

## EVALUATION OF ANALGESIC POTENTIAL OF *KIGELIA PINNATA* LEAF EXTRACT IN WISTAR RATS

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### ABSTRACT

The main aim of the present study is to evaluate the analgesic activity of leaf extract of *Kigelia pinnata* on wistar rats. Analgesic activity of the leaf extract of *Kigelia pinnata* at a dose of 200 mg/kg & 400 mg/kg was evaluated against the standard drug pentazocine at a dose of 10mg/kg. Wistar rats of either sex of five numbers in each group was undertaken for study and evaluated by hot plate and tail flick method. The both doses of leaf extract of *Kigelia pinnata* was found to produce significant ( $p < 0.001$ ) analgesic activity. In hot plate method, the analgesia began at 60 min, remained for 120 min and the peak effect was noted at 90 min in comparison to control but in tail flick method, the extract at 200mg/kg showed significant analgesic activity ( $P < 0.001$ ) after 60 minutes and remained for 90 min. The results showed significant analgesic activity. The leaf extract of *Kigelia pinnata* have potential analgesic activity against stimuli in the tested animals. So, it can be recommended for further studies.

**Keywords:** *Kigelia pinnata* leaf, Analgesic activity, Hot plate method, Tail flick method, Pentazocine.

### INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Pain motivates us to withdraw from potentially damaging situations, protect a damaged body part while it heals and avoid those situations in the future.<sup>1</sup> There are two types of pain acute pain and chronic pain. Acute pain is intense and for a short period of time. Acute pain may be an indication of severe injury. It affects 25-30% of community dwelling patients above 60 years of age. Morbidity of the pain is two times higher in patients above 60 years of age.<sup>2</sup> Chronic pain can be mild or intense (severe). It is common and universal, it occurs at all ages and in all populations. It becomes more common as people approach death. The prevalence of chronic pain in the WHO (World health organization) Mental Health Surveys was 37% in developed countries and 41% in developing countries.<sup>3</sup>

Analgesic drugs act in various ways on the peripheral and central nervous systems.

They include paracetamol (para-acetylaminophenol) also known in the US as acetaminophen, the non-steroidal anti-inflammatory drugs (NSAIDs) such as the salicylates and opioid drugs such as morphine and opium. Nonsteroidal anti-inflammatory drug (NSAID) alleviate pain by counteracting the cyclooxygenase (COX) enzyme.

The conventionally used therapies for pain are NSAIDs have very important role in managing pain and inflammatory conditions,<sup>4</sup> though with rather discouraging profile of side effects.<sup>5</sup> This demonstrates the need for new and safe analgesic and anti-inflammatory drugs. In this regard natural products have long gained wide acceptance among the public and scientific community.<sup>6</sup>

*Kigelia pinnata* (family: Bignoniaceae) known as "sausage tree" cultivated in many parts of India as an ornamental and roadside tree. *Kigelia pinnata* is a multipurpose medicinal plant with many attributes and considerable potentials. The plant has traditional uses which include anticancer, antiulcer, anti-aging, antioxidant and antimalarial activities. It is also widely applied in the treatment of genital infections, gynaecological disorders, renal ailments, fainting, epilepsy, rheumatism, sickle-cell anaemia, psoriasis, eczema, central nervous system depression, respiratory ailment, skin complaint, body weakness, leprosy, worm infestation and tumours etc.<sup>7</sup> The stem bark and fruit extract showed activity against melanoma and carcinoma cell lines.<sup>8</sup> Extracts of rootbark and stembark exhibited

antitrypanosomal activity.<sup>9</sup> The fruits and barks are ground and boiled in water and taken orally for the treatment of stomach ailments.

*Kigelia pinnata* is extensively used in Indian traditional medicine for several diseases including painful disorders but there is no scientific evidence available for such activity. Based on the traditional uses the aim of present study was to investigate the analgesic activity of leaf extract of *Kigelia pinnata*.<sup>10</sup>

### MATERIAL AND METHODS

#### Plant Material

Fresh leaves of *Kigelia pinnata* have been collected from Ramnagar region. After collection, the plant material was authenticated by Dr. K. S. Negi (Principal Scientist), National Bureau of Plant Genetic Resources, Bhowali, Nainital, Uttarakhand (Ref. No. Ph./ M. Pharm. Project/ 526). The leaves were dried in shade, powdered and subjected to maceration with methanol at room temperature for 72 hr with occasional shaking and concentrated by removing the solvents by drying.

