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In vitro testing of *Ficus dalhousiae* Miq root extract on Wistar albino rat for its anti-inflammatory activity

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ABSTRACT

The objective of the present investigation was to evaluate the anti-inflammatory activity of Ficus dalhousiae Miq roots ethanolic extract (FDREE) in Wistar albino rats using carrageenan and formalin induced paw edema model. The roots were made free from dust and foreign material and dried under shade at room temperature. After a week, the roots were powdered and passed through a sieve. The powder was weighed (500 g) and was extracted by successive solvent extraction process. The total yield of the ethanolic extract was 17.6%. Phytochemical screening was carried out for the detection of the chemical constituents by simple qualitative methods. The dosing was designed as per the acute toxicity study reported earlier. The anti-inflammatory activity was performed by carrageenan and formalin induced paw edema model at three different doses, 100 mg/kg and 200 mg/kg body weight. Wistar rats weighing (150-200 g) of either sex were used for the study. There was a significant reduction of elevated paw volume in the test groups observed in both carrageenan and formalin induced paw edema models. The percentage inhibition of inflammation was also high in the test groups compared with the negative control. It exhibited anti-inflammatory activity in both acute and subacute experimental models which provides the evidence of its use as a potent anti-inflammatory drug.

Keywords: *Ficus dalhousiae* roots ethanolic extract, Carrageenan, Tween80.

INTRODUCTION

Inflammation is a defensive response involving host cells, blood vessels, and proteins and other mediators that is intended to eliminate the initial cause of cell injury, as well as the necrotic cells and tissues resulting from the original insult, and to initiate the process of repair. [1] The classical signs of acute inflammation are pain, heat, redness, swelling, and loss of function. Inflammation is a protective attempt by the organism to remove the injurious stimuli and to initiate the healing process. Inflammation is not a synonym for infection, even though the two are often correlated, and despite the fact that words ending in the suffix *it is* are sometimes informally described as referring to infection. Although infection is caused by a microorganism, inflammation is one of the responses of the organism to the pathogen. Inflammation can even occur in the absence of infection, although such types of inflammation are usually maladaptive (such as in atherosclerosis). Inflammation is a stereotyped response, and therefore it is considered as a mechanism of innate immunity, as compared to adaptive immunity, which is specific for each pathogen.[2] Inflammation can be classified as either *acute* or *chronic*. *Acute inflammation* is the initial response of the body to harmful stimuli and is achieved by the increased movement of plasma and leukocytes (especially granulocytes) from the blood into the injured tissues. A cascade of biochemical events propagates and matures the inflammatory response, involving the local vascular system, the immune system, and various cells within the injured tissue. Prolonged inflammation, known as *chronic inflammation*, leads to a progressive shift in the type of cells present at the site of inflammation and is characterized by simultaneous destruction and healing of the

tissue from the inflammatory process. All the above signs may be observed in specific instances, but no single sign must, as a matter of course, be present.[3]

Plants are an important source of pharmacologicaly active natural products and are considered a promising avenue for the discovery of new drugs due to easy access and relatively low cost, as they are grown abundantly in nature.[4,5] The development of standardized herbal medicines with proven efficacy and safety can be considered as an important source for increasing the access of people toward medicine and offers new therapeutic options [6]. *Ficusd alhousiae* Miq. (Moraceae) known as KalAal, Pei-Aal and Soma-valka to the locals is a traditional medicinal plant found in Tamil Nadu and Kerala states of India. Literature indicates ethno medicinal use of this plant for hepatic and skin disorders [7]. The present study was undertaken to investigate anti-inflammatory activity of *F. dalhousiae* roots ethanolic extract.

Methods for testing acute and subacute inflammation are:
- UV-erythema in guinea pigs.
- Vascular permeability.
- Croton-oil ear edema in rats and mice.

Paw edema in rats (various modifications and various irritants).
- Pleurisy tests.
- Granuloma pouch technique.
- Methods for testing The Chronic proliferative inflammation are:
- Cotton wool granuloma
- Glass rod granuloma
- PVC sponge granuloma.

MATERIAL AND METHODS

Preparation of extracts:
The roots of *Ficusd alhousiae* Miq. were dried and powdered and subjected for the successive solvent extraction. The extracts were concentrated to get Residue. Ethanolic extract dried and suspended in Tween-80 solution.

Experimental animals
Albino rats of either sex (150-200g) were used in the study. They were divided into different groups each containing six animals. Animals were fasted for 12h before experiment and only water was allowed.

Assessment of Anti-inflammatory activity
The anti-inflammatory activity of Ethanolic extract was carried out by the Carrageenan Induced Paw edema method of Winter et al., 1962. The albino rats (150-200 gm) were divided into four groups of six animals each. One group named as Control (Group-I), another was Standard (Group-II) and remaining groups were used for test groups, named as Test Group I and Test group II. Rats were weighed and marked for identification. A mark was made on left hind paw of each rat just beyond tibia-tarsal junction, so that every time the paw could be dipped in the column up to the fixed mark to ensure constant paw volume. The initial paw volume of each rat was noted by mercury displacement method. The Group-I, serving as control, was administered 0.2 ml of 2% w/v carboxy methyl cellulose suspension orally. Group-II, serving as standard, was administered Indomethacin (10 mg/kg, body weight, orally). Test group I and Test group II serving as test was administered extracts in the dose of 100 mg/kg and 200 mg/kg body weight, orally.One hour after the oral administration of control, standard and test drug, 0.1 ml of 1% Carrageenan in normal saline was injected into the plantar area of the left hind paw of each rat. The volume of the paw was measured by a plethysmometer in 1, 2, 3 and 4 hour after Carrageenan suspension injection. The percentage increase in paw volume in animals treated with standard, extracts were compared with the increase paw volume of animals of control group after 1, 2, 3 and 4 hour.

