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Analgesic and Anti-inflammatory Activities of *Momordica dioica* Fruit Pulp

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Abstract – In the present study *Momordica dioica* fruit pulp was successively extracted with hexane and methanol. To the concentrated methanolic extract ethyl acetate was added and ethyl acetate soluble portion was separated. Both hexane extract (HE) and ethyl acetate soluble portion (EASP) of methanolic extract was vacuum dried to yield the respective HE and EASP. HE and EASP were evaluated for its analgesic and anti-inflammatory activities in a dose of 50 and 100 mg/kg in mice and rats. Both HE and EASP significant exhibited analgesic and anti-inflammatory activities when compare to standard drug.
Keywords – analgesic, anti-inflammatory, *Momordica dioica*

Introduction

Momordica dioica is a perennial dioiceous climber with tuberous roots found throughout India (Sastri, 1962). The fruits have been used in the treatment of inflammation caused by lizard excretion (Nadkarni, 1976), mental and digestive disorders (Satyavati, 1987). The whole plant is known for its use in the treatment of eye disease, poisoning and fever (Satyavati, 1987). There is paucity of data about the pharmacological activities of *Momordica dioica*, which prompted us to pursue this pharmacological evaluation of *Momordica dioica* fruit pulp extracts to verify the medicinal properties. In the present study, vacuum dried, HE and EASP of *Momordica dioica* fruit pulp was evaluated for its analgesic and anti-inflammatory activities.

Materials and Methods

Plant material – *Momordica dioica* fruits were collected and seed was separated mechanically during November 2001 from Virudhunagar district of TamilNadu, India and identified by Dr.Jayaraman, Taxonomist, Retired Professor, Presidency College, Chennai. A Voucher specimen is preserved in S.R.M. College of Pharmacy for future reference.

Extraction – The fruit pulp was coarsely powdered, air-dried and extracted by maceration successively with hexane and methanol for 48 hours. Then the extract was vacuum dried using rotary vacuum flash evaporator to yield a solid residue of the respective extract viz. hexane extract and methanol extract. To the methanolic extract, ethyl acetate was added and ethyl acetate soluble portion (EASP) was separated and concentrated under vacuum to get dried residue.

Animals – Wistar albino mice (25-30g) and wistar albino rats (150-200g) of either sex were obtained from the Tamilnadu Veterinary and Animal Sciences University, Madhavaram, Chennai. The animals were maintained at room temperature of 25±2°C with relative humidity of 75±5% under 12 hours dark and light cycle. The animals were given standard laboratory diet and water *ad libitum*.

Analgesic activity – Two standard methods viz. acetic acid induced Writhing reflex and hot plate methods were employed to determine the analgesic activity.

Acetic acid induced writhing-reflex method in mice – The analgesic activity was determined by acetic acid induced writhing method (Ghosh, 1984) using six wistar albino mice of either sex selected by random sampling technique. Standard drug Paracetamol (50 mg/kg) and the extracts (50 and 100 mg/kg) were given intraperitoneally 30 minutes prior to the administration of the writhing agent (0.6 % v/v aqueous acetic acid, 10 ml/kg). The number of writhings produced in the animal was observed for 30 minutes and percentage protection was calculated for analgesic activity.

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Table 1. Analgesic activity (writhing reflex method) of *Momordica dioica* fruit pulp extracts in mice

Treatment	Dose (mg/kg)	Writhings±SEM	% Protection
HE	50	11.3±1.12	50.74*
	100	8.0±1.93	65.22**
EASP	50	21.2±2.12	8.00
	100	20.0±2.06	13.04
Paracetamol	50	4.7±1.05	79.60**
Control	-	23.0±1.32	–

Significance level: * P<0.05, **P<0.001 Compared to control.

The analgesic activity data are presented in Table 1.

