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Ethanolic Whole Plant Extract of *Farsetia Jacquemontii* Showed Antipyretic & Analgesic Potential in Mice

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ABSTRACT

To evaluate the analgesic and antipyretic activities of ethanolic whole plant extract of *Farsetia jacquemontii* (EWFJ) in mice. The plant is the habitat of Rajasthan & Northwestern parts of India. In folk system of medicine, it is known as "Faridbooti", used traditionally in rheumatism, constipation, piles & abdominal pain. Antipyretic activity was assessed against Brewer's yeast induced pyrexia in mice using paracetamol (100 mg/kg) as standard. Analgesic activity was determined against hot plate & acetic acid induced writhing method in mice using diclofenac sodium (10 mg/kg) as standard. EWFJ (400 mg/kg) showed significant antipyretic effect after 2 hours of treatment when compared with standard paracetamol (100 mg/kg) in Brewer's yeast induced pyrexia model. EWFJ (400 mg/kg) reduced reaction time after 3 hours of treatment in the same manner as with standard diclofenac sodium (10 mg/kg) against hot plate method. EWFJ (400 mg/kg) showed the effect in similar manner as diclofenac sodium (10 mg/kg) against acetic acid induced writhing test. The study concluded antipyretic & analgesic effect of *Farsetia jacquemontii*.

Keywords: Antipyretic, Analgesic, *Farsetia jacquemontii*

INTRODUCTION

The importance of the reliability of medicinal plants had previously been focused on the treatment rather than the prevention of ailments. Despite that more than 90% of traditional medicinal remedies or formulations encompasses medicinal plants. Available literature also signified the implication of medicinal moieties from herbal resources in various preventive measures during adopted strategies for disease control.[1]

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In India, there are so many considerations involved giving rise to the use of medicinal plants in traditional system of medicines. Population escalation, insufficient supply towards the demand of drugs, unaffordable cost of therapies, adverse effects of various drugs of synthetic origins as well as the unavoidable development of resistance to the existing antimicrobials have directed to amplify the prominence for constituents from plant resources of their medicinal value against the widespread diversity of disease in human beings. [2]

Medicinal plants are measured as a rich source of constituents used in development of newer drugs either non- pharmacopoeial, pharmacopoeial or synthetic drugs. Furthermore, some plants are regarded as significant resource of nourishment which results in recommendation of their uses in therapeutic systems. Some of such plants comprise aloe, ginger, walnuts, green tea, turmeric & pepper etc. [2]

Exhaustive available literature establishes the medicinal uses of plant sources of wide & diverse origin in almost all aerial ailments of human body. However, there are so many plants still lacking to be scientifically proven in support of their traditional uses. Amongst those *Farsetia jacquemontii* is one which is widely used in eradication of pain, fever, inflammation, rheumatism constipation, piles, abdominal pain traditionally by native peoples of Rajasthan and Northwestern parts of India. [3,5] But its significance in these diseased conditions are still to be measured. Hence, this study encompasses the evaluation of antipyretic potential of *Farsetia jacquemontii* in mice.

Farsetia jacquemontii belonging to the family *Cruciferae,* is the habitat of Rajasthan and Northwestern parts of India. In folk system of medicine, it is known as "Farid-booti". [4]

METHODOLOGY

Collection & Authentication

The whole plant material was collected from native places of Jaipur (Rajasthan), in the month of January of 2018 which was authenticated by Prof. Alka Singh, Botanical department of Hindu college located at Moradabad (Uttar Pradesh), India wide letter no. 150118/B/09.

Preparation of extract

All aerial parts of *Farsetia jacquemontii* were dried in shade and powdered to a coarse form. The coarse powder was successively extracted according to their increasing polarity i.e. petroleum ether<chloroform<ethyl acetate<ethanol using continuous hot Soxhlet extractor at 60°C. The extracts were then concen-

trated under reduced pressure and preserved at low temperature for further evaluation of antipyretic & analgesic activity. [6,7] After extraction, individual extracts were introduced to preliminary phytochemical screening. Ethanolic extract selected for the further analgesic & antipyretic activities due to the presence of polyphenols with ethanolic extract that might be responsible for such pharmacological effects. Moreover, ethanolic extract produced high yield amongst all the selective solvent system and suggested to be safer for human consumption.

