurring naturally throughout greater parts of India at altitudes up to 1,500 meters. It also occurs naturally in Myanmar, Thailand, Laos, Cambodia, Vietnam and in southern provinces of China and has been planted extensively in Sierra Leone, Nigeria, Malaysia and on experimental basis in other countries as well [1-7]. The wood is pale yellow to cream coloured or plukish-buff when fresh, turning yellowish brown on exposure and lustrous when fresh [2-3]. The root and bark of *Gmelina arborea* are claimed to be stomachic, laxative; useful in hallucination, piles, abdominal pains, burning sensations, fevers and urinary discharge [8-12].

Serum total protein assay is a biochemical test for measuring the total amount of protein in blood or serum. Protein in the plasma is made up of albumin and globulin. The globulin, in turn, is made up of α_1 , α_2 , β and γ globulins. These fractions can be quantified using protein electrophoresis, but the total protein test is a faster and cheaper test that estimates the total of all fractions together [12-20].

Serum albumin is the most abundant blood plasma protein and is produced in the liver and forms a large proportion of all plasma proteins. The human version is human serum albumin and it normally constitutes about 50% of human plasma proteins.



Fig. 1: *Gmelina arborea* leaves (Gangadharan, 2012).

Serum albumins are important in regulating blood volume by maintaining the colloid osmotic pressure of the blood compartment [20-25].

Serum total protein and albumin levels in animals are affected by intake of different plant extracts such as that of *Gmelina* leaves. Elevation or reduction of these parameters can also be caused by certain diseases [1-3].

The aim of this research was to investigate the effects of ethanol leaf-extract of *Gmelina arborea* leaves on total protein and albumin concentrations in albino rats.

MATERIALS AND METHODS

Materials: Fresh leaves of *Gmelina arborea* were collected from Abakaliki, Ebonyi State, while twenty-four albino rats were gotten from University of Nigeria, Nsukka, Enugu State, Nigeria.

Methods

Extraction of the *Gmelina arborea* Leaves: 300g of dry and ground leaves of *Gmelina arborea* was subjected to extraction by soaking with 1000ml of ethanol and left for 48hours. Clean muslin cloth was used to filter out the solution. The filtrate was allowed to stay under mild sunlight until the ethanol evaporated to obtain the sticky extract of *Gmelina arborea* leaves.

Administration of the *Gmelina arborea* Leaf-Extract: All the animals were acclimatized for one week on rats chow before commencement of the experiment. Groups A, B, C and D were administered with 200mg/kg, 400mg/kg, 600mg/kg and 0mg/kg of ethanol leaf-extract respectively via oral intubation twice a day for two weeks. The animals were fed *ad libitum* with water and rat chow.

Collection of Blood Sample: The blood samples were collected through cardiac puncture into labeled sterile EDTA containers to prevent the blood from clotting.

Determination of Serum Total Protein and Albumin Concentrations: The serum total protein and albumin concentrations were determined by the methods of Cheesbrough (2006).

Data Analysis: All the tested parameters were subjected to statistical analysis using T-test. Differences between means were regarded significant at $P < 0.05$ (Oyeka, 1996).

RESULTS AND DISCUSSION

There was a significant dose-dependent decrease ($P < 0.05$) in total protein concentrations in the albino rats that received the ethanol extract of *Gmelina arborea* leaves (Fig. 2). Annongu and Folorunso (2012) also reported a significant decrease ($p < 0.05$) in the total protein levels in male and female pigs fed with fruit meal of *Gmelina arborea*. The decrease in total protein concentrations with increasing intake of the fruit meals of *Gmelina arborea* might be as a result of increasing anti-mutational factors in the plant (Annongu and Folorunso, 2012). Murali *et al.* (2011) in their research showed that ethanol extract of *Gmelina arborea* leaves (250mg/kg and 500mg/kg) significantly reduced the elevated serum levels of total protein. The higher dose of the extract (500mg/kg) prevented the increase in liver weight, while the lower dose was ineffective except in the paracetamol-induced liver damage (Murali *et al.*, 2011).

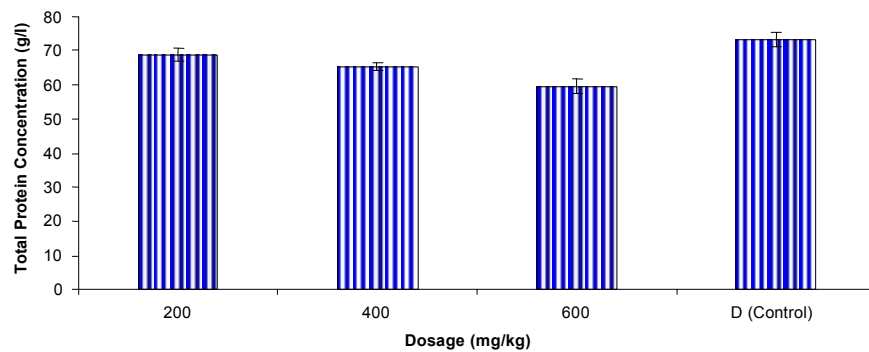


Fig. 2: A bar chart representing total protein levels in albino rats administered with ethanol extract of *Gmelina arborea* leaves.

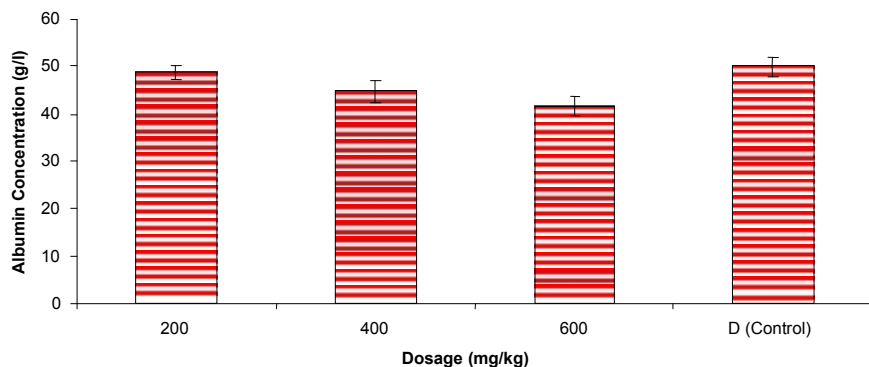


Fig. 3: A bar chart representing albumin levels in albino rats administered with ethanol extract of *Gmelina arborea* leaves.

There was also a significant dose-dependent decrease ($p < 0.05$) in albumin concentrations in the albino rats administered with the ethanol extract of *Gmelina arborea* leaves (Fig. 3). Annongu and Folorunso (2012) in their work also recorded a significant decrease ($p < 0.05$) in the albumin levels in male and female pigs fed with fruit meal of *Gmelina arborea*. Saidu *et al.* (2012) revealed that treatment of albino rats with *Gmelina arborea* aqueous leaf-extract significantly reduced the elevated levels of albumin towards the respective normal values indicating stabilization of plasma membrane as well as repair of hepatic tissue damage induced by paracetamol or other medications [26-27].

In conclusion, the ethanol leaf-extract of *Gmelina arborea* significantly ($p < 0.05$) decreased the total protein and albumin concentrations in albino rats at the stipulated doses.

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