Asian Journal of Pharmaceutical and Clinical Research
Vol. 4, Issue 1, 2011 ISSN - 0974-2441

Research Article

STUDY OF ANALGESIC AND ANTI-INFLAMMATORY ACTIVITIES OF THE ETHANOLIC EXTRACT ARIAL PARTS OF *FUMARIA VAILLANTII LOISEL*

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ABSTRACT

Oral administration of the ethanolic extract (200 and 400 mg/kg, p.o) of the aerial parts of *Fumaria vaillantii Loisel* produced significant analgesic activity in acetic acid-induced writhing and tail immersion tests, anti- inflammatory effect against carrageenin induced inflammation and adjuvant induced polyarthritis.

Key words: *Fumaria vaillantii Loisel*; Analgesic activity; Anti-inflammatory activity.

INTRODUCTION

Fumaria vallintaii (Common Fumitory or Earth smoke) is the most common species of the genus *Fumaria* in Western and Central Europe. It is an herbaceous annual plant, which grows erect, with stalks about 10 to 50 cm long. The fruit is an achene. It contains alkaloids, potassium salts, and tannins. It is also a major source of fumaric acid. The "smoky" or "fumy" origin of its name is uncertain.

EXPERIMENTAL

Plant material and Preparation of the extract

F.vaillantii belongs to family *Fumariaceae,* collected and identified in herbarium section of Dept. of Botany, Govt. Post Graduate College, Gopeshwar (Specimen No. GPG/BOT-F.E-204). Plant's aerial parts were dried and powdered and soxhlet extracted with Ethanol, filtrated and concentrated *in vacuo* to give a greenish-black coloured sticky extract (yield: 11.6%).

Animals

The animals were obtained from Govt. Veterinary College,Pantnagar. Male Swiss albino mice (20–25 g) and Wistar albino rats of both sex (120–150 g) were used. They were housed in standard environmental conditions and fed with standard rodent diet and water ad libitum.

Antinociceptive activity

Writhing test

Writhing was induced in mice (N = 6) by intraperitoneal injection (10 ml/kg) of 0.6% acetic acid. The number of writhings was counted over a 20 min period as previously reported [5,6]. Animals were treated through oral route 30 min before injection of acetic acid with ethanolic extract (200 and 400 mg/kg) and acetylsalicilic acid (200 mg/kg). The control group received only vehicle (0.3%w/v) of CMC.

Tail immersion test

Six mice were administered orally with vehicle (3 ml/kg), pentazocine (30 mg/kg), extract (200 and 400 mg/kg). The distal part of the tails of the animals was immersed in hot water maintained at 55.0 ±1.0 °C. The time taken to withdraw the tail was noted as reaction time [7]. A cut off time of 10 sec was maintained at 55 °C to prevent tissue damage. The reaction time was measured at 0, 15, 30, 45 and 60 min after treatment, respectively.

Anti-inflammatory activity

Carrageenin-induced rat paw edema

Six rats of either sex were treated orally with either vehicle (3 ml/kg), diclofenac (12.5 mg/kg), extract (200 and 400 mg/kg) suspended in the vehicle, 60 min prior to an injection of 1% carrageenin[8] into the plantar tissue of the right hind paw. The contra-lateral hind paws were injected with 0.1 ml of saline as control. Paw volume was measured plethysmographically at 0, 1, 2 and 3 h after Carrageenin injection.

Adjuvant-induced polyarthritis

The arthritic syndrome was induced in rats by an injection of 0.1 ml of Freund's complete adjuvent into the subplantar region of the right hind paw [9]. Animals were treated orally with either vehicle (3 ml/kg), diclofenac (12.5 mg/kg), extract (200 and 400 mg/kg). Plethysmographic determination of paw volume was performed on both injected and contra-lateral foot. Paw volume after 18 h of adjuvent injection was taken as sub acute phase of inflammation and that of the 30th day was observed as an index of chronic inflammation[10].

Statistical analysis

The results were statistically analysed using one way ANOVA followed by Dunnet's t-test. $P < 0.05$ was considered significant.

RESULTS

Oral administration of the ethanolic extract (200 and 400 mg/kg) of *F.vaillantii* aerial parts significantly ($P < 0.05$) reduced the number of writhings induced by acetic acid in mice (Table 1). The activity was comfrontable to that of acetylsalicilic acid (200 mg/kg, p.o.) used as a reference drug. Moreover the extract, induced protection in mice in tail immersion test show good activity (Table 2) that is comparable with the standard drug pentazocine (30 mg/kg, p.o.).On Carrageenin-induced acute inflammation model the ethanol extract ,showed maximum inhibition of rat paw edema at the end of 3 h. (Table 3) similar to the standard drug diclofenac (12.5 mg/kg, p.o.). The edema suppressant effects were found to be significant ($P < 0.05$) as compared to control. The adjuvant-induced arthritis was also significantly inhibited ($P < 0.05$) after oral administration of ethanolic extract, after 30 days administration similar to the standard drug diclofenac (12.5 mg/kg, p.o.) (Table 4).

