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Research Article

Analgesic and Antipyretic Effects of the Ethanolic Fruit Extract of the *Momordica cymbalaria* Hook. Fenzl

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ABSTRACT
Analgesic and Antipyretic Activities of the Ethanolic fruit Extract of the *Momordica cymbalaria* Hook. Fenzl. Ethyl alcohol extract of M.cymbalaria fruits evaluated for Acetic acid induced writhing, Tail-immersion and Yeast induced pyrexia model was used to evaluate antipyretic activity. *M.cymbalaria fruit* ethanolic extract (250 and 500 mg/kg, po.) significantly reduced the acetic acid-induced writhing and reaction time in tail-immersion test. It also showed a marked antipyretic effect by causing a reduction in yeast-induced fever. The ethanolic extract of *Momordica cymbalaria* (500mg/kg) showed almost same effect to the same degree as paracetamol (20mg/kg). This study shows that ethanolic extract of *M.cymbalaria* Hook.F. has significant analgesic and antipyretic activity.

Key words: *Momordica cymbalaria*, analgesic, antipyretic.

INTRODUCTION

Pain is an ill-defined, unpleasant, sensation usually evoked by an external or internal noxious stimulus. It is a warning signal primarily protective in nature, but causes discomfort. Analgesics are the drugs that selectively relieve pain by acting on the central nervous system or on peripheral pain mechanism without significantly altering consciousness.

Momordica cymbalaria Hook. F. belongs to the Cucurbitaceous family. The plant is a perennial herbaceous climber either allowed to trail on the ground or to climb on supports with the aid of tendrils. It is found in the south Indian states of Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu as a weed. The nutritional studies of the fruits of *M.cymbalaria* have reported that they possess a high level of calcium, potassium and vitamin C, in addition to its high crude fiber content. [1] The fruit extracts of *M.cymbalaria* were shown to have antidiabetic, hypolipidemic [2, 3], antidiarrhoeal [4], and antiulcer activity [5]. The roots of the plant are used for menstrual irregularities, anti fertility, antiovulatory, abortificient [6], and hepatoprotective [7] activity. However, there are no reports to our knowledge on its analgesic and antipyretic activities. Hence, the present study was undertaken to investigate the analgesic and antipyretic potential of the ethanolic fruit extract of *M.cymbalaria* Hook. in experimental animal models.

MATERIALS AND METHODS

Plant material: The fruits of *Momordica cymbalaria* Hook F. was collected in November 2011 from Anantapur district, Andhrapradesh, India. The fruits were dried under shade with occasional shifting and then powdered with a mechanical grinder and stored in an air tight container.

Preparation of extract: The powdered fruit was extracted with ethanol by the soxhlet apparatus. The solvent was concentrated by using with hot water bath (40^0C).

Animals used: Wistar rats, weighing 200-220g, and Swiss albino mice, weighing 18-25g, of either sex were procured from the animal house of the Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India. All the animals were kept in standard polypropylene cages under standard conditions: temperature (24 ± 1^0C), relative humidity (40-45%), and a12:12 light: dark cycle. The animals were fed a standard rodent diet, and water was given *ad labium*. The animals were allowed to acclimatize to laboratory conditions 48h before the start of the experiment. The experimental protocol is duly approved by the institutional ethical committee (Reg.no.1284/ac/09/CPCSEA)

Acute Toxicity Study: Six Wistar rats (200-220g) and six Albino mice (18-25 g) of either sex were dosed with Momordica cymbalaria ethanolic extract in different concentrations and were observed for any symptoms of toxicity for 48h as per guideline no.425 (OECD 2001), and LD_{50} was estimated to be >5000mg/kg. Based on the results obtained from this study, the doses of further pharmacological studies were fixed to be 250 and 500 mg/kg. [8]

Analgesic Activities: Acetic acid- induced writhing method- Mice were divided into four groups each consisting of six mice. They were starved for 18h. the treatment regimen was as follows:

1. Group I (Control): Vehicle (3 ml/kg, ip.), Normal saline.
2. Group II (Standard): Aspirin (150 mg/kg, po.)
3. Group III (Test-1): Ethanolic fruit extract of

