



EVALUATION OF CNS DEPRESSANT ACTIVITY OF *MOMORDICA DIOICA* ROXB WILLD FRUIT PULP

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ABSTRACT

The present study deals with the investigation of the petroleum ether, ethyl acetate, methanol and aqueous extracts of *Momordica dioica* pulp was assessed for effect on the central nervous system (CNS) using neuropharmacological experimental models (muscle co-ordination and locomotor activity) in mice. These extracts also used for a dose-dependent reduction of the onset and duration of reduction of locomotor activity. The result of the study reflected that methanol and aqueous extract of *Momordica dioica* fruit pulp (100 mg/kg and 200 mg/kg, p.o.) mostly decreased both activities as compare to other extracts. These results suggest that the methanolic and aqueous extracts of *Momordica dioica* fruits pulp possess a wide range of CNS activities, which need further investigation. These results suggest that the extract possess CNS depressant activity.

Keywords: *Momordica dioica*, CNS depressant, Photoactometer, Rotarod.

INTRODUCTION

Use of plant products is increasing in many segment of the population¹. At present, thousands of plant metabolites are being successfully used for the treatment of variety of diseases. According to an estimate, 80% of the world's population relied upon plants for their medication². The use of the medicinal plants is increasing in many countries where 35% of drugs contain natural products³. Presently drugs used for analgesic effect are synthetic in nature, prolonged use of which causes many side and toxic effects. Moreover, synthetic drugs are very expensive to develop. It is therefore essential that efforts should be made to introduce new medicinal plants to develop cheaper drugs. *Momordica dioica* is a pereannial dioiceous climber found throughout India⁴. *Momordica dioica* Roxb. belongs to the family Cucurbitaceae⁵. The fruits pulp and root used in the treatment of analgesic⁶ ⁷. There is an insufficient quantity of data about the pharmacological activities of *Momordica dioica*, which prompted us to carry out this pharmacological evaluation of *Momordica dioica* fruit pulp extracts to verify the medicinal properties. In the present study petroleum ether, ethyl acetate, methanol and aqueous extracts of *Momordica dioica* fruit pulp was evaluated for its central nervous system (CNS) depressant activities by using neuropharmacological experimental models (muscle co-ordination and locomotor activity) in mice.

MATERIALS AND METHODS

Plant material

Fruit of *Momordica dioica* were collected from Therla, Ta. Patoda, Beed district of Maharashtra, India in September 2009 and authenticated by P.G. Diwakar, Botanical Survey of India, Pune, where a sample specimen (voucher number: RAMAM1) No. BSI/WRC/Tech/2009/593 has been deposited.

Extraction

Shade dried, cleaned from extraneous materials, mechanically grinded and coarsely powdered fruit pulp of *Momordica dioica* was subjected to successive solvent extraction in Soxhlet extractor using petroleum ether, ethyl acetate, and methanol as solvent and the marc left was refluxed with water. All the extracts were vacuum dried to produce petroleum ether (1.5%), Ethyl acetate (2.6%), Methanol (18%) and Aqueous (4.67%) extracts respectively.

Animals

Swiss albino mice weighing 25-30 g were used. They were caged in a room under standard laboratory conditions (temperature 23 ± 1°C, relative humidity 55% ± 5% and lighting 08:00 20:00 h). The animals were fed on a pelleted diet (Chakan Oil Mills, Pune, India) and water ad libitum. The animals were transferred to the laboratory at least 1 h before the start of the experiment. The

experiments were performed during the day (08:00-16:00 h). The ethical committee of the institute approved the protocol of the study.

Drugs and chemicals

The following drugs and chemicals were used. Drugs: Diazepam (Maneesh Pharma Pvt Ltd., Mumbai) purchased from commercial source. Chemicals: petroleum ether (60-80°C) (RFCL Ltd, India), ethyl acetate (RFCL Ltd, India), methanol (MERCK Ltd, India) and DMSO (Research Lab Industries, India).

CNS depressant activity

Two standard neuropharmacological experimental methods viz. motor coordination and locomotor methods were employed to determine the CNS depressant activity.

