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Analgesic activity of ethanolic extract of *Pongamia pinnata* Linn. Leaves

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ABSTRACT

The dry leaves of Pongamia pinnata Linn. is used in traditional medicines for the treatment of diarrhoea, diabetes and inflammatory disorder. In the present study, we investigated the analgesic activity of the standardized ethanolic extract was evaluated for its in-vivo analgesic activity by using the Eddy's Hot plate method in mice. In both of the cases Diclofenac sodium was used as standard drug. The extract at the doses of 250 and 500 mg/kg elicited a significant analgesic activity in a dose-dependent manner by using Eddy's Hot plate method. The analgesic mechanism of activity of the standardized ethanolic extract of P. Pinnata Linn. pain mediators may be the main mechanisms of action of P. Pinnata ethanolic extract.

Key Words: Analgesic, *Pongamia pinnata*, Eddy's hot plate, Diclofenac sodium.

INTRODUCTION

The 'Pongam Tree' is known as one of the richest and brightest trees of India. The tree is named as 'Pongamia pinnata' in science. The name 'Pongamia' has derived from the Tamil name, 'pinnata' that refers to the 'Pinnate leaves'. The tree is a member of the 'leguminosae' family. Its sub family is 'Papilionaceae'. In the Tamil, this is generally known as 'Ponga', 'Dalkaramacha', 'Pongam' and 'Punku'. In both the languages of Hindi and Bengali, the people named it as 'Karanj' or 'Papar' or 'Kanji'. It is called 'Karum Tree' or 'Poonga Oil Tree' in English. It is an Indo-Malaysian species, a medium-sized evergreen tree, common on alluvial and coastal situations from India to fiji, from sea level to 1200 m. Now found in Australia, Florida, Hawaii, India, Malaysia, Oceania, Phillippines and Seychelles [1].

In the months of March and April, the 'Pongam Tree' stands as painted in crimson colour for a week or so as the buds develop into wilted, new leaves and just after the leaves begin to grow mature, the tree attains a gorgeous glowing lime-green colour. The 'Pongam Tree' is being cultivated in a large number of gardens and along the countless roads in India and is becoming the one of the most admired city trees [2].

It grows wild in the coastal forests throughout India and beside the streams and rivers. The 'Pongam Tree' is a medium-sized tree that grows rapidly. It contains a rough and grey-brown

bark. The new leaves develop and the flower bloom in the great numbers almost simultaneously in this tree. They remain half hidden in the midst of the leaves. The blossoms are 1.3 cm in length and they mass along the ends of the long stems. These stems rise from the upper angle of the leaves. The flowers have a minute stem. They are loose and brown in colour and also bear a calyx that is shaped as cups. There are five white petals as well as that are traced with the pink or violet colour [3]. The fruits of 'Pongam Tree' are some timber-like pods that grow about in length. They are dark grey in colour and get matured just before the next lot of new leaves appears. Each of the seeds of this tree is covered with a strong raft. The raft looks like a rubber ship. The ground underneath the tree always remains covered with a crackling carpet. The leaves of the 'Pongam Tree' have five, seven, or nine oval-shaped leaflets that have pointed tips [4].

The leaves are around 15 cm to 30 cm in the length and each of the leaflets is short stalked. The leaf stems and the flower stems are normally puffy at their bases. It is one of the few 'Nitrogen Fixing Trees' producing seeds containing 30-40% oil. The present review will possibly help to the bridge between traditional claims and modern therapy on Pongamia pinnata [5].

MAERIALS AND METHODS

Plant Material

The leaves of *Pongamia pinnata* Linn. (Family: Fabaceae) were collected from Bareilly District in the month of July 2010 and authenticated by Dr. Tariq Hussain, Head & Scientist Biodiversity & Angiosperm Taxonomy, National Botanical Research Institute (N.B.R.I) Lucknow, Uttar Pradesh, India, and accession number is 97841. The plant material was dried, powdered and stored in airtight containers until further studies.

Experimental Animal

Male albino mice weighing between 20-25 gm were selected for the analgesic activity was housed under the uniform laboratory condition fed with commercial diet & provided with water *ad-libitum*, during the experiment. The animals were procured from Gwalior & permitted for the study under the Institutional Animal Ethical Committee (IAEC).

All protocols of the study was approved by the Institutional Animal Ethical Committee with reference number **BU/PHARM/IAEC/10/005.** The IAEC is approved by committee for the purpose of control and supervision of experiments on animals (CPCSEA) with registration number **716/02/a/CPCSEA.**

Experimental Design

The animals were divided into 4 groups of 6 animals each and dose given as follows:
Group 1: served as control & received 12% tween 80 in distilled water as vehicle at a dose 10 ml/kg body weight orally.
Group 2: served as standard & received Diclofenac sodium in Tween 80 suspension with water at a dose of 10 mg/kg body weight orally.
Group 3: served as test & received PPEE 200 mg/kg body weight orally.
Group 4: served as test & received PPEE 500 mg/kg body weight orally.

Screening of Analgesic Activity:

Hot Plate reaction Time in Mice

The animals were placed individual in Hot plate regulated at temperature (55±0.5ºC) before the treatment & its reaction time was determined. After noting the initial reaction time, the treatment should be given to each mice. Then the each animals placed in the Eddy's hot plate under

regulated temp. to obtain animal response licking of the forepaws or jump of the Hot plate surface was recorded as the hot-plate latency. Mice with baseline latencies of <5s or >30s were eliminated from the study. The reaction time is noted by stop-watch and then the reaction time was re-determined after 0, 30, 60 & 90 min. after oral administration of standard and test drug [6].

