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Evaluation of Serum Proteins and Hepatomarkers of rats treated with Ethanol Leaf Extract of *Justicia secunda*

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Abstract

The aim of this study was to evaluate the serum protein and hepatomarkers of rats administered ethanol leaf extract of *Justicia secunda*. Freshly harvested leaves of *Justicia secunda* were processed into fine powder prior to extraction. Twenty five adult male wistar rats were divided into five rats per group. **Group I** was the normal control and was only fed with rat chow and water. Groups II-V was anaemia induced. However, while **Group II** was not administered with extract, **Group III** and **Group IV** were administered with 200 and 400 mg/kg of extract respectively and **Group V** was administered the standard drug. There was no significant (P>0.05) difference between the serum protein (total protein, albumin and globulin) level of rats administered with ethanol leaf extract of *J. secunda* and that reported for the normal control group. Similar observation was made on the serum hepatomarkers of rats administered the said extract. In conclusion, ethanol leaf extract of *J. secunda* is not hepatotoxic.

Keywords: Hepatotoxic; *Justicia secunda*; Total protein; Albumin and Globulin

1. Introduction

For the health of a human organism to function optimally, the liver, a metabolically active organ known for its detoxification strength must be morphologically and functionally intact driven by the stability of the arrays of catabolic and anabolic reactions domiciled within the liver and sinusoidal cells. Being critically involved in metabolism of xenobiotics, the liver is exposed to high doses of toxicants or its toxic metabolites hence highly susceptible to toxicity [1].

The use of plant based therapies by human is considered an old practice which has stood the test of time basically owing to its availability especially among the local people. This is evident by the fact that an estimated 80% of the world's population relies on plant based therapies to meet their basic health needs [2]. Unfortunately, trado-medical practitioners lack the skill to determine the effect of their prescriptions on the aforementioned sensitive organ in addition to the ambiguous and unverified safety claims on plant based therapies in several supposedly scientific literatures.

Justicia secunda Vahl is a member of the *Acanthaceae* family commonly known as Sanguinaria and Blood root in Venezuela and Barbados respectively [3]. The plant has found significance in folk medicine [4]. Evident by the fact that it is used locally by members of the Jehovah's Witness believers to treat anaemia [5] without recourse to potential damage that could reach the liver following its use, an observation which justifies the imperativeness of this study.

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2. Material and method

2.1. Collection of plant material

Fresh leaves of *Justicia secunda* was collected from Njua Kaku in Boki Local Govenment Area. Cross River State prior to its identification at the herbarium unit of the Department of Biological Science, Ahmadu Bello University Zaria.

2.2. Processing and extraction of plant material

Fresh leaves of *Justicia secunda* were detached from the stems, sorted, washed, dried under room temperature before being ground with the aid of an electric blender and afterwards sieved into fine powder. 300 g of a powdered leaf sample was steeped in 2 L of ethanol and allowed to stand for 48 h. with constant stirring. This was followed by the filtration of the solution using Whatman No. 1 filter paper, and the resulting extract concentrated to a semi-solid residue in a water bath at 60 °C for 2 days.

2.3. Experimental animals

Adult male wistar rats weighing 150-250 g were obtained from the animal house of the Veterinary Research Institution VOM, Jos in Plateau State, North Central Nigeria. The rats were neatly housed in ventilated, transparent plastic cages under standard laboratory conditions at ambient temperature and relative humidity. Light and dark cycles were maintained at 12 h each. The rats were fed on rat chow and were allowed access to water *ad libitum*.

2.4. Median Lethal dose 50% (LD_{50})

Nine (9) adult male wistar rats divided into three groups of three rats per group were employed in this study. Groups 1-3 were administered 10, 100 and 1000 mg/kg of extract orally respectively and afterwards observed for 24 h. for signs of toxicity. Following absence of mortality in any of the groups another three adult male wistar rats were separately administered with 1600, 2900 and 5000 mg/kg of extract separately. The animals were observed for 48 h. for signs of toxicity [6].

2.5. Animal grouping

A total of 20 male wistar rats weighing 150-200 g were used divided into five groups of five rats each.

- **Group I:** (Normal Control) rats were fed rat chow and water
- **Group II**: Rats administered 100 mg/kg of the extract of the rind of *Justicia secunda* orally.
- **Group III**: Rats administered 200 mg/kg of the extract of the rind of *Justicia secunda* orally.
- **Group IV**: Rats administered 400 mg/kg of the extract orally.

2.6. Biochemical assays

2.6.1. Serum total protein

The serum total protein concentration was determined using the biuret method. In this approach, alkaline copper reacts with the peptide bonds of proteins to form a characteristic pink to purple biuret complex. Sodium potassium tartrate prevents copper hydroxide precipitation and potassium iodide prevents the auto reduction of copper. The color intensity is directly proportional to protein concentration. The absorbance was measured at 546 nm. The concentration of serum total protein was expressed as g/dL.