Effect on motor coordination⁸

Digital rotarod apparatus (Inco - Ambala, India) was used to evaluate the muscle relaxing and sedative effects in the extract and vehicle-treated mice. The animals were trained to remain for 3 min on the rod rotating at a speed of 25 rpm. investigation. Only animals performing up to the required parameter were included in the test and divided into six groups. Group I served as control and received only vehicle. Group II received reference standard diazepam at a dose of 2 mg/kg i.p. 30 min before the test. Groups III, IV, V and VI were treated intraperitoneally route with *Momordica dioica* fruit pulp petroleum ether, ethyl acetate, methanol and aqueous extracts respectively at a dose of 100 mg/kg. All animals were subsequently assessed for their performance on the rotarod after 30 min. The fall-off time from the rod was noted for each animal.

Effect on locomotor activity⁹

Locomotor activity was recorded with a using a digital activity cage (Actophotometer Space-lab, India). The animals were divided into Six groups (n = 6). Each mouse was individually placed in the actophotometer for 5 min. Six groups of animals were intraperitoneally route each treated with vehicle and extract at a dose of 100 and 200 mg/kg respectively. Basal reaction time was noted before and 30 min after the administration of treatment. A count is recorded when the beam of light falling on the photocell of actophotometer is cut off by mice. Group II received reference standard diazepam at a dose of 2 mg/kg (i.p.) 30 min before the test. Mean change in the locomotor activity was recorded for each group.

Statistical analysis

The observations are reported as mean ± SEM. Differences between group means were assessed by one-way analysis of variance (ANOVA) followed by Dunnett's test to assess the significance of differences between individual groups. P > 0.05 was considered insignificant.

RESULTS**Preliminary acute toxicity test**

All mice were free of any toxicity up to the dose of 2 gm/kg without any mortality. From this data, two different doses, viz., 100 and 200 mg/kg, were selected for further study.

General pharmacological observation

Mice orally treated with the *Momordica dioica* fruit pulp extract (100 and 200 mg/kg) and submitted to the general observations did not show any difference in their behavior and parameters determined during the observation periods. They were alert, with normal grooming, touch response and pain response. Alertness, limb tone

and grip strength were normal and the animals did not show staggering gait or contractions.

Effect on motor coordination

The *Momordica dioica* fruit pulp extract (100 mg/kg) of petroleum ether, ethyl acetate, methanol and aqueous extracts all extracts shows the significant effect on the motor coordination as determined by the rotarod performance. But among them methanol and aqueous extracts shows more significant effect as compare to petroleum ether and ethyl acetate extracts. However, the diazepam-treated group revealed a statistically significant decrease in motor coordination activity as compared with the control [Table 1].

Table 1: CNS depressant activity of *Momordica dioica* fruit pulp on mice by rotarod test

Sr. No.	Group	Duration of catalepsy (sec) Mean \pm SEM at					
		30 min	60 min	90 min	120 min	150 min	180 min
1	Control	216.67 \pm 2.603	221.33 \pm 3.712	227 \pm 6.083	308.33 \pm 5.457	318.67 \pm 4.410	314.33 \pm 7.219
2	Standard	5 \pm 0.577**	3.67 \pm 0.33**	10.33 \pm 0.8819**	16.67 \pm 0.882**	26 \pm 1.155**	37 \pm 2.887**
3	Petroleum ether	198.33 \pm 4.910*	119.33 \pm 2.963**	156.67 \pm 7.860**	190.67 \pm 4.485**	238.33 \pm 9.062**	245.67 \pm 9.333**
4	Ethyl acetate	263.67 \pm 6.489**	199 \pm 4.583*	111 \pm 4.359**	261.67 \pm 9.244**	279.33 \pm 8.090**	290 \pm 3.512*
5	Methanol	66.67 \pm 5.487**	42 \pm 3.464**	30 \pm 1.155**	84 \pm 3.464**	155 \pm 7.234**	167.67 \pm 3.480**
6	Aqueous	39.33 \pm 4.807**	51.67 \pm 4.842**	171.33 \pm 2.906**	210 \pm 6.000**	220.67 \pm 1.856**	270.33 \pm 2.848**

Data are expressed as Mean \pm S.E.M, n = 6 in each group, Statistical analysis done by one way ANOVA followed by Dunnett's test. *p<0.05, **p<0.01, compared to control group

Effect on locomotor activity

The *Momordica dioica* fruit pulp extract (100 and 200mg/kg) of petroleum ether, ethyl acetate, methanol and aqueous extracts all extracts shows the significant effect on the locomotor activity as determined by the actophotometer performance. But among them methanol and aqueous extracts shows more significant effect as

compare to petroleum ether and ethyl acetate extracts. As well as when these extracts used for a dose dependent activity then these extracts shows the onset and duration of reduction of locomotor activity. However, the diazepam treated group revealed a statistically significant decrease in motor coordination activity as compared with the control [Table 2].

