



## Anti-inflammatory activity of *Erythrina indica* Linn. leaves

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### ABSTRACT

*Erythrina indica* Linn. Commonly known as “kalyana murukku” in Tamil belongs to the family Fabaceae. The plant is a reputed remedy for inflammatory, sedative, helminthiasis and hyperlipidemic. The leaves of *Erythrina indica* Linn. are used as sedative, in pain, inflammation, for round, tape or thread worm infestation and cathartic. In the present study the leaves of *Erythrina indica* Linn. was extracted with chloroform and water. The extracts were vacuum dried to yield respective chloroform (CE) and aqueous extract (AE). Both CE and AE were evaluated for their anti-inflammatory activity by acute and chronic model at two dose levels (250 mg/kg and 500 mg/kg). Significant anti-inflammatory activity was observed by the test extracts. Among the tested extracts, chloroform extract (CE) was found to exhibit higher anti-inflammatory activity as that of standard indomethacin at 10 mg/kg dose level. The present study supports the claims of *Erythrina indica* mentioned in the Indian system of medicine.

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### KEYWORDS

*Erythrina indica*;  
Fabaceae;  
Anti-inflammatory.

### INTRODUCTION

The plant *Erythrina indica* Linn. belongs to the family Fabaceae. It is commonly known as kalyana murukku<sup>[1]</sup> or mullu murukku grown throughout the tropical region of the world. It is a medium sized quick growing tree attaining a height of 18.3 mt, armed with black prickles, bark is smooth, greenish or yellowish lustrous peeling off in thin papery flake for relief of ear-ache and as an anodyne for toothache. The plant is a reputed remedy for inflammatory, sedative, helminthiasis and hyperlipidemic. The leaves of *Erythrina indica* Linn are used as sedative, in pain, inflammation, for round, tape or thread worm infestation and cathartic<sup>[2-5]</sup>. The plant is used in various diseases such as anti-inflammatory, sedative, anti-helminthiasis and anti-hyperlipidemic. Crushed leaves are applied in rheumatic

joints to relieve pain. The juices of leaves are used to kill worms, used for dysmenorrhoea, anti diarrhoea and analgesic. Leaves contains 8-oxo-erythraline, 11-b-methoxyerythralin n-oxide, 11-methoxy erythrine, ercristin and erythrinine<sup>[6]</sup>.

### EXPERIMENTAL

#### Plant material

The fresh leaves of *Erythrina indica* Linn. Were collected from in and around Chennai. The plant material was taxonomically identified and authenticated by Dr. P. Jayaraman, Director of Plant Anatomy Research Centre (PARC), Tambaram, Chennai.

#### Chemicals and reagents

The plant extract used in the present study were

TABLE 1: Anti-inflammatory activity by carrageenan-induced paw edema model

Extract	Dose mg/kg	Mean edema volume (ml)			Inhibition (%)		
		1h	2h	3h	1h	2h	3h
Control	1ml 1% CMC	0.522± 0.09	0.425± 0.05	0.375± 0.05	-	-	-
Standard (indomethacin)	10	0.144±0.04**	0.100±0.03**	0.100± 0.04**	72.41	76.47	73.33
Aqueous extract	250	0.333± 0.10	0.125±0.06**	0.200± 0.04*	36.20	70.58	46.66
	500	0.289± 0.06*	0.175± 0.05*	0.225± 0.08	44.63	58.82	40.00
Chloroform extract	250	0.440± 0.07	0.260± 0.02*	0.260± 0.04	15.71	38.82	30.66
	500	0.422± 0.11	0.175± 0.06*	0.225± 0.05	19.15	58.82	40

Values are mean SEM \*P<0.05 & \*\* P<0.01 Vs contro, Statistical data was analyzed by Student's t-test (n=6)

aqueous extract and chloroform extract of *Erythrina indica* Linn. (250 mg/kg and 500 mg/kg), Carrageenan (Merck Company) and Indomethacin 10 mg/kg (Novartis).

### Preparation of extract

The leaves of *Erythrina indica* Linn were shade dried coarsely powdered and extracted successively using chloroform and water. The solvents were filtered and distilled off and the final traces of solvent was removed under vacuum. The preliminary phytochemical analysis reveals the presence of alkaloid, steroid and tannins in chloroform and aqueous extract of the plant.