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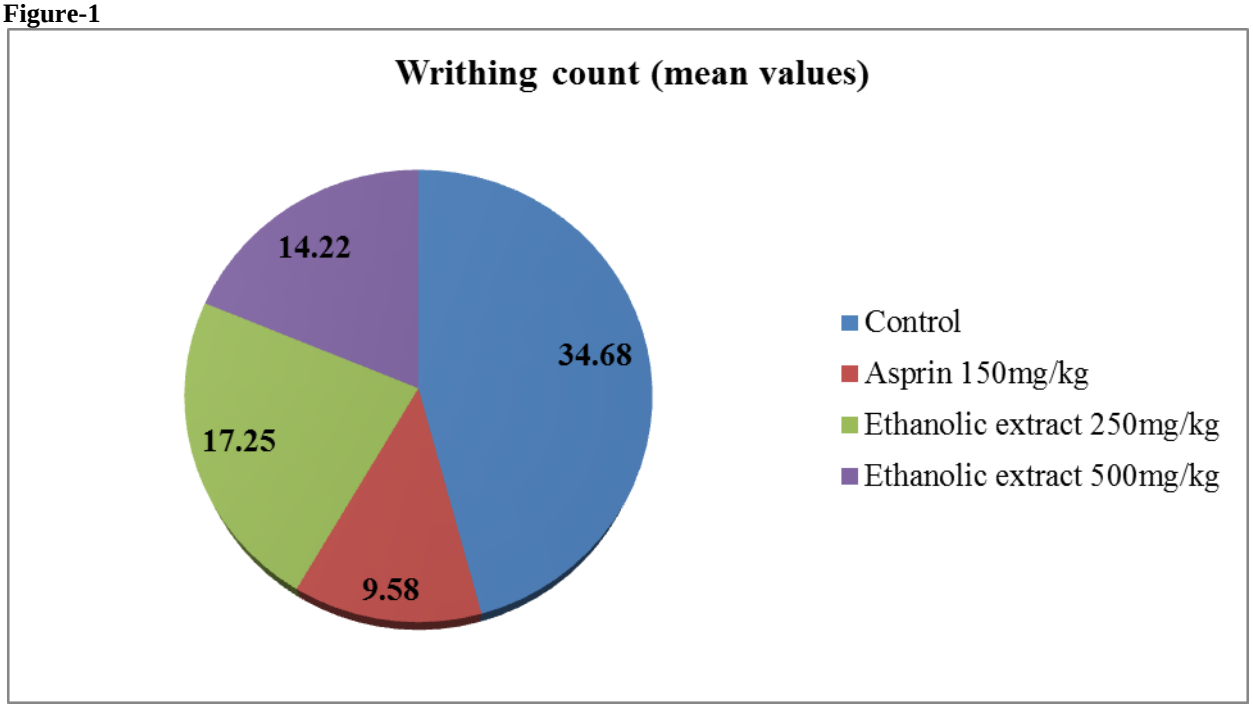
Table.1-Effect of ethanolic extracts of the *Momordica cymbalaria* fruit in acetic acid-induced writhing in mice

Group	Treatment	Writhing count	Inhibition (%)
I	Control (3 ml/kg, po.)	34.68±1.33	-
II	Aspirin (150 mg/kg, po.)	09.58±0.14*	73.95
III	Ethanolic extract (250 mg/kg, po.)	17.25±0.21*	50.20
IV	Ethanolic extract (500mg/kg, po.)	14.22±0.21*	58.96

Values are expressed as mean±SEM (standard error mean); n=6, p<0.01 when compared to control mice*

Figure-1



M.cymbalaria (250 mg/kg, po.)
4. Group IV (Test-2): Ethanolic fruit extract of *M.cymbalaria* (500 mg/kg, po.)
After half an hour, all mice received a 0.7% aqueous solution of acetic acid 10mg/kg, ip. and writhings were counted for 10 minutes after the acid injection. [9]
Acetic acid-induced writhing test

$$\% \text{ Inhibition} = \frac{\text{[Mean no. of writhing in the control group} - \text{Mean no. of writhing in the test group]}}{\text{Mean no. of writhing in the control group}} \times 100$$