2.6.2. Serum albumin

The serum albumin concentration was measured using the bromocresol green method described by Dumas et al. [7]. The albumin in a buffered solution reacts with anionic bromocresol green dye and produces a green color. The measurement was made at an absorbance at 628 nm. The intensity of the green color is proportional to the concentration of albumin present in the sample and was expressed as g/dL

2.6.3. Serum globulin

The serum globulin level was calculated by subtracting the albumin value from the corresponding value of total protein. The concentration of serum globulin was expressed as g/dL.

2.6.4. Determination of Activity Liver enzymes

The levels of alkaline phosphatase (ALP), alanine amino transferase (ALT) and aspartate amino transferase (AST) were analysed spectrophotometrically with Randox assay kits using the procedure described by Reitman and Frankel [8].

Table I Serum protein of Rats administered with Ethanol Leaf Extract of Justicia secunda

Grouping	Treatments	Total protein (mg/dl)	Albumin (mg/dl)	Globulin (mg/dl)
Group I	Normal control	81.9 ± 2.52^{c}	30.9 ± 3.03^{b}	51.0 ±3.26^{ab}
Group III	100 mg/kg ELEJS	74.9 ± 1.96^{bc}	30.7 ± 2.68^{b}	50.2 ± 1.55^{a}
Group IV	200 mg/kg ELEJS	74.6 ± 1.60^{bc}	32.6 ± 2.15^{b}	49.5 ± 1.89^{a}
Group V	400 mg/kg ELEJS	78.2 ±1.48^{bc}	34.1 ± 2.72^{bc}	51.6 ±1.00^{ab}

Results are expressed as mean ± standard deviation of three determinations. Values with different superscript in a column are significantly different at (P≤0.05).

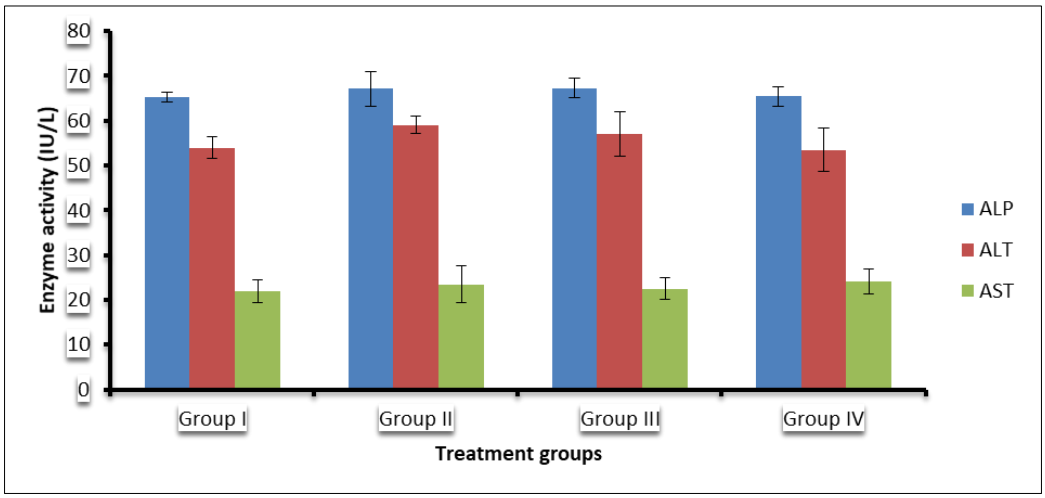

Figure 1 Serum Hepatomarkers of Rats administered Ethanolic Extact of *Justicia secunda*

3. Discussion

The liver accounts for a steady state of the living components. It is chiefly concerned with metabolic pathways that ensure biotransformation of xenobiotics, metabolism of nutrients, and synthesis of macromolecules among other numerous sensitive functions [9]. Thus, an injury to the liver may be translated to inefficient delivery of metabolic services by the affected organ and may lead to the death of a whole human organism. The serum hepatomarkes are domiciled within the hepatocytes and are released into the blood stream following damage to the liver [10]. On the other hand, a decrease in the albumin and globulin (total protein) levels could be an indicative of the liver's failed ability to synthesize the aforementioned proteins due to hepatic damage or injury. There was no significant (P>0.05) difference between the serum protein (total protein, albumin and globulin) level of rats administered with ethanol leaf extract of *J. secunda* and that reported for the normal control (**Group 11**) Similar observation was made on the serum hepatomarkers of rats administered with the said extract. This could be attributed to the absence of a phytoconstituent with potential to inflict harm to the liver. This is consistent with the finding of Anyasor et al. [11] who established that the aqueous extract of *Justicia secunda* offered protection against CCl_4 induced hepatotoxicity.

4. Conclusion

Through the findings made in this work, it has been deduced that ethanol leaf extract of *Justicia secunda* is not hepatotoxic.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

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