DISCUSSION

The tested samples protected mice against both thermal and chemical induced noxious stimuli, which were evidenced from both the tail immersion and acetic acid-induced writhing tests. Variation in order of activity for ethanol extract in acetic acid-induced writhing and tail immersion tests indicated that the different constituents present in different fractions may be responsible for central and peripheral analgesia.

Acetic acid, which is used as an inducer for writhing syndromes, causes algesia by releasing of endogenous substances, which then excite the pain nerve endings; the abdominal constriction is related to the sensitization of nociceptive receptors to prostaglandins [11]. It is possible that *F.vaillantii* extract exerts an analgesic effect probably by inhibiting the synthesis of prostaglandins.[12]

Table -1:Effect of the *F. vaillantii* aerial parts ethanolic extract on acetic acid induced writhing in mice

S. No.	Treatment	Dose(mg/kg)	No.of writhings
1	Control (CMC)	0.3% w/v	45.7 ± 4.2
2	Ethanolic Extract	200 mg/kg	28.5 ± 1.9 **
3	Ethanolic Extract	400 mg/kg	14.5 ± 1.8 **
4	Acetyl salicylic acid	(200 mg/kg)	21.8 ± 2.4 **

Values are expressed as mean ± S.E.M (n =6). ** P < 0.01 compared with vehicle control (ANOVA followed by Dunnet's t-test).

Table -2: Effect of the *F. vaillantii* aerial parts ethanolic extract on tail immersion method in mice

S. No.	Treatment	Dose	0 min	15 min	30 min	45 min	60 min
1	Control	-	3.60 ± 0.19	3.65 ± 0.18	3.77 ± 0.17	3.77 ± 0.15	3.80 ± 0.18
2	Pentazocine	30 mg/kg	3.66 ± 0.20	5.73 ± 0.31 **	8.22 ± 0.35 **	8.67 ± 0.29 **	8.48 ± 0.35 **
3	Ethanolic extract	200 mg/kg	3.75 ± 0.24	3.83 ± 0.17	5.57 ± 0.26 **	5.35 ± 0.19 **	4.47 ± 0.19
4	Ethanolic extract	400 mg/kg	3.62 ± 0.16	4.17 ± 0.28	7.92 ± 0.48 **	8.05 ± 0.28 **	6.48 ± 0.27 **

Values are expressed as mean ± S.E.M (n =6).* P < 0.05, ** P < 0.01 compared with vehicle control (ANOVA followed by Dunnet's t-test

Table -3: Effect of the *F. vaillantii* aerial parts ethanolic extract on Carrageenin induced paw edema in rats

S. No.	Treatment	Dose (mg/kg)	Paw volume (ml)			
			0 h	1 h	2 h	3 h
1	Control	-	0.31 ± 0.01	0.49 ± 0.01	0.47 ± 0.02	0.48 ± 0.02
2	Diclofenac	12.5	0.33 ± 0.01	0.31 ± 0.01 **	0.31 ± 0.01 **	0.31 ± 0.01 **
3	Ethanolic extract	200	0.33 ± 0.01	0.46 ± 0.01 **	0.45 ± 0.01 **	0.44 ± 0.02 **
4	Ethanolic extract	400	0.35 ± 0.01	0.46 ± 0.01 **	0.44 ± 0.01 **	0.43 ± 0.02 **

Values are expressed as mean ± S.E.M (n = 6). **P < 0.01 compared with vehicle control (ANOVA followed by Dunnet's t-test).

Table -4: Effect of the *F.vaillantii* aerial parts ethanolic extract on adjuvant-induced arthritis in rats

S. No.	Material	Dose (mg/kg)	Paw volume (ml)		
			0 h	18 h	30th day
1	Control		0.33 ± 0.01	0.72 ± 0.02	0.73 ± 0.02
2	Diclofenac	12.5	0.31 ± 0.01	0.48 ± 0.02 **	0.41 ± 0.02 **
3	Ethanolic extract	200	0.31 ± 0.01	0.62 ± 0.02 **	0.56 ± 0.03 **
4	Ethanolic extract	400	0.32 ± 0.01	0.60 ± 0.02	0.48 ± 0.03 **

Values are expressed as mean ± S.E.M (n =6).* P < 0.05, ** P < 0.01 compared with vehicle control (ANOVA followed by Dunnet's t-test)

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