ABSTRACT

The *Kigelia africana* (Lam.) *Benth.*, has been widely used for its reported biological activity in indigenous system of medicine. The present investigation was carried out to found the analgesic effect of fruits aqueous extracts of *Kigelia africana* (Lam.) *Benth.*, in experimental animal models of pain. The analgesic activity was evaluated by acetic acid induced writhing method in albino mice and by tail immersion method in albino mice respectively. The percentage inhibition of writhing showed by aqueous extracts of *Kigelia africana* (Lam.) *Benth.*, in doses of 100 mg/kg and 200 mg/kg was 48.69 and 55.15 respectively. In the tail immersion model, the aqueous extracts of *Kigelia africana* (Lam.) *Benth.*, in the above doses increased the pain threshold significantly after 30 min, 60 min, 90 min, 120 min and 180 min of administration. The aqueous extracts of *Kigelia africana* (Lam.) *Benth.*, in different doses (100 and 200 mg/kg, oral route) exhibited dose dependent and significant analgesic activity in both models of pain.

KEYWORDS: Analgesic, Kigelia, Acetic induced writhing and tail immersion method.

INTRODUCTION

The *Kigelia africana* (Lam.) *Benth.*, tree is found on riverbanks, where it may reach 20 m, along streams and on flood plains, also in open woodland, from KwaZulu-Natal to Tanzania.\(^{[1]}\)

*Kigelia africana* (Lam.) *Benth.*, can be grown under a wide range of climatic conditions. It flourishes in humid conditions and can be grown in both sun and partial shade. A climate...
with a temperature range of 30°C to 40°C seems to be well suited for this plant. The fruit is a woody berry from 30 - 100 cm long and up to 18 cm broad; weighs between 5 - 10 kg hangs down on a long rope-like peduncles.\textsuperscript{[2]} It is also having Digestive system disorders, leg oedemas, dermal irritations and infections, mastitis and retained placenta, antibacterial, antifungal properties and wound healing activity.\textsuperscript{[3]} \textit{Kigelia africana} (Lam.) Benth., plant is available in almost all the parts of Andhra Pradesh state. As it was considered as the plant available in Andhra Pradesh, there was no systematic work has been performed to reveal its therapeutic potency. Hence, in present study, an attempt was made to screen the analgesic activities of \textit{Kigelia africana} (Lam.) Benth., fruits extracts in a systematic way using laboratory animals.

**MATERIALS AND METHODS**

(i) Collection of plant material

\textit{Kigelia africana} (Lam.) Benth., plant Collection, identification and authentication was done. Fresh fruits of \textit{Kigelia africana} (Lam.) Benth. were collected in a street in Eluru, west godavari district, Andhra pradesh, India. In july and authenticated by department of botony, Acharya Nagarjuna university, guntur, India. A herbarium is maintained in sir crr College of Pharmacy, Eluru, Andhra Pradesh, India.

(ii) Preparation of Aqueous extracts

The shade dried thick sections of the fruit (250gm) was packed well in soxhlet apparatus and was subjected to continuous hot extraction with distilled water until the completion of extraction \textsuperscript{[4-6]}. The extract was filtered while hot and the resultant extract was distilled in vacuum under reduced pressure in order to remove the distilled water completely. It was finally dried and kept in a desiccators till experimentation. Obtained extract was weighed and percentage yield was calculated in terms of air dried powdered crude material.

(iii) Animals

Healthy albino mice of Swiss strain of either sex were used. They were housed in standard conditions of temperature (25±2°C), 12 hours light per day cycle, relative humidity of 45-55% in animal house. They were fed with standard pellets of food and water. Animals were kept and all operation on animals was done in aseptic condition.
Experimental protocol

Animals were selected, weighed (25-30 g) and devided into three groups (n=6), namely control, two groups belonging to aqueous extract of *Kigelia Africana* (Lam.) Benth.

*Kigelia africana* (Lam.) Benth., fruit aqueous extracts were evaluated for analgesic activity in mice using tail immersion and acetic acid writhing methods.

(iv) Acute toxicity studies

Swiss albino mice of either sex (20-25 gweight) were used for acute oral toxicity study.[7] The study was carried out as per the guidelines set by OECD 420. Animals were divided into three groups, six animals each. Group I received normal saline which serves as control and as there were no acute toxicity studies was performed earlier for this plant, a dose of 100 mg/kg and 2000 mg/kg was given orally to group II and III. Animals were observed for the 14 days period for any toxicity and gross behavioural changes. The results of acute toxicity study were tabulated in Table-1.