### Animals

Adult male Wistar rats weighing between 150-175 gms were used in the pharmacological and toxicological studies. All the animals were maintained in standard laboratory conditions. They were fed with balanced pellet diet (Hindustan food Ltd) and water *ad libitum*.

### Anti-inflammatory activity

#### (a) Acute model

#### Carrageenan induced paw edema model<sup>[7]</sup>

Rats were divided in to 6 groups, each groups consisting of 6 rats, weighed and numbered.

- Group 1 was treated with 1 ml/kg of carboxyl methyl cellulose (1% CMC).
- Group 2 and Group 3 were treated with aqueous extract of leaves of *Erythrina indica* (250 mg/kg and 500 mg/kg) respectively suspended in 1% CMC.
- Group 4 and Group 5 were treated with chloroform extract of leaves of *Erythrina indica* (250 mg/kg and 500 mg/kg) respectively suspended in 1% CMC.
- Group 6 was treated with indomethacin (10 mg/kg p.o) suspended in 1% CMC.

After 30 min of administration of test and standard

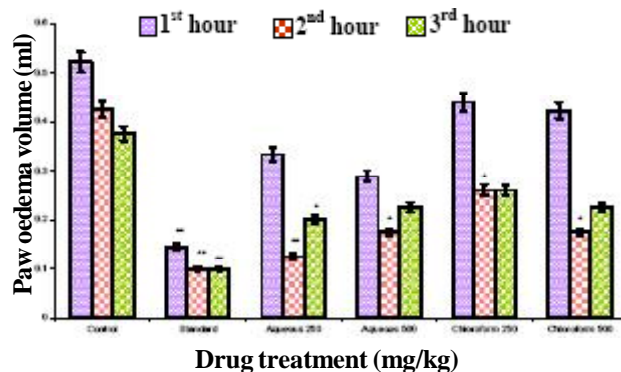


Figure 1 : Anti-inflammatory activity by carrageenan induced paw edema model

drugs orally, acute inflammation was induced by injecting 0.1ml of 0.1% of carrageenan (in normal saline) in the sub plantar region of left hind paw. The hind paw volume of the left leg was measured at the time intervals of 1st, 2<sup>nd</sup> and 3<sup>rd</sup> hours after carrageenan injection by plethysmograph.

Percentage inhibition was calculated by using formula.

$$\% \text{ Inhibition} = \frac{C-T}{C} \times 100$$

C - Mean difference between right and left paw volume in control, T - Mean difference between right and left paw volume in treated animals.

The result is tabulated in terms of paw volume in hours and percentage of inhibition was shown in TABLE 1 and figure 1.

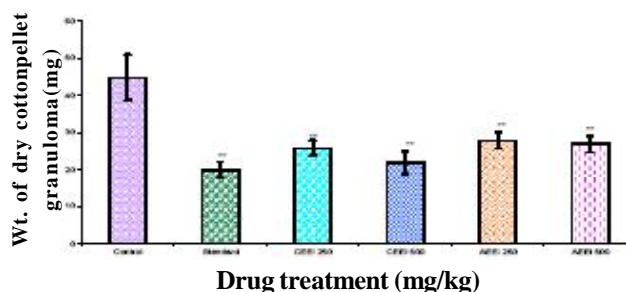
#### (b) Chronic model

#### Cotton pellet granuloma pouch method<sup>[8]</sup>

Rats were divided into 6 groups each groups consisting of 6 rats, weighed and numbered.

- Group 1 was treated with 1 ml/kg of carboxyl methyl cellulose (1% CMC).
- Group 2 and Group 3 were treated with aqueous extract of leaves of *Erythrina indica* (250 mg/kg

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CEEI – Chloroform extract of *Erythrina indica* Linn; AEEI – Aqueous extract of *Erythrina indica* Linn.

Figure 2 : Anti-inflammatory activity response on cotton pellet granuloma pouch method

TABLE 2 : Anti-inflammatory activity response by cotton pellet granuloma pouch method

Treatment	Dose (mg/kg)	Wt. of dry cotton pellet granuloma (mg)	Inhibition (%)
Control	1 ml (1% CMC)	45 ± 6.10	-
Standard	10	20.00 ± 2.25**	73%
Chloroform extract	250	26.00 ± 2.05**	65%
	500	22 ± 3.10**	70%
Aqueous extract	250	28.18 ± 2.18**	62%
	500	27.18 ± 2.15**	64%

Values are mean SEM \*\*P<0.01 Vs control, Statistical data was analyzed by Student's t-test (n=6)

and 500 mg/kg) respectively suspended in 1% CMC.

