



Research Article

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ANTI- INFLAMMATORY POTENTIAL OF CAPPARIS DIVERSIFOLIA WIGHT & ARN. LEAF EXTRACT AGAINST CARRAGEENAN INDUCED PAW EDEMA IN RATS

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ABSTRACT

The present study was carried out to evaluate the anti-inflammatory potential of ethanol leaf extract of *Capparis diversifolia* using carrageenan induced paw edema method in rats. The anti-inflammatory activity of ethanol leaf extract in 200mg/kg b.wt and 400mg/kg b.wt at 3 hours of administration was compared with reference standard drug, Indomethacin 100mg/kg b.wt. Maximum anti-inflammatory effect was exhibited in 400mg/kg b.wt. The present study confirms the traditional usage of *C. diversifolia* for anti-inflammatory activity and supports the isolation and use of phytoconstituents with anti-inflammatory activity from *C. diversifolia*.

Keywords: Anti-inflammatory activity, *Capparis diversifolia*, paw edema, carrageenan.

INTRODUCTION

Plant medicines are great importance in the primary healthcare in many developing countries. According to World Health Organization (WHO) still about 80% of the world population rely mainly on plant-based drugs. In Ayurveda, Siddha and Unani, large number of medicinal plants were utilized for the treatment of human diseases. Plants can synthesize a wide variety of phytochemical compounds as secondary metabolites. Many of the phytochemicals have been used effectively to treat the various ailments for mankind¹. Everyone has personal experience of inflammation and pain. Inflammation is either acute or chronic inflammation. Acute inflammation may be an initial response of the body to harmful stimuli. In chronic inflammation, the inflammatory response is out of proportion resulting in damage to the body². Many medicinal plants possess healing properties which when used appropriately are useful in the treatment of diseases caused by inflammation in the body.

Capparis diversifolia is an armed medicinal shrub belongs to Capparaceae, commonly called Travancore Caper. It is endemic to Southern Western Ghats. Leaves dimorphic, linear to oblong; flowers showy, purple, constricted in 3-8 flowered in subumbels; fruits smooth and ovoid. *C. diversifolia* leaves and flowers are consumed with milk to cure headache and fever³. The preliminary phytochemical and GC-MS analysis of methanol leaf extract of *C. diversifolia* revealed the presence of phytoconstituents with anti-inflammatory activity. To the best of our knowledge, no work has been done on the anti-inflammatory analysis of *C. diversifolia*. Hence the present study was carried out to demonstrate the anti-inflammatory potential of ethanol leaf extract of *C. diversifolia*.

MATERIALS AND METHODS

Plant Material

The leaves of *Capparis diversifolia* were collected from Tirunelveli district, Tamil Nadu, India and botanical identity of the plant was authenticated by Botanical survey of India,

Southern Regional Centre, Coimbatore. Voucher specimens were deposited in St. Mary's College Herbarium (SMCH-3011 & SMCH-3012) Thoothukudi, Tamil Nadu.

Preparation of plant extract for anti-inflammatory activity

The dried leaves of *C. diversifolia* were powdered in a mechanical grinder. 100gms of plant powder was packed in a Soxhlet apparatus and extracted with ethanol⁴. The ethanol extract was concentrated in a rotary evaporator. The concentrated ethanol extract was used for anti-inflammatory activity.

Animals

Acute oral toxicity study was performed as per OECD - 423 guidelines (acute toxic class method). Adult Wistar Albino rats of either sex (150-200g) were used for the present investigation. Animals were housed under standard environmental conditions at temperature (25±2°C) and light and dark (12:12 h). Rats were fed with standard pellet diet (Goldmohur brand, MS Hindustan lever Ltd., Mumbai, India) and water *ad libitum*.

Acute toxicity study

For toxicity studies, six albino rats of either sex were administered orally with the test substance in the range of doses 200-2000 mg/kg and the mortality rates were observed after 72 hour. The ethanol extract of *C. diversifolia* has shown no mortality at 2000 mg/kg. Therefore 2000 mg/kg dose was considered as LD50 cut off dose (safe dose), 1/10th and 1/5th of that were selected (200 and 400 mg/kg) for the experiment as sub-maximal and maximal dose respectively.

Present study was carried out in accordance with ethical principles by following International conference of Harmonization-Good Clinical Practices Guidelines (ICH-GCP). The handling of the animal was carried out as per OECD and good laboratory practice (GLP) guidelines.

**Anti-inflammatory activity
Carrageenan-induced rat paw edema**

Albino rats of either sex 150-200 grams were divided into 4 groups of six animals each. The dosage of the drugs administered to the different groups was as follows. Group I-control (normal saline 0.5 ml/kg), Group II and Group III- *Capparis diversifolia* ethanolic extract (200 and 400 mg/kg) respectively and Group IV- Indomethacin (100 mg/Kg). All the drugs were administered orally. After one hour of the administration of the drugs, 0.1 ml of 1% w/v carrageenan solution in normal saline was injected into the sub-planar tissue of the left hind paw of the rat and the right paw served as the control. The paw volume of the rats was measured in the digital plethysmograph (Ugo basile, Italy), at the end of 0 min, 60 min, 120 min and 180 min. The percentage increase in paw edema of the treated groups was compared with that of the control and the inhibitory effect of the drugs were studied. The relative potency of the drugs under investigations was calculated based upon the

percentage inhibition of the inflammation. Percentage inhibition was calculated using the formula;

$$\text{Percentage Inhibition} = \left[\frac{V_c - V_t}{V_c} \right] \times 100$$

Where, V_t represents the percentage difference in increased paw edema volume after the administration of test drugs to the rats and V_c represents difference of increased volume in the control groups.

