



ORIGINAL ARTICLE

Haematinic Potential of *Spondias Mombin* Leaf Extract in Wistar Rats

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ABSTRACT

The haematinic potential of ethanol extract of *Spondias mombin* leaves was investigated in female Wistar rats. The extract was orally administered at doses of 250mg/kg and 500mg/kg body weight for 42 days; at the expiration of which histological and haematological were carried out. The liver of experimental groups showed no significant change compared to control. Red blood cell count, haemoglobin concentration and packed cell volume were analysed as known indices of anaemia. Serum liver enzymes were also analyzed for possible side effects. Ethanol leaf extract of *Spondias mombin* induced a significant ($P < 0.05$) increase in erythrocyte count, haemoglobin concentration and packed cell volume of experimental animals. The liver enzymes were not significantly altered. The result obtained collaborates with the use of the plant locally as a haematinic.

Keywords: Haematinics, Haemoglobin, Red blood cell, Liver, Enzymes, Potential

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INTRODUCTION

The healing powers of plants have been exploited for centuries, with most pharmaceutical drugs derived from them. Medicinal plants are mostly used in traditional setting in rural areas around the world especially in the tropics where there is abundance of flora. Plants are relied upon in almost every part of Africa for the treatment of ailments and diseases [1]. Every part of the tree of *Spondias mombin* is used traditionally used for medicinal purposes. Researchers have reported scientific findings on its use [2-12]. Anaemia affects people of all ages especially the elderly, women of child bearing age and children [13]. It is characterized by reduction in circulating red blood cell, haemoglobin and haematocrit per unit of peripheral blood [14, 15]. It is estimated that half of the world's population will experience some form of anaemia in their lifetime [16]. The incidence of anaemia is higher in third world Countries due to mitigating factors such as poor nutrition, poverty and malaria [17]; women are also found to be anaemic during pregnancy [18]. Several plants have also been investigated for their haematinic properties; such as *Brillantasia nitens* [19], *Sphenocentum jollyanum* seed oil [20], *Telferia occidentals* [21], *Waltheria indica* [22], *HYgrophila spinosa* [23], *Hibiscus sabdariffa* [24] etc. *Spondias mombin* is traditionally given to women shortly after child birth to increase their blood content as claimed by traditional birth attendants. This necessitated the present study.

MATERIALS AND METHODS

Plant Material

Leaves of *Spondias mombin* were harvested from a locality (Ugep) in Cross River State, Nigeria. The plant material was identified and authenticated by Mt Frank Apejoye, the Chief Herbarium, Department of Botany, University of Calabar. A voucher specimen was deposited for reference (No. 313).

Preparation of Extract

2kg of plant material was washed, shade dried, powdered and thoroughly extracted with ethanol by cold percolation method. The solvent was decanted after 72 hours and distilled off over boiling water bath, concentrated under reduced pressure with the aid of a rotary evaporator and dried in a dessicator. The yield of the plant was 12% (w/w).

Animals

Eighteen [18] female wistar rats with an average weight of 180g used for this study were obtained from the Department of Zoology and Environmental Biology, Faculty of Sciences, University of Calabar, Nigeria. The animals were maintained in the Department of Anatomy, University of Calabar where the study was carried out. Permission was obtained for the study from the departmental Ethical Committee and the study was carried out according to the principles prescribed for laboratory animal use. The rats were fed with commercial rat chow obtained from Pfizer Nigeria Ltd and water was provided *ad libitum*.

Experimental Design

The animals were divided into three groups of six rats in each group. Group A served as control and was administered vehicle only. Groups B and C were given ethanol extract of *Spondias mombin* leaf suspended in 2mls of saline at doses of 250 and 500mg/kg body weight for 42 days. On the 43rd day, blood samples were collected from the vugular vein of the rats in heparinised vials. Haematological analysis for RBC count, haemoglobin concentration and percentage haematocrit volume were determined [25, 26]. Serum level of liver enzymes (AST, ALT and ALP) was also analyzed [27]. Liver tissue was excised and processed for routine histological study.

Statistical Analysis

Data obtained were subjected to T-test analysis and expressed as mean± standard deviation. Values with *P<0.05, **P<0.001, ***P<0.001 were considered significant.

RESULTS AND DISCUSSION

The liver of the test groups administered with extract at 250 and 500mg/kg body weight showed no significant change from the con troll group. The cytoarchitecture well defined central vein, radially arranged hepatocytes and sinusoids (Figs 1a-c).