Tail-immersion method: Mice were divided into four groups each consisting of six mice. The treatment regimen was as follows:
1. Group I (Control): Vehicle (3 ml/kg, ip.), Normal saline.
2. Group II (Standard): Pentazocine (30 mg/kg, po.)
3. Group III (Test-1): Ethanolic fruit extract of *M.cymbalaria* (250 mg/kg, po.)
4. Group IV (Test-2): Ethanolic fruit extract of *M.cymbalaria* (500 mg/kg, po.)
The distal part of the tail of the animals was immersed in hot water maintained at 55 ± 1.0^{0}C. The time taken to withdraw the tail was noted as the reaction time. A cut off time of 10 Sec. was maintained at 55^{0}C to prevent tissue damage. The reaction time was checked at 0, 15, 30, 45 and 60 min, respectively after treatment. [[10]]

Antipyretic Activity: Rats were divided into four groups each consisting of six rats. The test was performed in rats by injecting 10ml/kg. s.c. Of the 15% aqueous solution of Brewer's yeast to induce pyrexia. The rectal temperature of each animal was taken before and after the yeast injection using a distal clinical thermometer. Animals that did not show a minimum increase of 0.7^{0}C in the temperature 24 h after the yeast injection were discarded. [11] The selected animals were divided into four groups and treated as follows:
1. Group I (Control): Vehicle (3 ml/kg, ip.), Normal saline.
2. Group II (Standard): Paracetamol (20 mg/kg, po.)
3. Group III (Test-1): Ethanolic fruit extract of *M.cymbalaria* (250 mg/kg, po.)
4. Group IV (Test-2): Ethanolic fruit extract of *M.cymbalaria* (500 mg/kg, po.)
The rectal temperature of each animal was again recorded at 0.5, 1, 1.5, and 2 h after treatment.

STATISTICAL ANALYSIS

Data were subjected to statistical analysis using ANOVA, and statistical comparison was done using the Tukey-kramer multiple comparison tests. Values of $P< 0.01$ were considered statistically significant.

RESULTS

Table.2-Effect of ethanolic extracts of the *Momordica cymbalaria* fruit on tail-immersion test in mice

Group	Treatment	Reaction time (sec.)	Latency (%)
I	Control (3 ml/kg, po.)	2.70±0.60	-
II	Aspirin (150 mg/kg, po.)	4.82±0.22*	76.53
III	Ethanolic extract (250 mg/kg, po.)	3.72±0.45*	37.66
IV	Ethanolic extract (500 mg/kg, po.)	4.06±0.63*	47.22

Values are expressed as mean ± SEM (standard error mean); n=6, p<0.01 when compared to control mice.*