#### Phytochemical Screening

Freshly prepared *K. pinnata* leaf extract was subjected to standard phytochemical screening tests for various constituents by standard methods.<sup>11</sup>

#### Animals

Wistar rats weighing between 150-200 gm of either sex were used in the experimental study. The animals were kept properly in polypropylene cages and provided with food and water. Healthy and fresh animals were used in the experiment and they were kept on fasting overnight prior to the experimentation. The experimental protocol was approved by the Institutional Animal Ethical Committee.

#### Hot Plate Method

Wistar rats were divided into four groups having five animals in each group. Animals of group-1 (control group) received normal saline solution (0.01 ml), animals of group-2 (standard drug treated group) received pentazocine (10 mg/kg, i.p.), animals of group-3 received *K. pinnata* extract (200 mg/kg, p.o.) and animals of group-4 received *K. pinnata* extract (400 mg/kg, p.o.). Animals from each group were individually placed on the hot plate maintained at  $55 \pm 0.5^{\circ}\text{C}$  and the time was recorded till either paw licking or jumping response was observed. The reaction time was noted at 30, 60, 90, 120 and 180 minutes after the administration of the standard drug and test compound.<sup>12</sup>

**Tail Flick Method**

In tail flick method the treatments were given to the animals as per hot plate method. In this method, tail of the animals was individually placed on the analgesiometer and the latency period (reaction time) was noted when the animal responded with a sudden and characteristic flick or tail lifting. The reaction time for each group

was measured at 30, 60, 90, 120 and 180 min after the administration of the standard drug and test compound.<sup>13</sup>

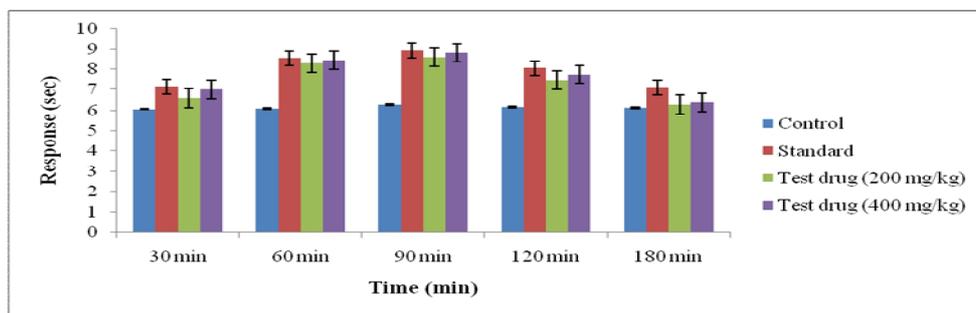
**Statistical Analysis**

All data were expressed as mean ± SEM and analyzed by One-way analysis of variance (ANOVA) followed by Tukey's test. P< 0.001 was considered statistically significant

**Table 1. Analgesic activity of *Kigelia pinnata* by hot plate method**

Groups	Dose	Reaction Time (Sec)				
		30 min	60 min	90min	120 min	180 min
		mean±SEM	mean±SEM	mean±SEM	mean±SEM	mean±SEM
Control	0.01 ml	6.06±0.20	6.09±0.15	6.26±0.11	6.16±0.15	6.12±0.14
Standard	10 mg/kg	7.13±0.76	8.54±0.36*	8.91±0.28*	8.04±0.10*	7.10±0.32
Test drug	200mg/kg	6.56±0.27	8.29±0.25*	8.58±0.30*	7.46±0.20*	6.28±0.30
Test drug	400 mg/kg	6.99±0.67	8.44±0.29*	8.80±0.23*	7.73±0.16*	6.37±0.24

Values are expressed as mean ± SEM (n=5), \*p<0.001 denotes significance with respect to the control group using one way ANOVA followed by Tukey's test.

