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Anti-inflammatory and antipyretic activity of *Fioria vitifolia*

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ABSTRACT

Fioria vitifolia Linn., (Malvaceae) has been extensively used in folk medicine for the treatment of common cold, flu, and upper respiratory infections and also as an immune system booster. Steroids, flavonoids, and triterpenes, gossypin alkaloids have been isolated from the whole part of the plant. In the present study, the methanolic extract of dried plant of *Fioria vitifolia* (MEFV) was investigated for anti-inflammatory (carrageenan induced rat paw oedema) and anti-pyretic (brewer's yeast induced pyrexia) activities. Pre-treatment with the extract (250-500mg/kg, p. o) significantly prevented increase in volume of paw oedema in dose dependent manner. A maximal effect was observed at 500mg/kg which was comparable to diclofenac (20mg/kg, orally). Ceiling effect at the dose of 500mg/kg was observed. The anti-pyretic effect of MEFV (measured as % reduction in body temperature) was compared with paracetamol (150mg/kg, orally). MEFV in dose of 500mg/kg caused significant decrease in body temperature of rats. In conclusion, this study has established the anti-inflammatory activity and anti pyretic activity of *Fioria vitifolia* and thus, justifies the ethnicuses of the plant.

Key Words: Carrageenan, Malvaceae, rat paw oedema, diclofenac, ethnicuses, *Fioria vitifolia*.

INTRODUCTION

Fioria vitifolia Linn, commonly known as *Hibiscus vitifolius*, belongs to the family of Malvaceae grows widely in tropical and sub-tropical regions. It is frequently used in folk medicine too. *Fioria vitifolia* roots extract shows potent protective action against anti-tubercular drug induced hepato toxicity. Some phytoconstituents like sterols, flavonoids, and triterpenes, alkaloids have been isolated from the plant. However, no data was found regarding the pharmacological and phytochemical evaluation of the plant. The aim of the present study is to investigate the anti-inflammatory and antipyretic properties of the methanolic extracts of dried plant of *Fioria vitifolia*. (The wealth of India, 2005)

MATERIALS AND METHODS

The plant of *Fioria vitifolia* Linn. was collected from Kallankattu valasu near Komarapalayam, Tamilnadu, India. The plant was authenticated and identified at Botanical survey of India, Coimbatore Tamilnadu, India.

Acute oral toxicity study

- The method uses defined doses (5, 50, 300, 2000 mg/kg body weight) and the results allow a substance to be ranked and classified according to the Globally Harmonized system (GHS) for the classification of chemical which cause acute toxicity. Most of the crude extracts possess LD₅₀ value more than 2000 mg/kg of the body weight of animal used (Amroyan *et al.*, 1997).
- Dose volume was administered 0.1 ml/100 gm body weight to the animal by oral route. After giving the dose, the toxic signs should be observed within 3-4 hours.

- No toxicity or death was observed for these given dose levels, in selected and treated animals. So the LD₅₀ of the ethanol extract of *Fioria vitifolia* Imbach, fruiting bodies as per OECD guidelines-423 is greater than 2000mg/kg (LD₅₀ > 2000mg/kg).

Drugs and reagents

Diclofenac (MicroLab, India), Carrageenan (Sigma-Aldrich), Brewer's yeast (Loba Chem, Mumbai) and Paracetamol (GlaxoSmithKline) were AR grade used in the study.

Preparation of extracts

The plant was washed thoroughly, dried under a shade and pulverized. The coarse powder was extracted with methanol using a soxhlet apparatus to obtain *Fioria vitifolia* methanolic extract (MEFV). The extracts were dried using a rotary vacuum evaporator and stored in a desiccators until further use (Cooper and Gunn, 1960).

Animals

Wistar albino rats of both sexes, weighing 150-200g were used for the study. The animals were kept in polypropylene cages in a room maintained under controlled atmospheric conditions. The animals were fed with standard diet (Hindustan liver, Mumbai, India) and had free access to clean drinking water. The experimental protocol was approved by the Institutional Animal Ethical Committee (IAEC/008/2012/CPCSEA) of JKKMMRF College of Pharmacy, Komarapalayam, Namakkal Dt. Tamilnadu.

Anti-inflammatory activity

The anti-inflammatory activity of the extract was determined, using carrageenan induced rat paw oedema assay (Winter *et al.*, 1962). The rats were divided into five groups of six rats each. The control group received 1% (v/v) DMSO in water at a dose of 5ml/kg. The positive control group was treated orally with the standard drug, diclofenac (20mg/kg). The test groups received the MEFV in doses of 250, 500mg/kg. All the doses were ad-

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Table 1: Effect of *Fioria vitifolia* on paw oedema induced by carrageenan in rats.

Drug dose	Paw volume (ml)		
	1hr	2hrs	3hrs
Control	18.00±1.00	21.33±2.00	22.00±3.05
Standard (indomethacin-20mg/kg)	9.33±0.33 ^c	7.00±0.57 ^c	6.66±0.88 ^b
MEFV (500mg/kg)	15.00±1.00	7.66±0.66 ^c	7.16 ±0.48 ^b
MEFV (250mg/kg)	18.66±0.88	14.00±0.63 ^b	13.33±1.17 ^a

Values are given as mean ± S.E.M for groups of six animals each. Values are statistically significant at *p<0.05. (^a = p<0.05; ^b = p<0.01; ^c = p<0.001) All group values and significance were compared.

ministered 30min before the induction of oedema by administering 0.1 ml of 1%w/v carrageenan in saline in sub plantar region of hind paw of animal. The degree of paw oedema of the entire group was measured using a plethysmo meter at 60, 120 and 180 min after the administration of carrageenan to each group (Adams *et al.*, 1968).