- Group 4 and Group 5 were treated with chloroform extract of leaves of *Erythrina indica* (250 mg/kg and 500 mg/kg) respectively suspended in 1% CMC.
- Group 6 was treated with indomethacin (10 mg/kg p.o) suspended in 1% CMC.

Autoclaved cotton pellet 50±1 mg was implanted subcutaneously by making incision on the back under ether anesthesia. Drugs were administered daily for 7 days orally. Animals were sacrificed on day 7<sup>th</sup> and the granuloma was dissected out, dried in an oven at 60°C for 24 hours and weighed. The percentage of inhibition of granuloma was determined.

Percentage inhibition calculated using formula

$$\% \text{ Inhibition} = \frac{C-T}{C} \times 100$$

C - Dry weight of the cotton in control animals, T - Dry weight of the cotton in the test animals

The result was expressed as percentage of inhibition of granuloma in TABLE 2 and figure 2.

## RESULTS AND DISCUSSION

The results indicate that the anti-inflammatory activity of *Erythrina indica* was studied by carrageenan-induced rat hind paw edema model, measured by plethysmograph (mercury displacement method) and cotton pellet granuloma pouch model. According to this test, there was a significant difference between the drug treated groups and control at the level of P<0.01. All the tested extract, aqueous as well as chloroform extract exhibited remarkable anti-inflammatory activity (P<0.05). Whereas at 3 hr, anti-inflammatory activity was diminished in all the test groups except standard and aqueous extract (250 mg/kg) groups. Hence, the results of the present investigation conclude that the *Erythrina indica* crude aqueous as well as chloroform extracts at the dose level of 250 mg/kg is accountable for the antiinflammatory activity.

Carrageenan induced paw edema is one of standard experimental model to acute inflammation and it is a bibasic response. The first phase is mediated through the release of Histamine, Serotonin and Kinin, whereas second phase is related to the release of Prostaglandins and slow reacting substance which peak at 3 hrs. The results of Carrageenan induced rat paw model indicated both the aqueous and chloroform extract showed satisfactory inhibition of inflammation for the dose ranges used and the % of inhibition was range from 62-65 % of test drug. The mechanism of anti-inflammatory action of *Erythrina indica* may be related with the inhibition of prostaglandin biosynthesis enzymes such as lipoxygenase and cyclo-oxygenase, increased vascular permeability and inhibition of degranulation of mast cells.

Cotton pellet granuloma is also known as foreign body granuloma and is a model of non-immunological type of inflammation mediated mostly by kinins. This model is the indication for the proliferative phase of inflammation. Inflammation involves proliferation of macrophages, neutrophils and fibroblast, which are basic for granuloma formation. Hence decrease in granuloma indicates the suppression of proliferative phase which was effectively inhibited by crude aqueous as well as chloroform extracts at the dose level of 250 mg/kg. As the drug under study showed significant inhibition (70.5 %) on this model of inflammation, it can safely be presumed that *Erythrina indica* posses anti-kinins activ-

ity and is effective to control non-immunological type of inflammation. These findings justify the usefulness of *Erythrina indica* in the treatment of inflammation associated diseases like arthritis and gout.

### CONCLUSION

The plant is used in various disease conditions such as anti-inflammatory, sedative, anti-helminthiasis and anti-hyperlipidemic. In the present study the leaves of *Erythrina indica* Linn. was extracted with chloroform and water. The extracts were vacuum dried to yield respective chloroform (CE) and aqueous extract (AE). Both CE and AE were evaluated for their anti-inflammatory activity by acute and chronic model at two dose levels (250 mg/kg and 500 mg/kg). Significant anti-inflammatory activity was observed by the test extracts. Among the tested extract, chloroform extract (CE) was found to exhibit higher anti-inflammatory activity as that of standard indomethacin at 10 mg/kg dose level. The present study supports the claims of *Erythrina indica* mentioned in the Indian system of medicine, justifying its application in various inflammatory mediated diseases as reported in traditional system of medicine.

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