Chemicals and instruments

All chemicals used in this study were of analytical grade purchased from sigma Aldrich. Reference standard paracetamol & diclofenac sodium was received as gift sample from AKUMS, Haridwar, UK, India.

Animals

Healthy & adult mice of swiss albino strain weighing from 20 g to 30 g of either sex was used for antipyretic activity. All mice were housed under standard laboratory conditions and were fed with standard animal feed with freely access to water. All adopted standard experimental protocols were approved from the IAEC (Institutional Animal Ethical Committee) with CPCSEA registration number 1205/PO/Re/08/CPCSEA.

The mice were divided in six groups. Each group contained 6 mice (n=6) in each group. All mice in each group were overnight fasted except free access to water before performing experimentation.

Groups were designed as follow:

Group I (Control group): received only saline.

Group II (Standard group) administered with paracetamol (100 mg/kg) for antipyretic activity whereas with diclofenac sodium (10 mg/kg) for analgesic activity.

Group III (Test 1) received 50 mg/kg of EWFJ.

Group IV (Test 2) received 100 mg/kg EWFJ.

Group V (Test 3) received 200 mg/kg EWFJ.

Group VI (Test 4) received 400 mg/kg EWFJ.

Acute oral toxicity study

OECD guidelines 423 were adopted for oral acute toxicity studies.[7]

The ethanolic extract was devoid of any toxicity in mice using oral route. Hence 50, 100, 200 and 400 mg/kg doses of extract were selected for the study.

Antipyretic potential (pyrexia induced with Brewer's yeast)

Antipyretic potential of EWFJ was determined against pyrexia induced with Brewer's yeast in mice. A digital thermometer was utilized to record the normal temperature. Then the pyrexia was induced with s.c. injection of a 20% aqueous suspension of Brewer's yeast prepared as 10 mL/kg. Rectal temperature after eighteen hours was recorded and corresponding groups were served as per treatment with saline, standard & different doses of EWFJ respectively. Rectal temperature, at the interval of 0.5, 1, 2, 3- & 4-hours post drugs administration, were measured.[8]

Analgesic potential

Analgesic potency of EWFJ was evaluated adopting following methods.

Eddy's hot-plate method

Mice were placed on hotplate individually which was thermally constant at the temperature of 55°C. The time at which mice responded was noted down. Paw licking or the jumping (whichever appeared first) were the stimulus of pain perceived by mice after their respective treatments. A maximum of 15 seconds was kept as cut off time to avoid any injury to paws of mice. Percent increase in reaction time was noted (as index of analgesia) at each time interval (0.5, 1, 2, 3 hours).[9]

Writhing response induced with acetic acid

Intraperitoneal injection of 1% (v/v) acetic acid at a dose of 2.3 ml/kg induced abdominal constriction in mice. Animals were pre-treated with their respective treatments, 30 min before acetic acid administration. The number of abdominal constrictions was cumulatively counted for twenty minutes. The percentage inhibition was calculated by using below given formula to record analgesic potential: -[10, 11]

Percentage Inhibition (Analgesic activity) =

[Mean of writhing count {Control group- Treated group} / Mean of writhing count of control group] x 100

Statistical Analysis

Obtained data was illustrated in form of mean & SEM (Standard Error Mean). The data was further analyzed statistically adopting student's t-test whereas in case of unpaired data, p-values were determined.

Results were assumed to be of significance if p-values were less than 0.05 whereas if p-values were found to be lesser than 0.005, then the results were expressed as highly significant.

