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**EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF ACACIA
*TORTA (Roxb.) Craib***

Girish N*, Anil Kumar KV, Beere Nagaraju

Department of Pharmacology, Visveswarapura Institute of Pharmaceutical Sciences, Bengaluru - 560070, India.

ABSTRACT

The objective of the present study was to evaluate the stem extracts of *Acacia Torta* (Roxb.) Craib were evaluated for anti-inflammatory activity in albino wistar rats using indomethacin as a reference drug. Ethanol and water were used to prepare stem extract by soxhlet extraction method. The extract is evaluated by using carrageenan induced inflammation model in albino Wistar rats at the dose of 100 mg/kg/p.o. and 400 mg/kg/p.o. and indomethacin at 10 mg/kg were used for the study. The anti-inflammatory activity was evaluated using carrageenan induced paw edema model in Wistar albino rats. The anti-inflammatory activity was found to be dose dependent in carrageenan-induced paw edema model. The hydro alcoholic extract of stem *Acacia Torta* (Roxb.) Craib revealed significant anti inflammatory activity and shown inhibition of paw oedema, 54.51% at 100 mg/kg/p.o and 54.45% at 400 mg/kg/p.o. The results of the present study suggest that stem of *Acacia Torta* (Roxb.) Craib possess significant level of anti-inflammatory activity and it was found to possess anti-inflammatory activity.

Keywords: *Acacia Torta* (Roxb.) Craib, Anti-inflammatory, Stem extract.

INTRODUCTION

Herbal therapy, although still an unwritten science, is well established in some countries and traditions and has become a way of life in almost 80% of population in rural areas [1]. Chronic inflammatory diseases includes rheumatoid arthritis are still one of the main health problems of the world's population [2]. At present, although synthetic drugs are dominating the market but element of toxicity that these drugs entail, cannot be ruled out. Their prolonged use may cause severe adverse effects on chronic administration and the most commonly reported are being gastrointestinal bleeding and peptic ulcers [3].

Inflammation is a process, accompanied by local liberation of chemical mediators that include histamine, 5-HT, bradykinin and eicosanoids [4]. Modern research in the field of anti-inflammatory compounds with improved tolerability and reduction in major side effects viz. gastric discomfort, dizziness, blurring of vision, rashes, itching etc. Drugs from plant origin are used in India for treatment of

Corresponding Author

Girish N
E-mail: girishn534@gmail.com

many diseases in traditional system of medicine [5]. Consequently there is a need to develop a new anti-inflammatory agent with minimum side effects. Search for safe and effective anti-inflammatory agents have been given priority in scientific research in herbal system of medicine.

Acacia torta (Roxb.) Craib, an important medicinal plant, is commonly known as Aadaari, Lataa Khadira has traditionally used in cough, bronchitis, dysentery, tubercular fistula, measles, inflammation, sepsis (skin diseases) and in emmenagogue [6]. The extract contains tannins, saponins, steroids, triterpenoids and alkaloids. In our laboratory, it was observed that crude extract of *Acacia Torta* (Roxb.) Craib exert anti-inflammatory activity in rats. Several plants of this genus have been used in folk medicine to treat stomach pain, cough, diarrhoea, piles, sore throat, as astringent, antipyretic, antimicrobial, antimalarial, antiviral, anti-oxidant, anti-hypertensive and as liver tonic [7]. *Acacia Torta* (Roxb.) Craib has been traditionally used in Maharashtra, Kerala, Karnataka and in Himalayas for the treatment of inflammation and rheumatism. However,

systematic study of this plant has not been carried out for the anti-inflammatory activity. Therefore, present study was undertaken to evaluate the anti-inflammatory effect of stem of *Acacia Torta* (Roxb.) Craib bark extract in carrageenan induced paw edema rat model.

MATERIALS AND METHODS

The plant *Acacia torta* (Roxb.) Craib stem, were selected for the present study. The plant belonging to family Mimosaceae were collected from the Savandurga state forest of Karnataka. The plants were authenticated by Dr. V. Rama Rao, Central Council for Research in Ayurvedic Sciences, Ministry of AYUSH, Govt. of India, G.C.P. Annexe, Ashoka Pillar, Jayanagar, Bengaluru. The air dried and powdered stem of *Acacia Torta* (Roxb.) Craib were successively extracted with alcohol and water in a Soxhlet apparatus.

Animals used

Albino rats of either sex weighing between (150-200 g) were procured from animal house of Visveswarapura Institute of Pharmaceutical Sciences Bengaluru for experimental purpose. The animals were acclimatized to laboratory conditions for 7 days. The animals were supplied with commercially available standard diet. Water was allowed *ad libitum* under hygienic conditions. The animals were grouped in cages in an air conditioned room at the temperature of $22 \pm 1^\circ\text{C}$ with 12 h light and dark cycle [8]. The ethical guidelines for the investigation of the animals used in experiment were followed in all the tests.

