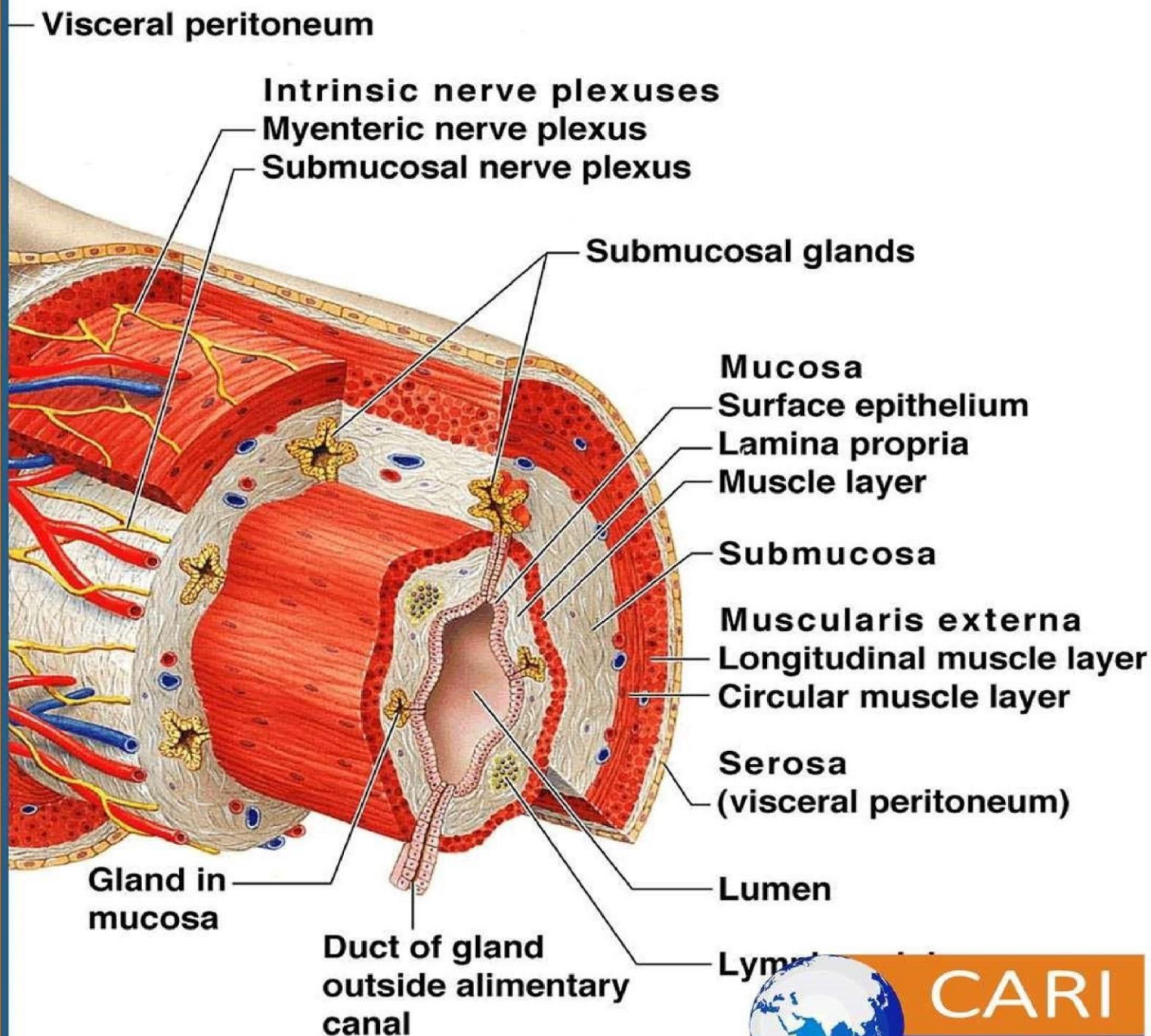


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**The Effect of Ethanolic Extract of *Justicia Secunda* on Kidney
Function in Female Wistar Rats**



The Effect of Ethanolic Extract of *Justicia Secunda* on Kidney Function in Female Wistar Rats

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ABSTRACT

Purpose: The kidneys serve as the excretory organ of the body. The assessment of serum creatinine, urea, and electrolytes (Na⁺, K⁺, HCO₃⁻, Cl⁻) are crucial and sensitive biochemical markers that are usually involved in the diagnosis of renal impairments (Agbasi et al. 2010; Tietz, 2008; Yakubu et al. 2003).

