

## ANALGESIC AND ANTIPYRETIC ACTIVITY OF *MIMUSOPS ELENGI* L. (BAKUL) LEAVES

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### Summary

**Objective:** To investigate the antipyretic and analgesic activity of methanolic extract of leaves of *Mimusops elengi* L. **Methods:** The preliminary phytochemical screening of the extract was carried out by chemical tests, thin layer chromatographic methods and quantitative estimation of quercetin by HPTLC was also carried out. Acute toxicity study was performed in mice after administration of the extract orally in graded doses. Antipyretic and analgesic activity was carried out on yeast induced pyrexia in rats and tail immersion model respectively at 100 and 200 mg/kg doses. **Results:** The preliminary phytochemical screening of the extract showed the presence of flavanoid, alkaloids, tannins and steroids. The methanolic extract produced significant antipyretic effect in a dose dependent manner and an appreciable antipyretic effect was noticed at 200 mg/kg dose. A dose dependent analgesic activity was observed and significant effect was observed at 200 mg/kg dose. **Conclusion:** The present study demonstrates the potential antipyretic and analgesic effect of *M. elengi* further supporting the claims by traditional medicine practitioners.

Key words- *Mimusops elengi*, analgesic, antipyretic, tail immersion.

### Introduction

*Mimusops elengi*, family- Sapotaceae called as Maulsiri. Other synonyms are Bakul (Bengal), Gokul (Assam), is large glabrous evergreen tree 12-15m high with compact leafy head, short erect trunk, dark grey fissured bark and dense spreading crown [1,2]. In various different systems of medicines, *Mimusops elengi* places an important role. Leaf is one of Sushruta's snake remedies. In practice about half teaspoonful of expressed juice of fresh leaves is poured in nostrils in stupor and coma [1]. Various activities have been reported in almost all parts of *Mimusops elengi*, some of which includes diuretic activity, antidiabetic, antibacterial and cognitive enhancing activity [3,4,5,6]. *In vitro* antioxidant activity has also been recently reported [7].

### Material and Method

#### Plant material

The leaves of *M.elengi* were collected in the month of August from local gardens of Lucknow, Uttar Pradesh and were authenticated by CSIR recognized institute, National Botanical Research Institute, (NBRI) Lucknow. A voucher specimen was submitted for future reference. (Ref no. NBRI/CIF/178/2010)

#### Animals

Wistar strain albino rats of either sex weighing 120 to 150 g and wistar strain albino mice 30-50g were fed on standard diet and water *ad libitum*. The animals were housed at room temperature ( $25 \pm 1$  °C), relative humidity 45-55% and a 12:12 hrs light/dark cycle. The Protocol followed was approved by Institutional Animal Ethics Committee (IAEC) under CPCSEA committee (BBDGEI/IAEC/05/2011) was taken before animal experimentation.

#### Preparation of extract

The leaves were dried, crushed to moderately coarse power, and stored in airtight container. The dried powdered drug was macerated using methanol. The solvent from the extract was eliminated under reduced pressure, and dried extract was collected.

#### Acute toxicity studies

Acute toxicity study was carried out as per the guidelines set by Organization for Economic Co-operation and Development (OECD) revised draft guidelines received from Committee for purpose of control and supervision of Experimental Animals (CPCSEA), Ministry of Social Justice and Empowerment, Govt of India.  $1/10^{\text{th}}$  of the LD-50 was taken as therapeutic dose [8].

#### Analgesic Activity

Analgesic activity was determined by tail immersion model. 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 [9]. Albino wistar mice (25-30 g) were divided in 4 groups. Group I control received vehicle group II received standard drug aspirin 100mg/kg, group III and IV received methanolic extract 100mg/kg and 200mg/kg respectively.

#### Antipyretic activity

Antipyretic activity was carried out Brewer's yeast induced pyrexia model. Pyrexia was induced in rats by injecting 20% (w/v) aqueous suspension of Brewer's yeast intramuscularly. After 18 h, the animals developed 0.5 °C or more rise in the rectal temperature. They were distributed into different groups of 6 each and methanolic extract in the doses of 100 and 200 mg/kg was administered orally. One group was administered with paracetamol (100 mg/kg) orally. Control group was given 0.5 ml normal saline. At different time intervals, rectal temperature was noted [10].

### Statistical Analysis

Results are expressed as the mean  $\pm$  S.E. One way Anova was used to analyze the significance of the results. 'p' values were considered statistically significant.

