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Evaluation of Carrageenan induced Anti-Inflammatory activity of ethanolic extract of *Leucas aspera* (Willd.)

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Abstract

The *Leacus aspera* is long history of medicinal plants belong to the family of Labiatae. It possesses valuable medicinal properties and used in treatment of cough, bronchitis, rheumatism, malarial fever, dysentery, asthma, hypertension and diabetes. The Present study was designed to evaluate anti-inflammatory activity of ethanolic extraction of *L. aspera.* The ethanolic extraction of *L. aspera* were studied in albino rats using carrageenan induced paw edema. The major phytoconstituents found in extracts is Flavonoids, alkaloids, saponins and triterpenoids. The inhibited by 200 mg/kg of the extract in *L. aspera* was comparatively less to that of indomethacin at a dose of 10 mg/kg. The results indicated that the *L. aspera* 200 mg/kg body weight shows more significant ($P < 0.001$) anti-inflammatory activity when compared with the standard and untreated control respectively. The findings of the study indicate that the ethanolic extract of *L. aspera* possesses anti-inflammatory activity which is probably related to the inhibition of prostaglandin synthesis. This is a possible rationale for its folkloric use as an anti-inflammatory agent.

Keywords: Anti-inflammatry, *Leacus aspera*, Carrageenan, paw edema

INTRODUCTION

Traditional and folk remedies have provided us with important drugs in the treatment of many diseases and are being increasingly subjected to scientific study. The family of anti-inflammatory drugs is no exception. Salicylates had their origin in the 'willow bark' of folk medicine. Paracetamol, Cortisone, gold salts, and Phenylbutazone made their way into clinical medicine serendipitously (Gross, 1973). Inflammatory diseases such as rheumatoid arthritis, inflammatory bowel disease, multiple sclerosis and other connective tissue diseases are a major cause of morbidity. Anti-inflammatory agents have been traditionally evaluated by studying their effect on inflammation produced in animals by injecting foreign or noxious agents (Ghosh, 1984). Though there are standard drugs like Aspirin, Indomethacin, Phenylbutazone, etc., these drugs are not entirely free of side effects and have their own limitation (Reynold, 1993; Roberts and Marrow, 2001). Thus, there is still a need to develop newer and safer anti-inflammatory drugs.

L. aspera commonly known as Thumbai (Family - Lamiaceae) is distributed throughout India. It is also known as *Apamarga*, *latjira*, Uttaranee and Safed aghedo in various regional languages. It is widely distributed throughout India and other countries in Wastelands, road sides and open filed. The whole plant, the roots and the seeds possess the medicinal properties against many ailments. Ethanopharma-cological studies depicted its use in dropsy, skin eruptions, colic, as a diuretic, astringent and purgative (Bhatnagar et al., 1973; Raj et al., 1978) as an antidote for snake bite (Selvanayagum et al., 1995). The inflorescence is used in cough. The seeds are employed as an emetic, purgative, and cathartic, in gonorrhea, whooping cough, as an anti-asthmatic and for insect bite (Raj et al., 1978: Reddy et al., 1989). Different fractions of ethanolic extract of *L. aspera* were screened for its anti-inflammatory activity by carrageenan induced rat paw oedema method.

MATERIAL AND METHODS

Collection and authentication of experimental plant

Fresh, mature *L. aspera* Linn. were collected from Kandhari, Thiruvarur District, Tamil Nadu. The plants were identified and authenticated by a taxonomist and an exemplar specimen was deposited at the Department of Botany, St. Joseph's College, Tiruchirappalli, India. The herbarium number of the plant is RVR001.

Preparation of extract

The coarse powder plant material was extracted with ethanol by using soxhlet apparatus. The solvent was removed under reduced pressure to get semisolid mass. Standard methods were used for preliminary phytochemical screening of the extract, which was performed to know the phytoconstituents in the extract (Harborne, 1984).

Experimental animals

The male albino wistar rats (150-200g) obtained from Venkateswara Enterprises, Bangalore were used in this study. They were housed in polypropylene cages (47cm x 34cm x 20cm) lined with husk. It was renewed every 24 hours under a 12:12 hour light: dark cycle at around 22ºC and had free access to water and food. The experiment was carried out in accordance with the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), New Delhi, India.

Carrageenan induced inflammation in albino rats

Paw edema was induced in male albino rats (150–200g, 4 weeks old) by the injection of 100 μL carrageenan 1% (λ-carrageenan, type IV) in the right hind foot pad. The left hind foot pad was injected with the same volume of saline solution (Patil et al., 2009).

Evaluation of anti-inflammatory activity

Ethanolic extract of *L. aspera* was tested for Anti-Inflammatory activity against carrageenan induced paw edema in rats. The reductions of paw edema of rats are compared with the standard drug i.e. indomethacin. The percentage of inhibition of paw-edema is calculated by

% inhibition of paw edema = C-T / C-T X 100

C= increase in paw edema volume of control groups

T= increase in paw edema volume after administration of extract.

RESULT AND DISCUSSION

The Plants are a rich source of secondary metabolites with interesting biological activities. In general, these secondary metabolites are an important source with a variety of structural arrangements and properties. The World Health Organization estimates that plant extracts or their active constituents are used as folk medicine in traditional therapies of 80% of the world's population (Zaidan et al., 2005). There is growing awareness in correlating the phytochemical constituents of a medicinal plant with its pharmacological activity. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities (Prachayasittikul et al., 2008).

Table. 1 Phytochemical analysis of *Leacus aspera*

Phytochemical compounds	*Leacus aspera*
Alkaloids	+
Flavonoids	+
Phenols	+
Saponins	+
Tannins	+
Phytosterols	+
Terpenoids	+
Phlobatannins	+
Carbohydrates	+

(+) Presence of Phytochemical Compounds
(-) Absence of Phytochemical Compounds

Table. 2 Anti-inflammatory effect of *Leacus aspera*

S.No	Group	Mean paw edema	% edema
1.	Control	-	-
2.	Carrageenan alone	0.63±0.08	-
3.	Carrageenan + *L. apera* extract 100mg/kg	0.45±0.02	53.3±1.61
4.	Carrageenan + *L. apera* extract 200mg/kg	0.42±0.02	49.05±5.74
5.	Indomethacin	0.37±0.05	44.12±2.11

In the present study reveals that ethanolic leaves extract of *L. aspera* exhibited the presence of alkaloids, terpenoids, flavonoids, Phenol, Tannins, phytoserol, Carbohydrates and saponins. (Table.1). In phytochemical analysis the major compounds of Alkaloids, Phenols, Tannins and etc., are rich in medicine and constitute most of the valuable drugs. They have physiological effect on animals. (Edeoga and Eriata, 2001). The experiment showed (Table 2) that the extract exhibited statistically significant ($p<0.05$) inhibition of paw volume in a dose-dependent manner. Significant inhibition of paw edema was observed with both doses tested till the sixth hour. However, maximum inhibition of paw edema was found to be in Group V the inhibition of paw edema with the extract was higher than that found with the standard drug Indomethacin. The low percentage of inhibition is 43.52 % which belongs to the Group II i.e. Carrageenan Induced. The duration of action was found to be comparable to that of Indomethacin till the sixth hour during investigation.

CONCLUSION

The use of herbal medicines is wide spread among patients in treating variety of diseases. Herbal anti-inflammatory agents can provide better option to avoid harmful side effects caused by prolong intake of synthetic ones. The plant extract obtained from *L. aspera* produced an excellent Anti-inflammatory activity when tested using standard method.

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