Hot plate method in mice – The analgesic activity was determined by Eddys hot plate method (Eddy, 1953) using six wistar albino mice of either sex, selected by random sampling technique. Mice were placed on a hot plate maintained at 55±1°C and the reaction time to first sign in seconds for forepaw licking or jumping. Pentazocine 10 mg/kg was used as a standard. One hour after the administration of vehicle, standard drug and extracts treated mice were individually placed on the hot plate of the analgesiometer maintained at 55°C. The time for forepaw licking or jumping was taken as the reaction time. The analgesic activity data are presented in Table 2.

Acute Anti-inflammatory activity – The anti-inflammatory activity was determined by carrageenan induced paw oedema method (Winter, 1962) in six-wistar albino rats of either sex using plethysmograph. Diclofenac sodium (standard drug) in a dose of 5 mg/kg, and extracts in a dose of 50 and 100 mg/kg were administered intraperitoneally 30 minutes prior to the administration of carrageenan (0.1 ml of 1% W/V) in the plantar region of the paw. The paw volume was measured plethysmometrically at 1,2,3,4 and 5 hrs after the injection of carrageenan. The anti-inflammatory activity data are presented in Table 3.

Table 2. Analgesic activity (hot Plate method) of *Momordica dioica* fruit pulp extracts in mice

Treatment	Dose (mg/kg)	Reaction Time in Seconds	% Protection
HE	50	5.16±0.31	35.46*
	100	6.67±0.21	50.07**
EASP	50	4.16±0.31	19.95
	100	6.0 ±0.36	44.50*
Pentazocine	10	7.0 ±0.77	52.43**
Control	–	3.33±0.21	–

Significance level: * P<0.05, **P<0.001 Compared to control.

Statistical analysis – The results are expressed as mean ± SEM. except acute anti-inflammatory activity (Table 3). The Dunnett's test was used to make a statistical comparison between groups. Results with P<0.05 were considered significant.

Results and Discussion

It was observed that HE exhibited significant (P<0.001) analgesic activity (acetic acid induced writhing reflex and hot plate method), when compare to EASP. HE exhibited graded dose response. EASP was found to be less active in both the models when compare to standard drugs. The results reveal that HE is more centrally active than EASP.

In acute anti-inflammatory model, both HE and EASP showed inhibition at 3 hrs (Table 3). The oedema development in carrageenan induced paw oedema model is generally represented by a biphasic curve (Winter, 1962). The first phase occurs within an hour of injection and prostoglandins plays a major role in the development of the second phase of reaction, which is measured at 3 hrs. The presence of prostoglandins in the inflammatory exudates from the injected paw can be demonstrated at 3 hrs and periods thereafter (Vinegar, 1969). HE (70.24% reduction of oedema) was found to be more active than EASP (63.85% reduction of oedema). A significant (P<0.001) and dose dependent activities were exhibited by both HE and EASP. HE at the dose level of 100 mg/kg was found to exhibit equivalent as Diclofenac sodium at 5 mg/kg dose level.

Based on the results of this study, it is concluded that *Momordica dioica* fruit pulp was found to possess analgesic (peripheral and centrally mediated) and also has potential anti-inflammatory activities and thus support the claimed

Table 3. Acute anti-inflammatory activity (carrageenan induced paw oedema method) of *Momordica dioica* fruit pulp extracts in rats

Treatment	Dose (mg/kg)	% Reduction of oedema				
		1 hr	2 hrs	3 hrs	4 hrs	5 hrs
HE	50	10.70	39.22**	60.66**	47.16**	41.10*
	100	21.41	52.67**	70.24**	57.24**	52.99**
EASP	50	7.20	33.87**	54.27**	38.27**	30.50*
	100	12.63	47.32**	63.85**	48.38**	44.63*
Diclofenac sodium	5	53.53*	68.88**	78.67**	65.22**	61.15**

Significance level: * P < 0.05, **P<0.001 Compared to control.

use of this plant in the ayurvedic system of medicine.

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