### Results and Discussion

The preliminary phytochemical studies of the leaves of *Mimusops elengi* L. showed the presence of tannins, flavanoid, carbohydrates and alkaloids as the major phytoconstituents. The HPTLC studies of the methanolic extract of *M.elengi* leaves shows the appreciable amount of quercetin. For analgesic activity, tail immersion method was done, the methanolic extract at the dose of 200mg/kg exhibited significant analgesic activity, when compared with the standard and the lower dose of the extract i.e. 100mg/kg. (Table 1) In the screening of the antipyretic activity, methanolic extract at the dose of 200mg/kg exhibited significant activity (Table 2)

Antinociceptive effect of *Mimusops elengi* was investigated by tail immersion method [11]. This particular method selected has various advantages, limited tissue damage is one of them. The results obtained from both standard aspirin (100mg/kg) and the *M.elengi* leaves extract (100mg/kg and 200mg/kg) treated groups were compared with the control. (Table 1)

The yeast induced pyrexia is called pathogenic fever, which is due to the production of prostaglandins (PGE<sub>2</sub>). Paracetamol acts by blocking the effect of pyrogen on temperature sensitive neurons in the preoptic region of the hypothalamus [12]. The results obtained from both standard paracetamol (100mg/kg) and the *M.elengi* leaves extract (100mg/kg and 200mg/kg) treated groups were compared with the control.(Table 2)

Presence of flavanoid has been attributed towards the antipyretic activity [13] and since appreciable amount of quercetin has been found in the leaves of *M.elengi*, (Fig 1 & Fig 2) thus it can be concluded that analgesic and antipyretic activity of the plant is due to the presence of flavanoid.

**Table 1. Effect of *Mimusops elengi* L. leaf extract on tail immersion method**

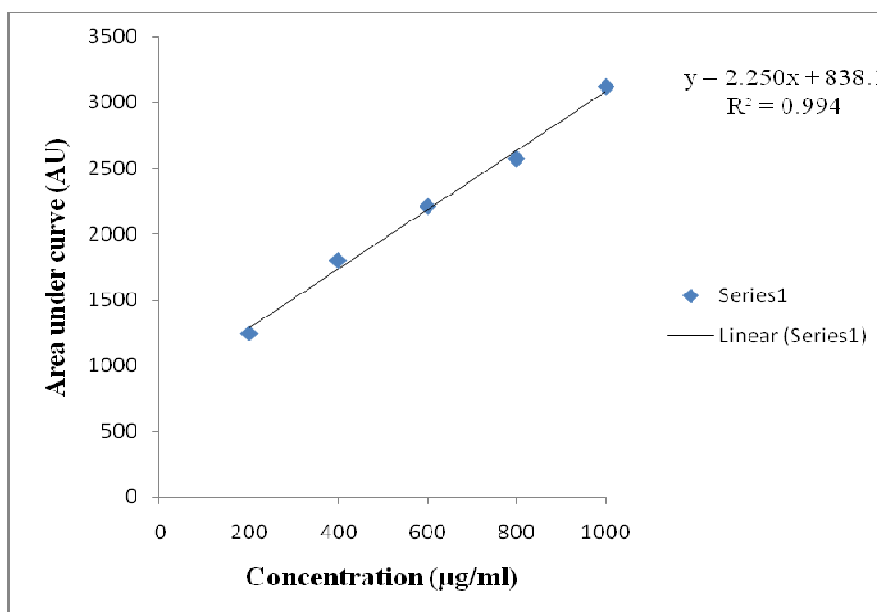
Treatment	Reaction time in seconds				
	0 hr	1 hr	2 hr	3 hr	4 hr
Control (Normal saline)	3.77±0.22	3.82±0.58	3.96±0.36	3.70±0.031	3.52±0.39
Aspirin (100mg/kg)	4.06±0.59	4.54±0.27	6.12±0.26	6.07±0.37	5.79±0.32
MEME (100mg/kg)	4.76±0.49	3.84±0.28	4.51±0.38	6.00±0.16	5.78±0.30
MEME (200mg/kg)	4.28±0.05	3.95±0.68	5.96±0.29	7.11±0.58	7.56±0.48

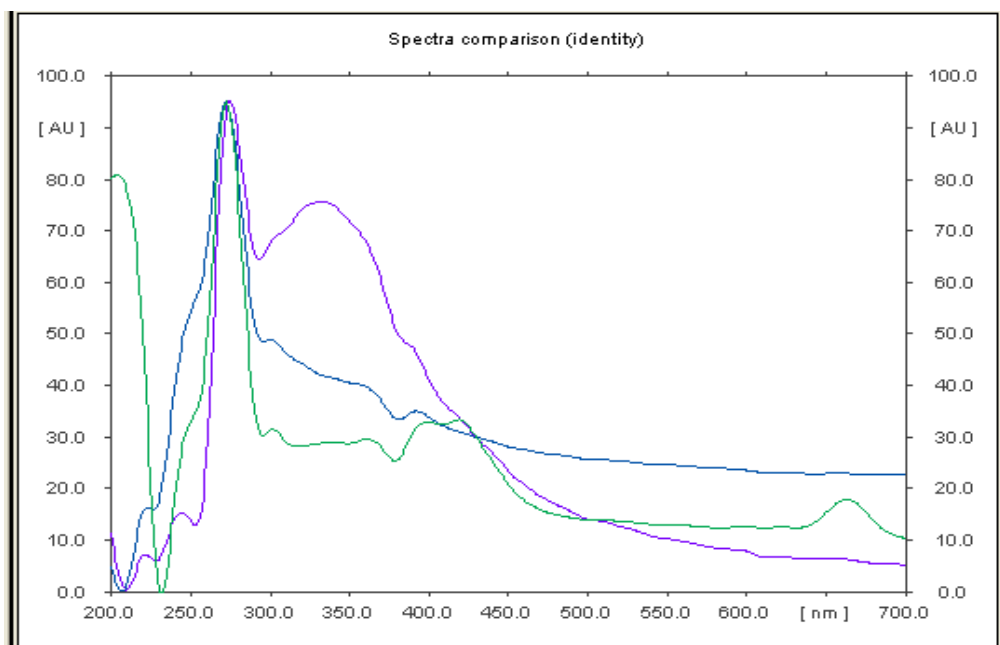
Each value represents mean ± SE of 6 rats. MEME-Methanolic extract of *Mimusops elengi* L.