Antipyretic activity

Antipyretic activity was measured by Brewer's induced pyrexia in rats. Male Wistar rats were fasted over night with water *adlibitum* before the experiments. Pyrexia was induced by subcutaneously injecting 20% w/v brewer's yeast suspension (10ml/kg) into the animal's dorsum region. Twelve hours after the injection, the rectal temperature of each rat was measured using a digital tele thermometer only, rats that showed an increase in temperature of at least 0.7°C were used for the experiments. MEFV in doses of 250, 500 mg/kg was administered orally and the temperature was measured at 1, 2, 3 & 4 hrs after drug administration. Paracetamol (150mg/kg) was used as standard drug (Hayare *et al.*, 2000).

Statistical treatment

The results were subjected to two way ANOVA followed by dunnet's test. The data is deemed to be statistically significant if p <0.05.

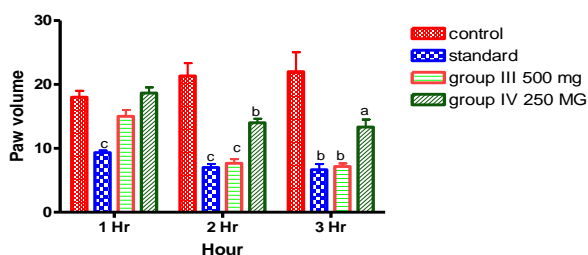


Figure 1: Effect of *Fioria vitifolia* on paw oedema induced by carrageenan in rats.

Table 2: Effect of *Fioria vitifolia* on yeast induced pyrexia in rats.

Drug dose	Before yeast administration	After yeast administration	After Drug Administration			
			1hr	2hr	3hr	4hr
Control	32.40±0.05	33.46±0.06	33.36±0.88	33.30±0.05	33.08±0.08	33.03±0.06
Standard	32.83±0.03	33.33±0.23	32.80±0.11 ^a	32.46±0.14 ^c	32.43±0.08 ^b	32.30±0.05 ^c
MEFV 500 mg	32.23±0.17	33.20±0.15	32.86±0.12 ^a	32.60±0.13 ^b	32.40±0.10 ^b	32.26±0.08 ^c
MEFV 250 mg	32.40±0.10	33.06±0.08	32.93±0.14	32.50±0.15 ^b	32.33±0.06 ^b	32.46±0.03 ^b

Values are given as mean ± S.E.M for groups of six animals each. Values are statistically significant at *p<0.05. (^a = p<0.05; ^b = p<0.01; ^c = p<0.001) All group values and significance were compared with control group

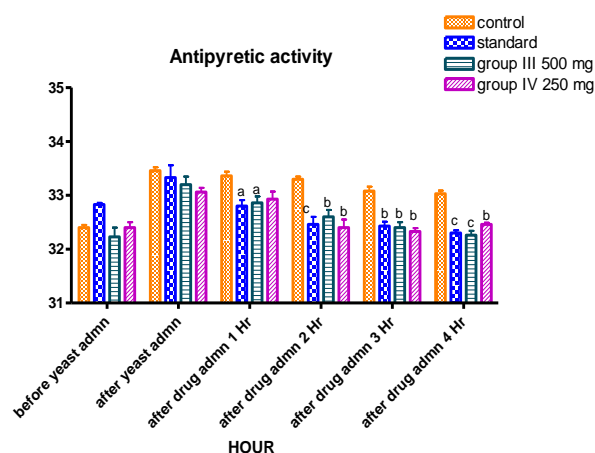


Figure 2: Effect of *Fioria vitifolia* on yeast induced pyrexia in rats.

RESULTS

The methanolic extract of *Fioria vitifolia* significantly decreased the paw oedema induced by carrageenan in rats at the dose of 500mg/kg comparable to indomethacin (20 mg/kg) (Table 1). Effect of the *Fioria vitifolia* on brewer's yeast-induced pyrexia in rats was significant and showed reduction in rectal temperature of rats (Table 2). Preliminary phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, sterols, triterpenoids and carbohydrates in the methanolic extract of the whole plant of *Fioria vitifolia*.

DISCUSSION

Carrageenan induced paw oedema is a commonly used primary test for the screening of new anti-inflammatory agents and it is believed to be biphasic. The first phase (1-2hr.) is due to the release of histamine or serotonin and the second phase of oedema is due to the release of prostaglandin. The results of this study indicate that the methanolic extract of *Fioria vitifolia* significantly reduced carrageenan induced paw oedema in rats. Therefore, the mechanism of action may be by inhibition of histamine, serotonin or prostaglandin synthesis. Usually most anti-inflammatory and analgesic drugs possess antipyretic activity. In general, non-steroidal anti-inflammatory drugs produce their anti-pyretic action through the inhibition of prostaglandin synthetase within the hypothalamus. Therefore, the antipyretic activity of methanolic extract of *Fioria vitifolia* is probably by inhibition of prostaglandin synthesis in hypothalamus. The anti-inflammatory and antipyretic activities of methanolic extract may be due to the presence of alkaloids, sterols and flavonoids, triterpenoids.

CONCLUSION

The results show that the plant *Fioria vitifolia* has significant anti-inflammatory and antipyretic activities. However, further investigation is required to isolate the active constituents responsible for these activities and to elucidate the exact mechanisms of action.

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