Acute oral toxicity studies

The acute toxicity of stem extracts of *Acacia torta* (Roxb.) Craib was determined by using female albino rats of weight between (180-200) g, maintained under standard conditions. The animals were fasted for 12 hr prior to the experiments. Animals were administered with single dose of stem extracts of *Acacia torta* (Roxb.) Craib and observed for its mortality up to 48 hr study period (short term toxicity). Based on the short-term toxicity profile, the next dose was decided as per OECD guidelines No 423. From the LD50 dose 1/5th dose was selected and considered as high dose [9].

Experimental Design for evaluation of anti-inflammatory activity through carrageenan-induced hind paw edema

Albino rats of either sex weighing between (150-200g) were divided into following 4 groups of 6 animals each [10, 11].

Group I: Control, animals were treated with 10% Tween-80 *p.o.*

Group II: Standard group, animals were treated with 10mg/kg Indomethacin *p.o.*

Group III: Animals were treated with 100mg/kg b wt. *p.o.* of hydro alcoholic extract of stem *Acacia torta*.

Group IV: Animals were treated with 400mg/kg b wt. *p.o.* of hydro alcoholic extract of stem *Acacia torta*.

Paw oedema was induced by an intradermal injection of 0.1 ml of carrageenan (1% in normal saline) into the plantar surface of the right hind paw of rats. The acute phase of inflammatory reaction i.e. oedema volume was determined using plethysmometer prior to and 3, 6, 12 and 24 hours after carrageenan injection. All the drugs were administered one hour prior to carrageenan. Percentage inhibition of paw oedema was calculated using the following formula:

$$\% \text{ inhibition} = \frac{\text{Mean increase in paw volume in control group} - \text{Mean increase in paw volume in test group}}{\text{Mean increase in paw volume in control group}} \times 100$$

Preliminary phytochemical screening of stem *Acacia torta* (Roxb.) Craib

It was observed from the preliminary phytochemical screening of the stem that Carbohydrates and Flavonoids were absent in the extract of stem *Acacia torta*. Moreover it was found that Saponins, steroids, triterpenes, alkaloids and tannins were present in the hydro alcoholic extract of stem *Acacia torta*.

Statistical analysis

Results were expressed as mean \pm SEM. Statistical significance was assessed using One-way and single measures of Analysis of variance (ANOVA) followed by Dunnett's comparison tests. *** $P < 0.001$ and ** $P < 0.01$ was considered as significant Vs control.

RESULTS

The acute toxicity studies reveal that the hydro alcoholic extract of stem *Acacia torta* (Roxb.) Craib were found to be non-toxic at dose of 2000 mg/kg and the extracts were found to be safe at dose of 2000 mg/kg. Hence 2000 mg/kg was the maximum tolerable dose considered for the hydro alcoholic extract. Thereby the screening doses selected for systemic administration of test extracts for organ protective activities are mentioned below.

The hydro alcoholic extract of stem *Acacia torta* - 100 mg/kg (1/20th of the 2000 mg). The hydro alcoholic extract of stem *Acacia torta* - 400 mg/kg (1/5th of the 2000 mg).

Table 1. Effect of hydro alcoholic extract of acacia torta (roxb.) craib stem on carrageenan induced paw edema

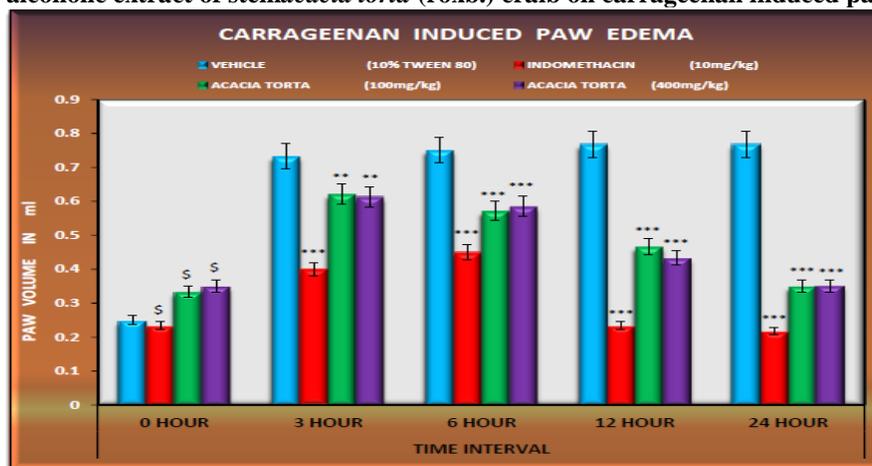
Treatment	0h	3h	6h	12h	24h
Vehicle (10% Tween-80)	0.25±0.03416	0.7333±0.01493	0.7517±0.01493	0.7683±0.01493	0.7683±0.01542
Indomethacin (10mg/kg)	0.2333±0.02108 ^{\$}	0.4 ± 0.01667***	0.45 ±0.02108***	0.2333±0.02236***	0.2167±0.02582***
Acacia Torta (100mg/kg)	0.3333±0.04216 ^{\$}	0.6217±0.02236**	0.5717±0.02108***	0.4667±0.007032***	0.35±0.02007***
Acacia Torta (400mg/kg)	0.35±0.03416 ^{\$}	0.6133±0.03416**	0.585±0.04216***	0.4333±0.02078***	0.35±0.01961***