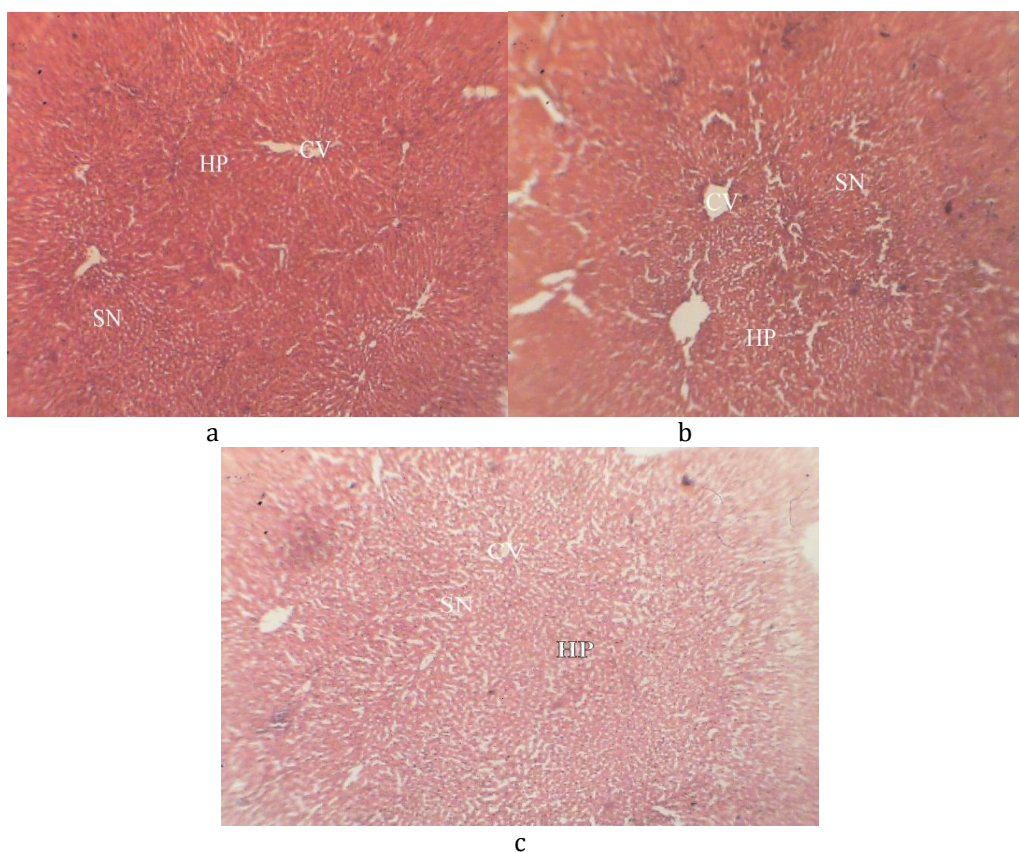


Figure 1: Showing the cytoarchitecture of the liver of (a) control animals (b) animals administered with 250mg/kg body weight and (c) animals administered with 500mg/kg body weight of *Spondias mombin* ethanol extract. CV- Central Vein, SN- Sinusoid, HP-Hepatocytes.

The haematological parameters were dose-dependently increased in the experimental groups. Significant (P<0.05) increase was indicated in the values of RBC, haemoglobin and haematocrit (Table 1). Defective haematopoiesis is indicated by reduction in erythrocytes number and haemoglobin content, however, in this study, there was no indication of anaemia from the levels of haemoglobin found. Haemoglobin is a

protein used by red blood cells to distribute oxygen to other tissues and cells in the body [28]. The significant increase in haematocrit in the study may be indicative of the normal functioning of the bone marrow in the process of erythropoiesis. Similarly, levels of ALT and AST were non-significantly ($P>0.05$) increased in the result obtained, AST and ALT are cardinal and specific indicators of biochemical changes in response to any treatment [29]. The non-significant increase of these enzymes may imply that extracts of *Spondias mombin* is safe and non-toxic to the liver. However, significance ($P<0.001$) was recorded in the value of ALP. ALP is involved in the transport of metabolites across cell membranes, involved in protein synthesis and glycogen metabolism [30] and is useful in diagnosing hepatobiliary or cholestatic obstruction [31]. Most enzymes measured as indices of drug metabolism are released into the blood stream when cells are damaged or their functions are disrupted. Cell membrane integrity is assessed by its ability to prevent enzyme leakage dependent on intracellular energy [32]. Therefore, the significant decrease ($P<0.001$) observed may mean protection against hepatobiliary damage. The absence of histological changes in the liver alongside liver function test shows that *Spondias mombin* may not adversely affect the liver. Therefore, this result supports the use of leaf extract of *Spondias mombin* as a haematinic given to pregnant women after childbirth to combat anaemia induced during pregnancy and it can also be given to anyone anaemic.

Table 1: Effect of *Spondias mombin* leaf extract on the haematological parameters of rats treated for 42 days

Treatment	Erythrocyte ($10^6/\mu\text{l}$)	Leukocyte ($10^3/\mu\text{l}$)	Haemoglobin (g/dl)	Haematocrit (%)
Group A Control	7.44±0.38	19.58±3.50	11.68±0.59	45.78± 2.64
Group B (250mg/kg)	8.67±0.19*	21.24±2.64**	15.82±0.23**	47.92±0.80*
Group C (500mg/kg)	8.72 ±0.10*	24.32±1.69**	16.34±0.55**	48.80±0.85*

Values represent mean ± standard deviation of six animals

* $P<0.05$, ** $P<0.01$ when compared to control animals.

Table 2: Effect of *Spondias mombin* leaf extract on the serum liver function of rat treated for 42 days

Treatment	AST (μL)	ALT (μL)	ALP (μL)
Group A Control	503.25±16.52	132.85±3.84	24.25±9.09
Group B (250mg/kg)	516.57±10.14	148.36±8.59	3.13±1.10***
Group C (500mg/kg)	520.88±18.46	153.26±4.63	0.43±0.13***

Values represent mean ± standard deviation of six animals

*** $P<0.001$ when compared to control animals.

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