RESEARCH ARTICLE

Effect of Stem Bark Extract of *Erythrina Senegalensis* on the Kidney of Rats

Onoshe S, Madusolumuo M. A, and Azolukwam S. U
Department of Biochemistry, Modibbo Adama University of Technology Yola, Nigeria.

**Abstract:**
This study was designed to evaluate the effect of stem bark extract of *Erythrina Senegalensis* on the kidney of rats. Twenty five albino rats weighing 150-200g were randomly divided into four groups of six animals each: those administered water and normal feed (control), those administered 50mg/kg of extract, those administered 100mg/kg of extract, and those administered 200mg/kg of extract. The extract was administered daily for 14 days after which the animals were sacrificed. The extract did not show any significant effect on the serum concentration of urea, creatinine, Na⁺, K⁺ and HCO₃⁻ in the treatment group compared to control. The observed non-significant difference of the assayed biochemical parameters from the control values following the oral administration of the extract for 14 days is an indication that the extract could be considered safe when given orally especially at the dose used in this study.

**Key Words:** *Erythrina Senegalensis*, Extract, Albino Rats, Creatinine, Urea.

**Introduction**
In the absence of an efficient public health care system among rural communities, medicinal plants have been widely exploited for the management of various disease conditions (WHO, 2003). This practice has gained considerable acceptance in developing and developed nations on grounds that plants are very effective, affordable and they are devoid of adverse or toxic side effects often associated with drugs used in convectional orthodox practice (Pushpa Latha et al., 2010). However, research is beginning to show that consumption of these plant preparation is not without some deleterious effect on the human system (Abou-Arab and Abou-Donia, 2000; Kneifel et al., 2002; Dusanee et al., 2007).

*Erythrina Senegalensis* is a thorny shrub or small tree with bright red flowers. It is popularly known as coral tree in English and minjirya among the Hausa people of Nigeria. The stems, leaves and roots are used by traditional healers for the management of various ailments among which are hepatitis, diarrhea, nose bleeding, sterility, amenorrhea, fever, urinary bilharziasis, dizziness, liver cirrhosis and other liver disorders (Magassouba et al., 2007; Moundiapet al., 2002; Malgras, 1992). There are many reports on the pharmacological significance of the plant including analgesic, anti-plasmodial, anti-inflammatory, 15-Lipoxygenase inhibitory activity and antimicrobial (Togola, 2008; Said et al., 2000). It is against this background that we were prompted to examine the effect of the stem bark extract on the kidney of rats.

**Material and Methods**

**Plant Material**
The stem barks of *Erythrina Senegalensis* were collected from an abandoned farm land in Girei Local Government, Adamawa State. The botanical identification of the plant was done at the department of Plant Sciences, Modibbo Adama University of Technology. A voucher specimen with the number WH/ESS015/05 is kept in our laboratory for future reference.

**Chemicals**
All reagents used in the study were of high purity and purchased from SIGMA Chemicals Co. (Dorset, UK).

**Experimental Animals**
Twenty Five male Albino rats weighing 150-200g were purchased from the animal house of Veterinary Research Institute Vom, Plateau State. They were housed in cages in a controlled room temperature 22±1°C and relative humidity of 60–70%. They were kept under standard conditions of 12/12 h light and dark cycle. The animals were maintained with standard pelleted diet (Vital Feed, Nigeria) and water ad libitum. The animals were acclimatized to laboratory condition for seven days before commencement of the experiment.
Preparation of Plant Extract
The plant materials were washed and air-dried at room temperature until a constant weight was obtained. The dried plant was ground using a pestle and mortar and the powdered samples were kept until required. The powdered stem bark about 250g were dissolved in a little amount of water and made up to 1L. The mixture was left to stand for 24hrs after which it was filtered using a Whatman No 1 filter paper. The filtrate was evaporated to dryness at 50°C on a water bath.

Experimental Design
The experimental animals were randomly divided into four groups of six animals each. The treatment protocol was as presented below:
- **Group I (Control)**: Received water and Normal feed.
- **Group II**: Received 50mg/Kg body weight of extract.
- **Group III**: Received 100mg/Kg body weight of extract.
- **Group IV**: Received 200mg/Kg body weight of extract.

The duration of treatment in all groups was 14 days.