<table>
<thead>
<tr>
<th>Groups(n=6)</th>
<th>Dose (mg/kg) b.w</th>
<th>Lethality</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>100</td>
<td>No</td>
</tr>
<tr>
<td>III</td>
<td>2000</td>
<td>No</td>
</tr>
</tbody>
</table>

**TAIL IMMERSION METHOD**

The tail immersion method was used to evaluate the central mechanism of analgesic activity. Here the painful reactions in animals were produced by thermal stimulus that is by dipping the tip of the tail in hot water 5.Albino mice were devided into three groups of six animals each. The animals were fasted for 16 hours with water adlibitum. The group-1 was served as solvent control which received the vehicle 0.5 % carboxy methyl cellulose (0.1ml/10Kg) through oral route, group-2 to 3 were received in a dose of 100 and 200mg/Kg each the extracts of aqueous.[8] After administration of above drug, the basal reaction time was measured after in a regular interval of 30 minutes, by immersing the tail tips of the mice (Last 1-2 cm) in hot water heated at temperature of temperature (55 ± 1) °C. The actual flick responses of mice[9] i.e. time taken in second to withdrawn it’s from hot water source was calculated and result were compared with control group were tabulated in Table-2.
Table-2: Analgesic activity of aqueous extracts of fruits of *Kigelia africana* (Lam.) *Benth.*, by tail immersion response.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/Kg)</th>
<th>Tail flick latency in minutes (X ± SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>CMC (0.5% w/v)</td>
<td>0.1 mL/10gm</td>
<td>3.43 ± 0.10</td>
</tr>
<tr>
<td>Ethanol extract</td>
<td>100</td>
<td>5.50 ± 0.25</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>4.06 ± 0.40</td>
</tr>
</tbody>
</table>

Significant ***p < 0.001, **p < 0.05

All values are expressed in mean ± standard error mean (n=6).

All data were found to be significant at 5% level of significance where p<0.05.

CMC represent carboxy methyl cellulose.

**ACETIC ACID INDUCED WRITING METHOD**

Albino mice of either sex were divided into 3 groups of 6 animals each. Extracts were orally administered. Group I served as control and received 1% acetic acid at the dose of 1ml/Kg. Group II and III received aqueous extract at a dose of 100 mg/Kg and 200 mg/Kg. After 30 minutes of drug administration acetic acid (3% v/v) was administered to all group of animals at a dose of 0.1 mL/10 g intra peritoneal10-11. The onset and severity of writhing response was noted for 10 minutes. The inhibition of pain response by drug treatment was noted were tabulated in Table-3.

Table-3: Analgesic activity of aqueous extracts of fruits of *Kigelia africana* (Lam.) *Benth.*, by acetic acid induced writhing method.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose</th>
<th>Number of Writhings (30 min)</th>
<th>Percentage inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (1% acetic acid)</td>
<td>1 mL/100mg</td>
<td>13.0 ± 0.89</td>
<td>-</td>
</tr>
<tr>
<td>Aqueous extract</td>
<td>100 mg/Kg</td>
<td>6.67 ± 0.33**</td>
<td>48.69%</td>
</tr>
<tr>
<td></td>
<td>200 mg/Kg</td>
<td>5.83 ± 0.48**</td>
<td>55.15%</td>
</tr>
</tbody>
</table>

**p < 0.01

**RESULTS AND DISCUSSION**

(i) **Acute toxicity study**

The acute oral toxicity of aqueous extract of the fruits of kigelia was carried out as per OECD-420 guide lines. The acute toxicity studies revealed that LD 50 > 800ml for aqueous extract. Therefore we selected 100mg/kg as first dose and 200mg/kg as second dose of aqueous extract of fruits of *Kigelia africana* (Lam.) *Benth.*,
(ii) Anti-analgesic activity

Aqueous extract of fruits of *Kigelia africana* (Lam.) Benth., was studied for its therapeutically effective role in tail immersion model of analgesia and in acetic acid induced method. In both methods; aqueous extract showed high analgesic activity among the fruits of *Kigelia africana* (Lam.) Benth., extracts. The analgesic activity may be due to the presence of flavanoids in the fruits aqueous extracts by doing phytochemical tests.

In tail immersion, the extract produced a significant analgesia after 1.5 hours in the dose of 100 and 200 mg/Kg body weight. These effects were well comparable with the control. It shows will be 200mg/kg aqueous fraction is more effective as compared to 100mg/kg solvent extracts and analgesic activity was found to be more in dose of 200 mg/Kg body weight results were evidenced from the tail immersion (Fig. 1)

![Tail Immersion Method](image)

Figure No-1: Analgesic activity of aqueous extracts of fruits of *Kigelia africana* (Lam.) *Benth.*, by tail immersion response.

Lessening the number of writhes in acetic acid induced writhing method suggesting its peripheral analgesic activity results were evidenced from the acetic acid-induced writhing tests (Fig. 2).
Figure No-2: Analgesic activity of aqueous extracts of fruits of *Kigelia africana* (Lam.) *Benth.*, by acetic acid induced writhing method

**CONCLUSION**

From the above study, it can be concluded that, *Kigelia africana* (Lam.) *Benth.*, fruits extracts were possessing analgesic activities in dose dependent manner. Presence of different phytoconstituents may be responsible for the said activities. The pharmacological studies showed significant analgesic activity properties at the dose of 100mg/kg and 200mg/kg with aqueous extracts. When compared two doses 200mg/kg showing more therapeutic activity than 100mg/kg. From the above findings, it can be concluded that *Kigelia africana* (Lam.) *Benth.*, possesses moderate analgesic properties. Isolation and characterization of the constituents responsible for the said activities is needed.

**ACKNOWLEDGEMENT**

The authors are thankful to the principal Dr. I.Sudheer Babu and authorities of sir cr reddy college of pharmaceutical sciences, Eluru for providing necessary facilities to carry out this research work.

**REFERENCES**