Figure-2

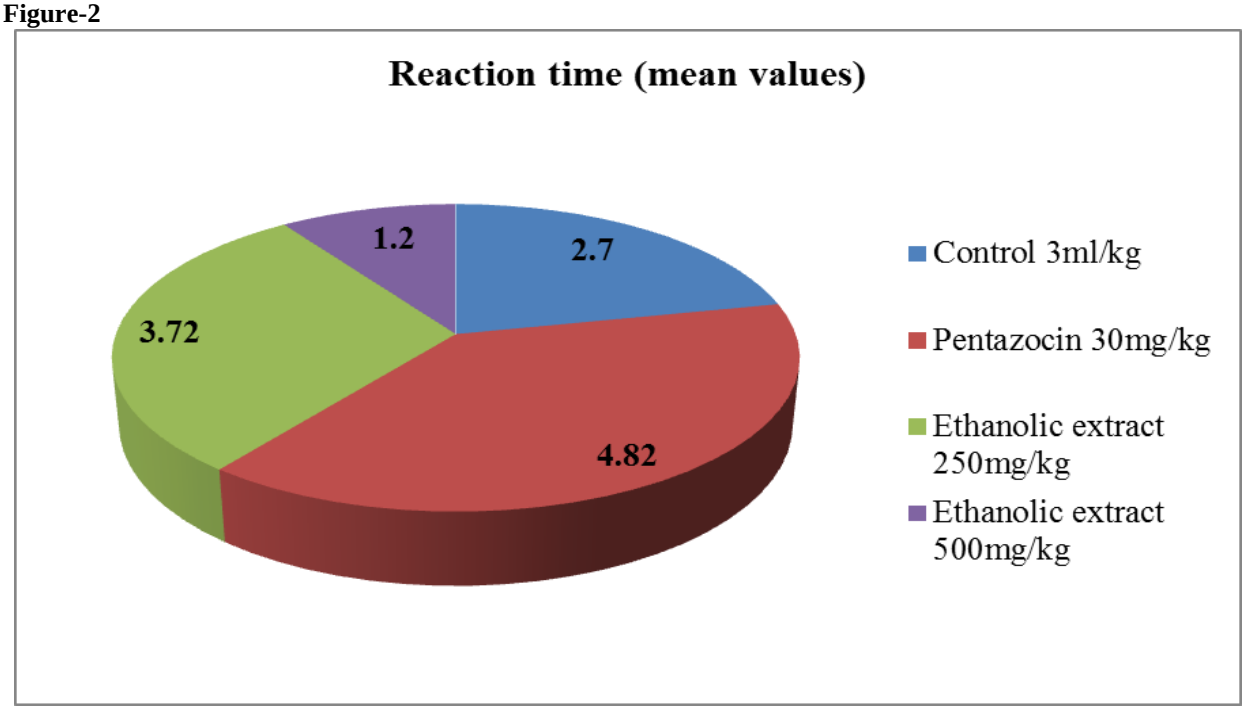


Table.3-Effect of ethanolic extracts of the *Momordica cymbalaria* fruit on yeast-induced pyrexia in rats.

Group	Treatment	Rectal Temperature (^{0}C)					
		-24 h	0 h	0.5 h	1.0 h	1.5 h	2.0 h
I	Control (3ml/kg, po.)	38.4±0.2	39.3±0.2	39.4±0.2	39.3±0.4	38.7±0.3	38.4±0.1
II	Aspirin (150 mg/kg, po.)	38.6±0.3	39.6±0.1	37.2±0.4**	37.2±0.2**	36.3±0.3**	36.2±0.3**
III	Ethanolic extract (250 mg/kg, po.)	38.8±0.4	38.6±0.2	37.2±0.6*	37.1±0.2**	37.2±0.5**	37.1±0.2*
IV	Ethanolic extract (500mg/kg, po.)	38.5±0.2	40.1±0.3	38.6±0.2*	37.5±0.2	37.5±0.1**	37.2±0.3**

Values are expressed as mean ± SEM (standard error mean); n=6, p<0.05 and **p<0.01 when compared to control rats.*

Effect on acetic acid writhing: The ethanolic extracts (250 and 500 mg/kg, po.) significantly reduced the acetic acid-induced writhing by 50.20% and 58.96% respectively [Table-1].

Effect on the tail-immersion test: The ethanolic extracts (250 and 500 mg/kg, po.) induced significant protection [Table-2] in mice in tail-immersion test, with the ethanolic extracts (500mg/kg) being more active compared to the standard drug Pentazocine (30mg/kg).

Anti pyretic Effect: The extracts showed a marked antipyretic effect [Table-3] by causing a reduction in yeast-induced fever. The ethanolic extract of *Momordica cymbalaria* (500mg/kg) showed almost same effect to the same degree as paracetamol (20mg/kg).

DISCUSSION

Several experimentally induced laboratory models were employed in evaluating the analgesic and antipyretic activities of ethanolic extracts of *Momordica cymbalaria*. The results obtained showed that the ethanolic extracts possess a significant analgesic effect on the various pain models used. A significant inhibitory effect was shown by both the extracts in the writhing test (a test useful for evaluating mild analgesic and NSAIDS). This suggests that the analgesic effect of the extract may be peripherally mediated. [9] The extracts also showed a significant effect in the tail-immersion tests (centrally acting analgesic drugs elevate the pain threshold of animals toward heat

and pressure). The effect of the extracts on this pain model indicates that it might be centrally acting. [10] The extract caused a better hypothermal activity against yeast-induced pyrexia in rats. The subcutaneous injection of yeast induces pyrexia by increasing the synthesis of prostaglandin and is used to screen agents for an antipyretic effect. [11]

The analgesic and antipyretic activity of *M.cymbalaria* Hook. may be due to the individual or combined action of bioactive constituents present in it. The findings will be helpful for further Phytochemical and Pharmacodynamic investigations to find the active constituents responsible for the activity, which may explore some new and promising leads.

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