RESULTS AND DISCUSSION

Hot Plate Test in Mice

The control group at 0 min. 30min, 60 min and 90 min shows hot plate reaction time in sec is 2.11 ± 0.03, 2.19 ± 0.07, 2.19 ± 0.07 and 2.15 ± 0.03 respectively.

Table- 1: Effect of *Pongamia pinnata Linn. leaves* extracts on hot plate reaction in mice

Group	Dose (mg/kg) (P.O.)	Mean latency (s) before and after drug administration (s)			
		0 min.	**30 min**	**60min**	**90 min**
Group I (Control)	Vehicle	2.11 ± 0.03	2.19 ± 0.07	2.19 ± 0.07	2.15 ± 0.03
Group II (Diclofenac Sodium)	10	2.14 ± 0.05	5.53 ± 0.05**	8.14 ± 0.06**	11.78 ± 0.10**
Group III (PPEE 250)	250	2.18 ± 0.04	3.13 ± 0.05**	5.83 ± 0.05**	5.39 ± 0.04**
Group IV (PPEE 500)	500	2.12 ± 0.03	4.13 ± 0.04**	7.43 ± 0.07**	7.16 ± 0.06**

*Results are presented as mean ±SEM, (n=5), *p<0.01 , **p<0.05 dunnet test as compared to control*

The corresponding mean volumes in Diclofenac sodium (10 mg/kg) treated group were 2.14 ± 0.05, 5.53 ± 0.05**, 8.14 ± 0.06**, 11.78 ± 0.10** respectively, indicating significant analgesic activity of Diclofenac sodium from 60 min onwards when compared to control. Leaves extract in both the doses of 250 mg/kg and 500 mg/kg had produced significant increase in hot plate reaction time in dose depended manner from 0 to 90 min. The leaf extract in both doses 250 mg/kg and 500 mg/kg had also produced significant inhibition with the mean hot plate reaction time in dose dependent manner at 0 to 90 min [7]. **(Table-1).**

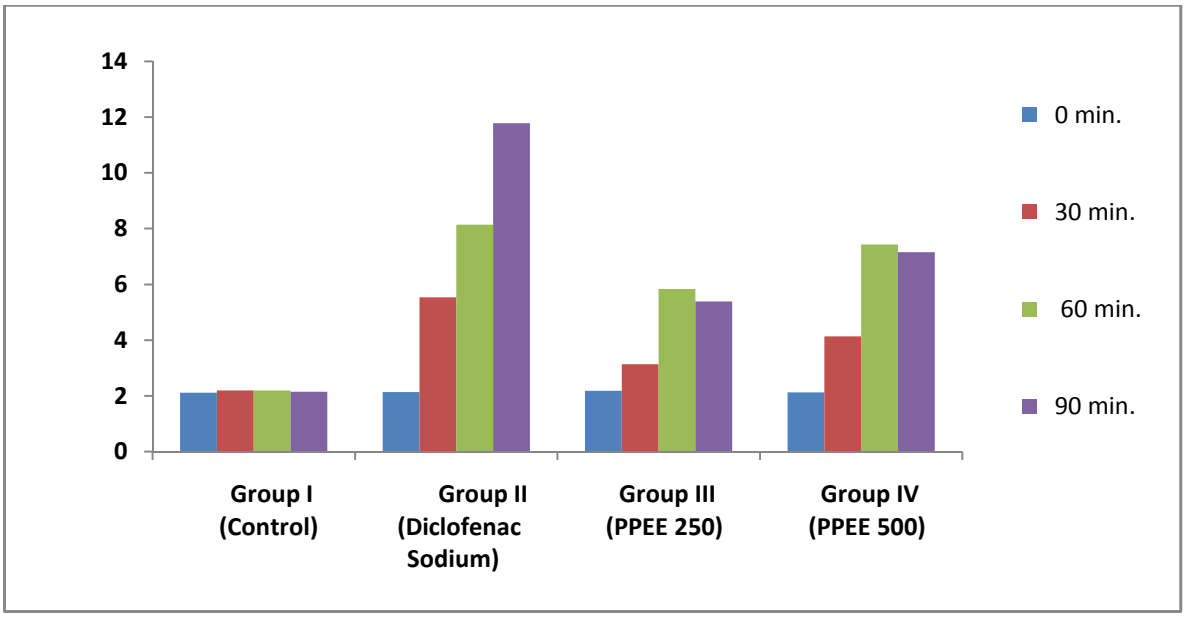

Figure 1: Graphical representation of Analgesic effect of ethanolic extract of *Pongamia pinnata* Linn. leaves in pain using Eddy's Hot plate method.

The mechanism underlying the activity of *Pongamia pinnata* Linn. in analgesic is still unknown. Preliminary phytochemical screening of the ethanolic extract of *Pongamia pinnata* leaves gave positive test for carbohydrates, amino acids, fixed oils, phytosterols, glycosides, flavonoids, tannins and phenolic compounds, which might be partly responsible for the anti-pyretic and analgesic activity reported in the current investigation.

Therefore, the overall results obtained suggested that the ethanolic extract of *Pongamia pinnata* might relieve pain, Further studies are going on to isolate the bioactive principles responsible for analgesic activity with their mechanism of action.

The ethanolic extract of *Pongamia pinnata leaves* exhibits analgesic activity at a dose level of 250 and 500 mg/kg body weight. Whereas, the ethanolic extract of *Pongamia pinnata* shown better analgesic activity. This finding provides some scientific evidence on the traditional use of both plants.

Effects of ethanolic extract of *Pongamia pinnata* Linn. was determined in interval of 0, 30, 60, 90 min. *Pongamia pinnata* ethanolic extract (PPEE) have shown the more significant (*p<0.01) analgesic effect at the dose of 500 mg/kg as compared to positive control of Diclofenac sodium.

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