RESULTS AND DISCUSSION

Antipyretic potential (pyrexia induced with Brewer's yeast)

The obtained results are shown in **Table 1** & **Fig.1**

Table 1. Antipyretic activity revealed by different groups against pyrexia induced with Brewer's yeast

Groups	Rectal-Temperature (°C)						
	Initial before yeast injection	18 Hrs. after Yeast injection	Time after drug administration (hrs)				
			0.5 hrs	1 hr	2 hrs	3 hrs	4 hrs
Control	37.01±0.056	39.00±0.066	39.01±0.062	39.14±0.08	39.15±0.05	38.88±0.041	38.45±0.054
Paracetamol (100 mg/kg)	37.12±0.052	38.99±0.085	38.66±0.094[d]	37.88±0.077[d]	37.9±0.082[d]	37.23±0.084[d]	37.02±0.061[d]
Ethanolic Extract (50 mg/kg)	36.99±0.101	39.11±0.055	38.80±0.042	38.45±0.071[d]	38.66±0.079[d]	38.42±0.051[d]	38.12±0.031[d]
Ethanolic Extract (100 mg/kg)	37.10±0.081	39.1±0.072	38.45±0.055[c]	38.66±0.056[d]	38.22±0.072[d]	37.99±0.034[d]	38.10±0.051[d]
Ethanolic Extract (200 mg/kg)	37.06±0.068	39.90±0.062	39.1±0.055[d]	38.22±0.066[d]	38.01±0.087[d]	37.76±0.034[d]	37.33±0.045[d]
Ethanolic Extract (400 mg/kg)	37.12±0.045	38.99±0.064	38.45±0.049[d]	37.91±0.067[d]	37.45±0.045[d]	37.33±0.10[d]	37.12±0.081[d]

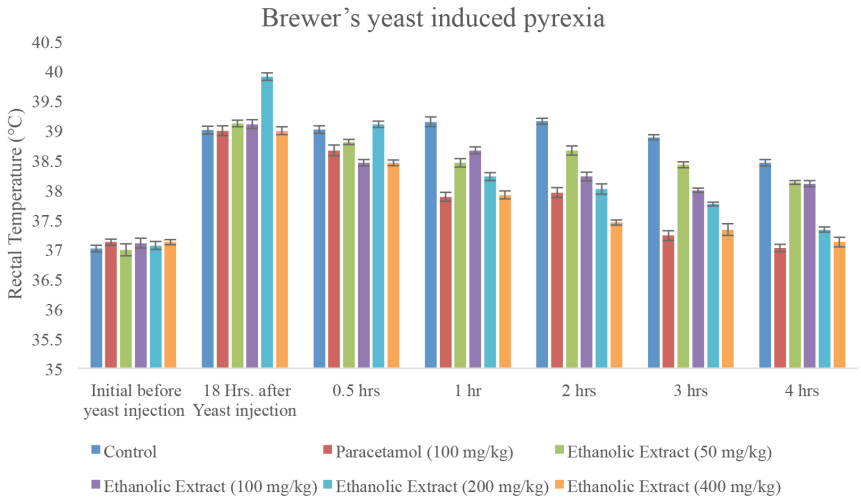

Figure 1. Antipyretic activity revealed by different groups against pyrexia induced with Brewer's yeast

Values are expressed as mean ± SEM (n=06): Significance at $p<0.001^d$ as compared to control

As revealed from obtained results, EWFJ (400 mg/kg) showed significant antipyretic effect after 2 hours of treatment when compared with standard paracetamol (100 mg/kg) in Brewer's yeast induced pyrexia model.

The study affirmed the antipyretic potential of EWFJ (400 mg/kg).

Analgesic Activity

Analgesic activity of EWFJ was evaluated against Eddy's hot-plate test & writhing response induced with acetic acid.

Eddy's Hot-Plate Test

Obtained results from Eddy's hot-plate test are shown in **Table 2** & **Fig.2**.

As depicted in the figure, EWFJ (400 mg/kg) reduced reaction time after 3 hours of treatment in the same manner as with standard diclofenac sodium (10 mg/kg) when explored to hot plate method.

The study evidenced the existence of analgesic effect of EWFJ at the dose of 400 mg/kg.

Table 2. Reaction time (seconds) shown by different groups at different time intervals.