Values are Mean ± SEM, P value **P< 0.01, ***P< 0.001, \$ Not significant v/s Control. P-values were calculated by comparing with control by one way measures of ANOVA followed by Dunnett’s test.

Table 2. Effect of hydro alcoholic extract of acacia torta stem on carrageenan induced paw edema (percentage inhibition)

Treatment	Percentage Inhibition of Paw Volume			
	3h	6h	12h	24h
Indomethacin (10mg/kg)	45.43%	40.14%	69.71%	71.93%
Acacia Torta (100mg/kg)	15.05%	23.81%	39.22%	54.51%
Acacia Torta (400mg/kg)	16.18%	22.00%	43.64%	54.45%

Fig 1. Effect of hydro alcoholic extract of stem acacia torta (roxb.) craib on carrageenan induced paw edema



Values are Mean ± SEM, P value **P< 0.01, ***P< 0.001, \$ Not significant v/s Control. P values were calculated by comparing with control by one way measures of ANOVA followed by Dunnett’s test.

The results showed (Table.1) that, in the rats administered only vehicle (10%Tween-80), the sub plantar injection of carrageenan produced a local edema that increased progressively from 0.73 ± 0.014 ml after third hour to reach a maximum 0.76 ± 0.015 ml within twenty four hour. The extract (400 mg/kg) as from the third hour post carrageenan injection caused a dose dependent and significant (P<0.001) reduction in edema in the rats. Whereas the extract at 100mg/kg is also from the third hour post carrageenan injection caused a dose dependent and significant (P<0.001) reduction in edema in the rats compared with the same time of the 10%Tween-80 treated group. Indomethacin (10mg/kg) produced a significant (P<0.001) reduction in edema at third hour in the rats compared with the same time of the 10%Tween-80 treated group. (Fig.1)

Hydro alcoholic extract of stem *Acacia Torta* at the doses of 100 and 400 mg/kg, significantly (P<0.01 and P<0.001) and dose dependently reduced the paw volume after 3 hour. The percentage inhibition at 24th hour in the group treated with 100mg, 400mg/kg body weight of the extract was respectively 54.51% and 54.45%. Indomethacin treated group, showed significant (P<0.001) reduction in the paw volume after 3 hour with 71.93% inhibition of edema, so, the hydro alcoholic extract of stem *Acacia Torta* shows anti-inflammatory activity, comparable with standard drug (Table.2).

DISCUSSION

Natural products are a source for bioactive compounds and have potential for developing some novel therapeutic agents. *Acacia torta* (Roxb.) Craib possess many therapeutic activities. More recently there has been an

interest in their analgesic and anti-inflammatory activities following reports about their ability to relieve pain and inflammation [12, 13].

The standard experimental model of acute inflammation is the carrageenan induced hind paw oedema, where it shows a biphasic response. In this study, the extracts at dose of 100mg/kg and 400mg/kg body weight were significantly inhibited paw oedema (Table.1&2/Fig.1) where maximum inhibition was observed [14].

The inhibition of carrageenan induced inflammation in rats is an established model to screen compounds for potential anti-inflammatory activity. It is well known that carrageenan induced paw edema is characterized by biphasic event with involvement of different inflammatory mediators. In the first phase (during the first 2 h after carrageenan injection), chemical mediators such as histamine and serotonin play role, while in second phase (3-4 h after carrageenan injection) kinins and prostaglandins are involved [15].

Carrageenan-induced paw edema model in rats is known to be sensitive to cyclo-oxygenase inhibitors and has been used to evaluate the effect of non-steroidal anti-inflammatory agents, which primarily inhibit the cyclo-oxygenase involved in prostaglandin synthesis. Our results revealed that administration of hydro alcoholic extract of stem *Acacia torta* (Roxb.) Craib inhibited the paw volume after third hour and during all phases of inflammation,

which is probably due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis.

CONCLUSION

Thus, it is concluded that the hydro alcoholic extract of stem *Acacia torta* (Roxb.) Craib produced significant anti-inflammatory activity against carrageenan induced paw edema model. The results support the traditional use of this plant in some painful and inflammatory conditions and suggest the presence of biologically active components which may worth further investigation and elucidation.

CONFLICT OF INTEREST

None declared.

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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