Methodology: Thirty-six animals were grouped into 6, with 6 rats in each group. The animals were housed at room temperature in metal cages. Animals in each group had access to clean water and commercial standard rodent pellets. Group 1 (control group) received distilled water, Groups 2-6 were treated orally with low, middle, and high doses of ethanolic extract of *Justicia secunda* leaves daily for 42 days.

Findings: A significant increase in the level of urea concentration was observed compared to the control. From the present study, Na⁺, K⁺, Cl⁻, and HCO₃ increased significantly in the moderate and high dose groups.

Unique contribution to theory, policy and practice: In conclusion, this study indicates that ethanolic extract of *Justicia secunda* increased the serum level of urea, creatinine, and electrolytes.

Keywords: *Electrolytes, Creatinine, Urea*

INTRODUCTION

Medicinal plants are not only used as food, but also for therapeutic purposes to treat illnesses (Oli et al., 2019). Researchers in science and medicine are interested in the use of medicinal plants in the treatment of various diseases, and this has revealed the medical significance, mechanism of action, as well as the harmful effects of these plants. Medicinal plants can contain toxins that can affect the organs in the body, especially the liver and kidneys (Moghaddam et al., 2012; Tanimu and Wudil, 2012).

Justicia secunda (blood root) is a specie of plant that belongs to the family *Acanthaceae*. Plants in this family are known for their several therapeutic uses. They are used in the treatment of central nervous system disorders like epilepsy and other mental disorders, anaemia, wound healing, and abdominal cramps (Okpara *et al*, 2022). Due to the sedative and analgesic properties of *Justicia secunda*, it is used in the treatment of headaches and fever (Khan et al., 2017). Every part of the *Justicia secunda* plant plays a useful role in the treatment of illnesses. The most frequently used extracts are those gotten from the leaves followed by root extracts (Onochie et.al, 2020). In this study, a specie of plant known as *Justicia secunda* was used to determine its effect on the kidney of female wistar rats.

The effects of various medicinal plant extracts on renal indices have been determined by various studies. Yet, few researches have been conducted to determine the effect of *Justicia secunda* on renal function indices. This research attempts to bridge that gap in knowledge.

MATERIALS AND METHOD

Plant material and preparation

Fresh leaves of *Justicia secunda* (bloodroot) were obtained from a small garden opposite the Department of Forestry in Rivers State University. The leaves were identified and given vital names by the Department of Forestry, Faculty of Agriculture, Rivers State University, Port Harcourt. The leaves were air-dried at room temperature. Using a hot air oven at 45-50 degrees celcius, the leaves were dried completely and ground to powder form. Extraction was done using soxhlet extraction, with 500ml of absolute ethanol used as a solvent. The extract was orally administered to the Wistar rats on a daily basis for a period of 5 weeks (35 days).

Experimental animals

A total of forty (40) young wistar rats were used for this study. Animals were housed in well ventilated wired cages at room temperature at the animal house, and had access to commercial standard rodent Pellets and cool clean water *ad libitum*. The experiments were conducted according to the institutional animal care protocols at the Animal House, Rivers State University, Port Harcourt, Nigeria, and followed approved guidelines and ethics for the treatment of laboratory animals. After acclimatization, they were evenly distributed into five (6) groups of six (6) rats each, with the exception of the control group, which had ten (10) rats. The extract was administered

orally, with the aid of an oral intubation tube, to all animals but those in the control group. The doses were administered to the animals according to their individual weights. At the end of the experimental period of 8 weeks, the animals were sacrificed and blood samples were collected for analysis.

Study Design

The study was conducted on forty (40) randomly selected female wistar rats weighing from 21-33g before acclimatization, 54-83g after acclimatization, and 280-500mg before sacrifice. After acclimatization for 14 days, the rats were assigned to six (6) groups (groups 1 to 6) according to their weight, with group 1 as the control.

Group 1 (Control group): The rats were fed with regular rat feed and distilled water.