Groups	Reaction Time (Seconds)				
	Time after drug administration (Hrs)				
	Initial	0.5 hrs	1 hr	2 hrs	3 hrs
Control	6.12 ± 0.066	6.22 ± 0.068	6.18 ± 0.077	6.18 ± 0.06	6.20 ± 0.087
Diclofenac Sodium (10 mg/kg)	6.31 ± 0.056	7.58 ± 0.054[d]	8.60 ± 0.067[d]	9.41 ± 0.062[d]	9.23 ± 0.1092[d]
Ethanolic Extract (50 mg/kg)	6.12 ± 0.0479	6.25 ± 0.022[a]	6.71 ± 0.042[d]	7.10 ± 0.102[d]	7.23 ± 0.066[d]
Ethanolic Extract (100 mg/kg)	6.17 ± 0.073	7.11 ± 0.067[d]	7.25 ± 0.049[d]	7.90 ± 0.067[d]	7.85 ± 0.045[d]
Ethanolic Extract (200 mg/kg)	6.15 ± 0.036	7.45 ± 0.062[d]	7. 73 ± 0.045[d]	8.21 ± 0.063[d]	8.20 ± 0.034[d]
Ethanolic Extract (400 mg/kg)	6.15 ± 0.066	7.78 ± 0.063[d]	7.78 ± 0.067[d]	8.81 ± 0.098[d]	8.85 ± 0.066[d]

Values are expressed as mean ± SEM (n=06): Significance at $p<0.001^{d}$ as compared to control

Writhing Response induced with acetic acid

Obtained results are summarized with the help of **Table 3** & **Fig.3**.

As shown in the figure, EWFJ (400 mg/kg) showed the effect in similar manner as diclofenac sodium (10 mg/kg) against acetic acid induced writhing test.

Table 3. Number of writhing & Percentage inhibition shown by different groups

S. No.	Groups	No. of Writhing (Mean ± SEM)	% Inhibition
1	Control	37.83	
2	Diclofenac Sodium (10 mg/kg)	7.83	79.3
3	Ethanolic Extract (50 mg/kg)	24.66	34.81
4	Ethanolic Extract (100 mg/kg)	15.16	59.92
5	Ethanolic Extract (200 mg/kg)	10.16	73.14
6	Ethanolic Extract (400 mg/kg)	9.16	75.79

Values are expressed as mean ± SEM (n=06): Significance at p<0.001[d] as compared to control

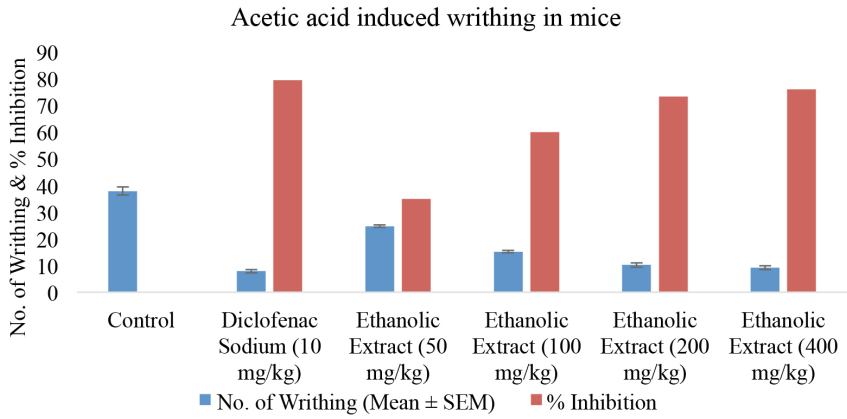

Figure 3. Number of writhing & Percentage inhibition shown by different groups

The study revealed the analgesic potential of EWFJ at the dose of. 400 mg/kg.

Present study concluded the confirmation of antipyretic & analgesic potenctial of *Farsetia jacquemontii*. Antipyretic potential of ethanolic whole plant extract of *Farsetia jacquemontii* was measured against pyrexia induced in mice with Brewer's yeast, using paracetamol at the dose of 100 mg/kg as standard and results demonstrated moderately significant (p<0.001) after 2 hours of pretreatment when compared to standard paracetamol. Analgesic activity of same was determined against hot plate method & writhing induced with acetic acid in mice using diclofenac sodium at the dose of 10 mg/kg as standard. The

results revealed EWFJ being significant ($p<0.001$) confirming to antipyretic as well as analgesic effects of the plant.

The study will be beneficial for further researchers in progress to isolate as well as identify the compounds responsible for such activities.

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