Table 2: CNS depressant activity of *Momordica dioica* fruit pulp on mice by actophotomotor test

Sr. No.	Group	Dose	Duration of catalepsy (sec) Mean \pm SEM at					
			30 min	60 min	90 min	120 min	150 min	180 min
1	Control	---	202.67 \pm 3.712	97.33 \pm 2.603	94.33 \pm 5.547	87 \pm 7.81	123.67 \pm 3.84	161.67 \pm 9.504
2	Standard	2mg/kg	112.33 \pm 1.453**	38.67 \pm 4.055**	2.67 \pm 0.33**	8.67 \pm 1.764**	21.33 \pm 3.18**	39.33 \pm 7.506**
3	Petroleum ether	100	281.67 \pm 6.692**	267.67 \pm 5.239**	246.33 \pm 5.548**	131 \pm 5.686**	157.67 \pm 5.239**	177.67 \pm 5.239
4	Ethyl acetate	200	121.67 \pm 5.823**	100.67 \pm 1.838	76.67 \pm 5.20**	90.67 \pm 2.231	99.33 \pm 3.040**	112.33 \pm 5.181**
		100	285 \pm 7**	272.33 \pm 7.881**	75.67 \pm 6.96	88 \pm 5.774	107.67 \pm 2.906	153 \pm 6.506
5	Methanol	200	50 \pm 2.989**	28 \pm 2.221**	6 \pm 0.3651**	44.67 \pm 3.547**	78.33 \pm 3.313**	111.33 \pm 1.116**
		100	253.67 \pm 6.766**	175.87 \pm 4.055**	91 \pm 6.658**	251.33 \pm 3.844**	280 \pm 8.88**	305 \pm 4.359**
6	Aqueous	200	36.33 \pm 2.348**	8.33 \pm 1.174**	62.33 \pm 3.471**	76.83 \pm 4.262	90.67 \pm 2.348**	99.67 \pm 2.431**
		100	250 \pm 6.658**	127 \pm 5.557**	60.33 \pm 2.906**	70.69 \pm 4.842	185 \pm 2.646	286.33 \pm 4.906**
		200	128.67 \pm 8.249**	25.33 \pm 3.393**	44 \pm 3.183**	67.33 \pm 3.602**	89.67 \pm 5.777**	106.67 \pm 3.190**

Data are expressed as Mean \pm S.E.M, n = 6 in each group, Statistical analysis done by one way ANOVA followed by Dunnett's test. **p<0.01, *p<0.05 compared to control group.

DISCUSSION

In this work, the effects of different doses of petroleum ether, ethyl acetate, methanol and aqueous extracts of *Momordica dioica* fruit pulp were studied in several neuropharmacological models. The results of the study provided evidence that the methanolic and aqueous extracts of *Momordica dioica* fruit pulp possess a wide spectrum of CNS activity. Locomotor activity is considered as an index of alertness and a decrease in it is indicative of sedative activity¹⁰. However, same extracts of the doses of *Momordica dioica* fruit pulp extracts were found effect on the locomotor activity. Moreover, the effect on locomotor activity works to the advantage of the plant extracts activity¹¹.

CONCLUSION

From the findings of the present study it can be concluded that the methanolic and aqueous extracts of *Momordica dioica* fruit pulp possesses significant analgesic and antipsychotic activities,

which may be attributed to various mechanisms such as decreased serotonergic and dopaminergic transmission and increased cholinergic transmission. These findings scientifically validated the traditional claim and suggested its valuable role in the treatment of various CNS disorders. The study further revealed that the extract is devoid of any neurotoxicity and CNS depressant effect. As the present study is based upon the behavioral models without any associated neurochemical estimations, it becomes necessary to carry out the specific binding studies and estimations of the neurotransmitter levels in the brain to understand the exact mechanism of action and extend these results further.

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