Statistical analysis

The data were statistically analysed using student's t-test. For the statistical tests a P value of less than 0.01 and 0.05 was taken as significant.

Table 1: Anti-inflammatory activity of ethanolic leaf extract of *Capparis diversifolia*

Minutes	Normal saline Control (Group 1)	EECD -1 200 mg/kg (Group 2)	EECD -2 400 mg/kg (Group 4)	Indomethacin Standard (Group 2)
0	35.16±1.23	36.35±1.84	38.16±1.35	35.93±1.04
60	64.33±1.63	61.23±2.16	52.86±1.38*	47.33±1.18**
120	112.54±3.26	48.22±1.94***	26.86±1.06***	23.92±0.91***
180	132.65±2.66	33.86±1.56***	18.36±0.63***	18.96±0.65***

Each Value SEM ± 5 individual observations * P < 0.05; ** P < 0.01 *** P < 0.001, Compared to edema induced control Vs drug treated rats. EECD- Ethanolic Extract of *Capparis diversifolia*

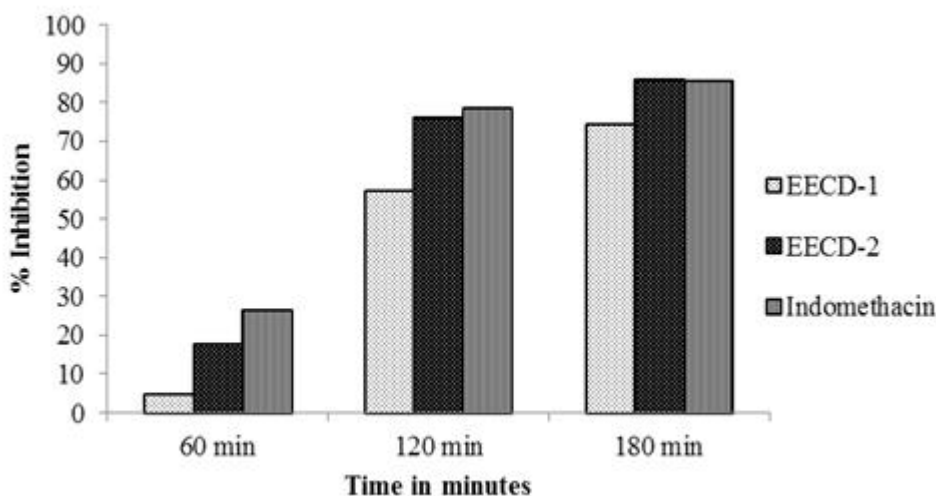


Figure 1: Percentage inhibition of inflammation by *C. diversifolia* leaf extracts in carrageenan induced paw edema

RESULTS AND DISCUSSION

The anti-inflammatory potential of ethanol leaf extract of *Capparis diversifolia* evaluated in carrageenan induced paw edema model. Carrageenan induced paw edema inflammation is commonly used as an experimental model for evaluating the anti-inflammatory potential of compounds and natural products as it produces reproducible results⁶. Indomethacin is a non-steroidal anti-inflammatory drug which inhibits the production of prostaglandins. Prostaglandins synergize with other vasodilators such as histamine and bradykinin and produce redness and increase the blood flow in the areas of acute inflammation.

The results showed that the plant extract have significant (P < 0.001; P < 0.001) anti-inflammatory effect and the results were compared with the standard drug indomethacin 100mg/kg which showed percentage paw volume reduction of 85.70 %. Here the leaf extract 400mg/kg b.wt exhibited high activity compared to standard drug indomethacin (Table 1). The significant (P < 0.001) suppressive activity of the leaf extract in late phase showed its potent anti-inflammatory effect⁵. The percentage reduction in the paw volume in the group of animals treated with *C. diversifolia* extract 200mg/kg b.wt was 74.47% and for the 400mg/kg was 86.15% after 3 hours (Fig. 1).

GC-MS analysis of *C. diversifolia* leaf revealed the presence of 6, 6, 7-Trimethyl-9-oxo-3 oxabicyclo (3.3.1) nonane 2, 4-

dinitrophenylhydrazone; 2, 6-dimethyl-N-(2-methyl-phenylbenzyl) aniline; 1,12-octadecandiol and phytol with anti-inflammatory activity⁹. The results of the present study revealed the antiedematogenic effects of *C. diversifolia* leaf extracts on carrageenan induced edema may be related to inhibition of inflammation mediator formation.

CONCLUSION

Studies are in progress in order to isolate and identify the active compounds which might be responsible for anti-inflammatory activity and also to understand the exact mode of action related to this activity.

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