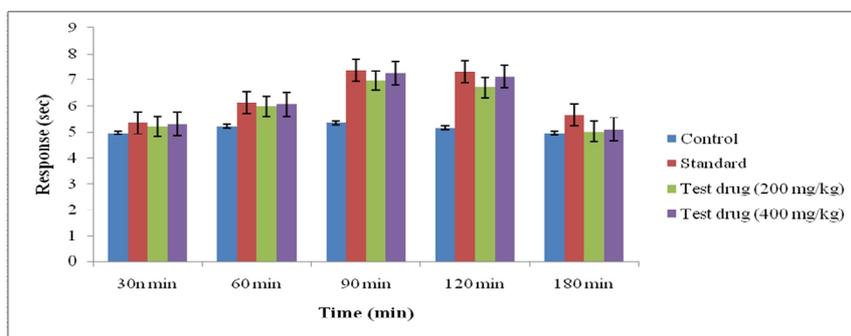


Graph - 1

**Table 2. Analgesic activity of *Kigelia pinnata* by tail-flick method**

Groups	Dose	Reaction Time (Sec)				
		30 min	60 min	90min	120 min	180 min
		mean±SEM	mean±SEM	mean±SEM	mean±SEM	mean±SEM
Control	0.01 ml	4.50±0.19	4.69±0.15	5.25±0.20	4.81±0.21	4.62±0.19
Standard	10 mg/kg	5.07±0.15	5.77±0.036*	6.67±0.12*	6.46±0.098*	5.82±0.88
Test drug	200mg/kg	4.73±0.17	5.54±0.045*	6.52±0.11*	5.77±0.14	5.24±0.05
Test drug	400mg/kg	4.88±0.16	5.68±0.036*	6.61±0.11*	6.35±0.08*	5.42± 0.05

Values are expressed as mean ± SEM (n=5), \*p<0.001 denotes significance with respect to the control group using one way ANOVA followed by Tukey's test.



Graph - 2

## RESULTS

The phytochemical analysis of *Kigelia pinnata* leaf extract revealed the presence alkaloids, carbohydrates, saponins, flavonoides, tannins and phenolic compounds.

In hot plate method, the extract significantly ( $P < 0.001$ ) prolonged the reaction time at different time intervals and the effect was found to be dose dependent (Table - 1). The analgesia began at 60 min, remained for 120 min and the peak effect was noted at 90 min in comparison to control. The higher dose of the extract (400 mg/kg) exhibited better analgesic activity than the effect of the lower dose of the extract (200 mg/kg) and standard drug, pentazocine (10 mg/kg, i.p.) shows highly significant analgesic effect. In tail flick method, the result showed that oral administration of *K. pinnata* extract at a dose of 200 mg/kg and 400 mg/kg exhibited a significant analgesic activity ( $P < 0.001$ ) in a dose dependant manner (Table - 2). The analgesia began at 60 min, remained for 120 min and the peak effect was noted at 90 min in comparison to control but the extract at dose 200 mg/kg was produced analgesia at 60 min to 90 min. The standard drug, pentazocine (10 mg/kg, i.p.) shows highly significant analgesic effect.

## DISCUSSION AND CONCLUSION

The analgesic studies revealed that the extract of *K. pinnata* leaf exhibited significant analgesic effect against thermal noxious stimuli<sup>[14]</sup> and also revealed that the extract showed dose dependent analgesic effect as compared with control. The analgesic activities were studied using thermal tests. The thermal tests were selected because these tests were sensitive to strong analgesics and were limited tissue damage because of a cutoff point that is usually applied to limit the amount of time the animal spends on hot plate and analgesiometer. The results indicate that the *K. pinnata* leaf extract possessed central (delay in reaction time to thermal pain) analgesic effects.<sup>15,16</sup>

Based on the results of the present study it can be concluded that the *Kigelia pinnata* leaf extract possess analgesic activity. The analgesic activity of *Kigelia pinnata* is being used in traditional systems of medicine. Thus it can be said that *Kigelia pinnata* leaf extract may reduce the risk of pain related diseases. It is hoped that these studies will stimulate further efforts towards the development of new and urgently needed medications for the treatment of pain.

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