Group 2: The rats were fed with regular rat feed and the extract was administered to them according to their weights. (250mg/body weight)

Group 3: The rats were fed with regular rat feed and the extract was administered to them according to their weights. (300mg/body weight)

Group 4: The rats were fed with regular rat feed and the extract was administered to them according to their weights. (350mg/body weight)

Group 5: The rats were fed with regular rat feed and the extract was administered to them according to their weights. (400mg/body weight)

Group 6: The rats were fed with regular rat feed and the extract was administered to them according to their weights. (450mg/body weight)

Table I: Table showing the effect of the *Justicia secunda* extract on serum electrolytes (K, Na, Cl, HCO₃)

GROUP	K μmol/l	Na μmol/l	Cl μmol/l	HCO ₃ μmol/l
CONTROL	4.00±0.07	125.20±1.99	61.40±1.36	24.80±1.16
250mg/bw	3.43±0.22*	110.250±4.87	53.50±2.60	27.00±1.08
300 mg/bw	3.76±0.12	117.60±3.83	60.80±2.06	25.60±1.36
350 mg/bw	4.48±0.17*	139.80±5.75*	63.20±1.36	26.60±1.54
400mg/bw	4.08±0.21	128.80±5.87	69.20±2.22*	27.40±0.75

450mg/bw	4.68±0.29*	146.60±8.93*	64.20±1.16	26.00±1.51
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Values are expressed in mean ± SEM, n=5, *p<0.05 statistically significant compared to control

Table II: Table showing the effect of the *Justicia secunda* extract on Serum Urea and Creatinine

GROUP	Ur	Cr
	µmol/l	µmol/l
CONTROL	4.96±0.24	84.26±19.42
250mg/bw	6.08±0.36	122.25±7.26*
300 mg/bw	6.06±0.23	122.60±4.34*
350 mg/bw	6.08±0.28	122.00±5.47*
400mg/bw	6.72±0.78*	132.20±12.62*
450mg/bw	5.64±0.69	113.40±13.87

Values are expressed in mean ± SEM, n=5, *p<0.05 statistically significant compared to control

DISCUSSION

The kidneys serve as the excretory organ of the body. The assessment of serum creatinine, urea, and electrolytes (Na⁺, K⁺, HCO₃⁻, Cl⁻) are crucial and sensitive biochemical markers that are usually involved in the diagnosis of renal impairments (Agbasi et al. 2010; Tietz, 2008; Yakubu et al. 2003).

In this study, there was a significant increase in the level of urea concentration compared to the control. This implies that the plant extract had an effect on kidney function. This result is in contrast with Irma et al (2021) who reported a decrease in urea concentration in the treatment group implies that the plant extract had no effect on kidney function and cannot cause kidney damage.

Creatinine level significantly increased when compared with the control in the present study. This increase in creatinine level may be as a result of glomerular inflammation. This result was in agreement with Nwankpa et al (2018) who stated that creatinine increase may have resulted from glomerular inflammation and interstitial nephritis.

Results from the present study revealed increased creatinine and urea levels in treatment groups, implying that administration of the plant extract may impair kidney function. This result agrees with Abubakar et al (2010). They stated that plant extract capable of increasing urea .and creatinine levels impairs renal function. Blood levels of creatinine and urea are indicators of renal function or glomerular filtration rate (GFR). When the plasma urea concentration is elevated, plasma creatinine will normally also increase due to the reduction of GFR. This increase in plasma creatinine signifies renal pathology. This pathology might be due to the phytochemical components of the plant.

From the present study, Na⁺, K⁺, Cl⁻, and HCO₃⁻ increased significantly in the moderate and high dose groups. This implies that the plant extract is likely to cause renal impairment due to its phytochemicals. This result was in agreement with Imo and Uheghu (2015). They reported that alteration in the concentration of body electrolytes is an indication of poor renal function or renal impairment. Ganong *et al* (1999) stated that an increase in serum electrolyte level is due to the inability of the kidney to excrete these ions and indicates renal impairment.

From the study, it was observed that ethanol extracts of *Justicia secunda* may have caused both impaired glomerular and tubular function although the exact mechanism is not known. The elevation of kidney function parameters seen in the present study suggest that ethanol extracts of *Justicia secunda* had a deleterious effect on the kidney.

In conclusion, this study indicates that ethanolic extract of *Justicia secunda* increased the serum level of urea, creatinine, and electrolytes.

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