**Table 2. Effect of *Mimusops elengi* L. leaf extract on yeast-induced pyrexia in rats.**

Treatment	Rectal temperature ( $^{\circ}$ C) before and after treatment				
	0 hr	1 hr	2 hr	3 hr	4 hr
Control (Normal saline)	35.86 $\pm$ 0.14	35.86 $\pm$ 0.14	35.79 $\pm$ 0.04	35.86 $\pm$ 0.14	35.83 $\pm$ 0.03
PCM (100mg/kg)	38.14 $\pm$ 0.29	37.84 $\pm$ 0.31	37.44 $\pm$ 0.24	37.44 $\pm$ 0.24	36.32 $\pm$ 0.32
MEME (100mg/kg)	38.05 $\pm$ 0.45	37.61 $\pm$ 0.52	37.22 $\pm$ 0.53	37.29 $\pm$ 0.23	36.44 $\pm$ 0.48
MEME (200mg/kg)	38 $\pm$ 0.49	37.78 $\pm$ 0.45	37.64 $\pm$ 0.46	37.13 $\pm$ 0.14	36.25 $\pm$ 0.39

Each value represents mean  $\pm$  SE of 6 rats. MEME-Methanolic extract of *Mimusops elengi* L.

**Fig 1 . Standard curve of quercetin (concentration ranging from 200- 1000ug/ml)**

**Fig 2. Spectral comparison of extract of *M.elengi* with standard quercetin**

### References

1. Kirtikar KR & Basu BD. Indian Medicinal Plants with illustrations. Oriental Enterprises, Delhi: India
2. Prajapati ND, Purohit SS, Sharma AK, & Kumar T. Handbook of Medicinal Plants- A Complete Sourcebook. Agrobios: India.
3. Katedeshmuk RG, Shete RV, Otari KV, Bagade MY, Pattewar A. Acute toxicity and diuretic activity of *Mimusops* extracts. International Journal of Pharma and Biosciences 2010; 1: 1-6.
4. Jerline M, Jothi G, Brindha P. Effect of bark extract on alloxan induced hyperglycemia in albino rats. Journal of Cell and Tissue Research 2009; 9: 1985-88.
5. Shahwar D, Raza A. *In vitro* antibacterial activity of extract of *Mimusops elengi* against gram positive and gram negative bacteria. African Journal of Microbiology Research 2009; 3: 458-62.
6. Hadaginhal RV, Tikare VP, Patil KS, Bhanushali MD, Desai NS, Karigar A. Evaluation of cognitive enhancing activity of *Mimusops elengi* Linn.on albino rats. International Journal of Research in Ayurveda and Pharmacy 2010; 1: 484-92.

7. Rao KS, Munjuluri PR, Kumar BVV, Keshar NK. Evaluation of in vitro Antioxidant Activity and Total Phenolic Content of Methanol Bark Extract of *Mimusops elengi*, DOI: [10.5530/ax.2011.2.11](https://doi.org/10.5530/ax.2011.2.11)
8. W.J Dixon. The up and down method of small animals. J Amer Statist Assoc 1965; 60: 967-78.
9. Kumar JP, Shankar NB. Analgesic activity of *Mollugo pentaphylla* Linn. by tail immersion method. Asian Journal of Pharmaceutical and Clinical Research 2009; 2: 61-3.
10. Manikandar RVM, Rajesh V, Kumar RS, Perumal P, Raj CD. Analgesic and antipyretic activity of stem bark of *Prosopis cineraria* (Linn) Druce. Journal of Pharmacy Research 2009; 2: 660-62
11. Vogel HG. Drug Discovery and Evaluation, Pharmacological Assays. Springer-Verlag Berlin: New York.
12. Singh N, Gupta AK, Juyal V, Chettri R, Study on antipyretic activity of extracts of *Bergenia ligulata* wall. International Journal of Pharma and Biosciences 2010; 1: 1-5.
13. Mutalik S, Paridhavi K, Rao CM, Udupa N. Antipyretic and analgesic effect of leaves of *Solanum melongena* Linn. in rodents. Indian journal of pharmacology 2003; 35: 312-315