Biochemical Assay
At the end of fourteen days, the animals were anaesthetised in chloroform vapour, dissected and blood samples collected by cardiac puncture into plain blood bottles. The blood was allowed to clot for few minutes. Serum samples were extracted by centrifuging the clotted blood at 3000g for 10min using a bench top centrifuge. Serum creatinine concentration was estimated using Jaffe’s reaction as described by Cook (1975). Serum urea concentration was measured by Berthelot’s reaction as described by Young (1997). Serum electrolytes Na⁺ and K⁺ were measured using a flame emission spectrophotometer as described by Tietzel et al., (1994) and HCO₃⁻ was estimated using a titrimetric method as described by Cheesbrough (1992).

Statistical Analysis
All data were expressed as the mean ± SEM of six replicates and were subjected to one way analysis of variance (ANOVA) followed by Duncan multiple range tests to determine significant differences in all the parameters. Values were considered statistically significant at p<0.05.

Results
The effect of administration of *Erythrina Senegalensis* on serum urea and creatinine is shown in table I. Urea was slightly higher in all the treatment groups when compared with control but the difference was not statistically significant at p<0.05. Creatinine value showed a slight dose dependent increase in the treatment groups compared to normal but the difference was not significant at P<0.05.

The effect of stem bark extract of *Erythrina Senegalensis* concentration of some serum electrolytes is presented in table II. There were slight dose dependent increases in Na⁺ values in treatment group compared to control but the difference was not statistically significant at p<0.05. The same applies to K⁺ and HCO₃⁻ concentration between treated and control group.

### Table I: Effect of *Erythrina Senegalensis* on renal function indices in rats

<table>
<thead>
<tr>
<th>Parameter (mmol/l)</th>
<th>Group</th>
<th>I (Control)</th>
<th>II (50mg/kg)</th>
<th>III (100mg/kg)</th>
<th>IV (200mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td></td>
<td>4.40±1.14</td>
<td>4.90±0.40</td>
<td>4.80±0.49</td>
<td>5.30±0.63</td>
</tr>
<tr>
<td>Creatinine</td>
<td></td>
<td>47.90±1.74</td>
<td>48.80±2.72</td>
<td>48.90±0.85</td>
<td>49.60±1.63</td>
</tr>
</tbody>
</table>

*Each value represents the mean ± standard error of mean (n=6).*

### Table II: Effect of *Erythrina Senegalensis* on Serum electrolytes in rats

<table>
<thead>
<tr>
<th>Parameter (mmol/l)</th>
<th>Group</th>
<th>I (Control)</th>
<th>II (50mg/kg)</th>
<th>III (100mg/kg)</th>
<th>IV (200mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na⁺</td>
<td></td>
<td>136.50±1.87</td>
<td>137.20±3.84</td>
<td>139.20±3.35</td>
<td>141.10±5.00</td>
</tr>
<tr>
<td>K⁺</td>
<td></td>
<td>3.80±0.19</td>
<td>3.60±0.40</td>
<td>4.10±0.40</td>
<td>4.30±1.53</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td></td>
<td>23.80±0.98</td>
<td>24.60±1.07</td>
<td>23.60±1.96</td>
<td>24.40±1.52</td>
</tr>
</tbody>
</table>

*Each value represents the mean ± standard error of mean (n=6).*
Discussion

The measurement of serum urea and creatinine concentration alongside serum electrolytes plays a vital and well-known role in the investigation and diagnosis of renal sufficiency. Higher than the acceptable limits of serum urea and creatinine, Na⁺, K⁺ and HCO₃⁻ are indications of renal dysfunction (Whelton et al., 1994).

From our findings, there were no significant differences in the mean values of serum urea, creatinine, Na⁺, K⁺ and HCO₃⁻ in treatment and control group. Our findings agrees with result of previous studies (Wilson et al., 2014, Wandjiet al., 1994; Doughari, 2010). The observed effect may be largely attributed to the presence of flavonoids and polyphenols which have been reported, amongst others, as phytochemical constituents of the plant (Donfack et al., 2008).

The observed non-significant difference of serum urea and creatinine from the control values following the oral administration of the extract for 14 days is an indication that the extract could be considered safe when given orally. The lack of significant alterations in serum electrolytes concentration further buttress that the extract had no effect on the kidney of the animals.

In conclusion, the repeated oral administration of stem bark extract of *Erythrina Senegalensis* for a period of 14 days will not compromise the integrity of the kidney.

References


Antiplasmodial, analgesic and antiinflammatory activities of the aqueous extract of the stem bark of Erythrina senegalensis. J. Ethnopharmacol., 71: 275-280.