The percent inhibition was calculated by following formula;

$$\% \text{ Inhibition} = (Vc-Vt / Vc) \times 100$$

Where, Vt and Vc are the mean change in paw volume of treated and control rats respectively

RESULTS AND DISCUSSION

The extracts were studied for their anti-inflammatory activity in Carrageenan-induced hind paw edema in rats and the paw volume was measured plethysmometrically at 30, 60,120,180 min. after injection. The Ethanolic extract of *Ficus dalhousiae* Miq. significantly (P<0.05) reduced Carrageenan-induced paw edema in rats. The Ethanolic Extract showed a significant anti-inflammatory effect comparative to the standard drugs, Indomethacin. The present results indicated the Ethanolic extract of *Ficus dalhousiae* Miq. exhibited more significant activity than aqueous extract in the treatment of pain and inflammation.

Table no.1- Effect of *Ficus dalhousiae* Miq. extracts on Carrageenan-induced paw edema

Treatment	Doses	Mean increase in Paw volume(ml)+SEM			
		Time in minutes			
		30 min	60 min	120 min	180 min
Control	------	0.33±0.02	0.42±0.06	0.68±0.04	0.79±0.05
Alc- 1	200mg/kg	0.26±0.04 (21.21)	0.34±0.06 (19.04)	0.54±0.08 (20.58)	0.64±0.10 (18.98)
Alc - 2	400 mg/kg	0.21±0.03 (36.36)	0.30±0.06 (28.57)	0.42±0.08 (38.23)	0.51±0.13 (35.44)
Aq- 1	200 mg/kg	0.31±0.07 (6.96)	0.38±0.11 (9.52)	0.64 ±0.08 (5.88)	0.76 ±0.09 (3.79)
Aq- 2	400 mg/kg	0.28 ±0.12 (15.15)	0.39±0.08 (7.14)	0.62±0.11 (8.82)	0.72±0.12 (8.86)
Indomethacin	10mg/kg	0.18±0.10 (45.45)	0.23±0.11 (45.23)	0.39±0.12 (42.64)	0.41±0.11 (48.10)

Each value represents the Mean ±SEM (n = 6).,

Figures in parenthesis indicate % of inhibition

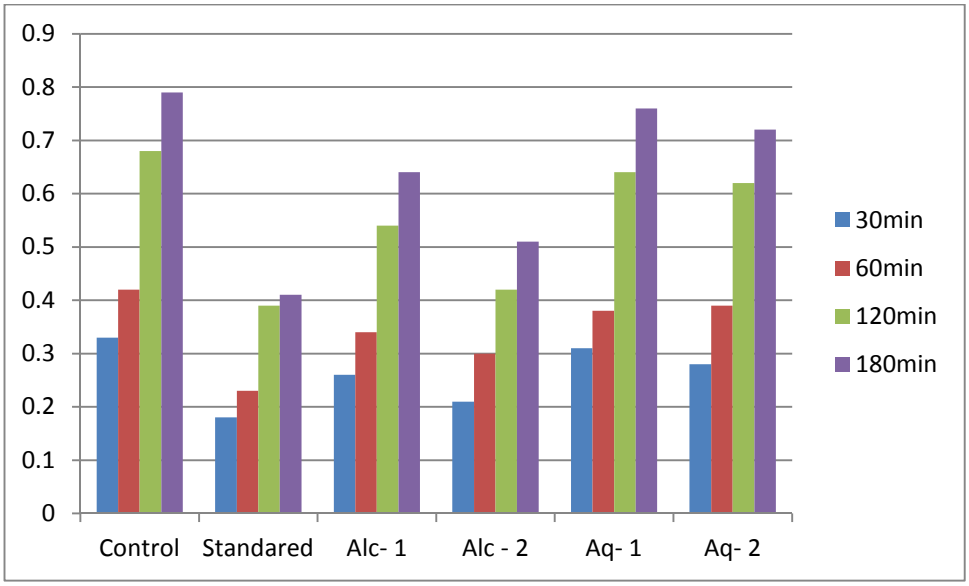

Fig.1 Effect of *Ficusdalhousiae*Miq.extracts on Carrageenan-induced paw edema

Alc-1= Alcoholic extract 200mg/kg, Alc-2= Alcoholic extract 400mg/kg, Aq-1= Aqueous extract 200mg/kg, Aq-2= Aqueous extract 400mg/kg, Std. = Indomethacin

CONCLUSION

The extracts were studied for their anti-inflammatory activity in Carrageenan-induced hind paw edema in rats and the paw volume was measured plethysmometrically at 30, 60,120,180 min. after injection. The Ethanolic extract of *Ficus dalhousiae* Miq., significantly (P<0.05) reduced Carrageenan-induced paw edema in rats. The Ethanolic Extract showed a significant anti-inflammatory effect comparative to the standard drugs, Indomethacin. The present results indicated the Ethanolic extract of *Ficus dalhousiae* Miq. exhibited more significant activity than aqueous extract in the treatment of pain and inflammation. The detailed pharmacological evaluation helped us to conclude *Ficus dalhousiae* Miq. as an important medicinal plant having important chemical constituents which possess anti-inflammatory effect.

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