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Pharmacological Screening of a Methanol Extract from *Mormodica charantia* in Rodents

Peter I. Aziba, Martins Ekor and A.A. Adedeji

Department of Pharmacology, Obafemi Awolowo College of Health Sciences, Shagamu, Ogun State University, Nigeria

Abstract

A methanol leaf extract of *Mormodica charantia* was evaluated for analgesic and contractile effects. The extract showed a significant reduction in writhing induced by acetic acid in mice and contractile effects on isolated rat stomach strip preparation, but reversed a dimethytubocurarine block of rat diaphragm muscle preparations, suggesting cholinomimetic and analgesic activities.

Keywords: *Mormodica charantia*; writhing; contractil effect.

Introduction

Mormodica charantia (Cucurbitaceae), also known as "Ejirin" in southwest Nigeria, is widely used as a herbal medicinal plant for treatment of various ailments (Dalziel, 1937; OliverBever, 1986; Iwu, 1993). A decotion of the leaves is used as a laxative for relief of stomachache, antihelminties, and treatment of fever (Sofowora, 1980). Based on the traditional use of *M. charantia*, a study was undertaken to screen the extract for analgesic and receptor effects.

Materials and methods

Plant material and extraction

Leaves (50 g) of *M. charantia* were collected around the Makun area in Shagamu, southwest Nigeria, in January 1998. The identity was confirmed by Prof. Zac Gbile of the Botany Department of Ogun State University Ago-Iwoye. A voucher specimen was deposited in the Herbarium of the University.

Air-dried powdered leaves were macerated in methanol for 24 h; solvent elimination was carried out under reduced pressure which yielded a light greenish semi-solid compound. A solution of the extract was made in methanol for administration of animals.

Phytochemical screening

A phytochemical analysis of the leaf extract of *M. charantia* was conducted according to the method of Trease and Evans (1983). Positive results were obtained for saponins, glycosides, tannins and flavonoids.

Animals

Swiss mice of either sex (weighing 22–28 g for *in vivo* studies) and albino rats (Wistar strain) of either sex (weighing 200–250 g for *in vitro* studies) were purchased from the National Institute of Medical Research in Lagos, Nigeria. All animals were bred and housed in a standard environmental condition of the department animal house. Animals had free access to standard diet and water.

Analgesic activity

The extract at doses of 150 and 300 mg/kg was administered i.p for 15 min before writhing induction (Winter et al., 1962). Writhing was induced by injection of 0.6 ml (v/v) of acetic acid; the control group received only saline (1 ml/kg). Paracetamol (10 mg/kg) was used as the reference drug. Writhing observation started 3 min after acetic acid injection and continued for 20 min (observation time).

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Address correspondence to: Peter I. Aziba, Department of Pharmacology, College of Medicine, University of Ibadan, Nigeria

Table 1. Effect of *M. charantia* extract on acetic acid-induced writhing response in mice.

Treatment	Dose (mg/kg)	Number of writhing	Inhibition (%)
Control (Vehicle)	–	85.5 ± 1.3	–
M. charantia	150	40.2 ± 2.3*	53
	300	18.0 ± 2.0**	79
Paracetamol	10	8.7 ± 1.4**	90

Values are mean + S.E., n = 6; * $P < 0.05$, ** $P < 0.001$ vs. control, Student's *t*-test.

Muscle contraction

The method of Bulbring Deprerre (1964) was used for phrenic nerve diaphragm preparations. The preparation was placed in physiological salt solution aerated with 95% O_2 and 5% CO_2 and stimulated with rectangular pulses having 20–40 V pulse width, 0.5–2.0 msec, frequency of Hv. Extract reversed (d-tc) block of nerves and muscle stimulation respectively.

Effect of extract on the isolated rat stomach strip

Strip of the rat fundus (approx 2.5 cm) was removed according to the method Vane (1957), and suspended in a 20 ml organ bath containing Tyrode solution of the following composition: NaCl (137 mM), KCl (2.8 mM), $CaCl_2 \cdot 2H_2O$ (1.8 mM), $MgCl_2 \cdot 6H_2O$ (1.30 mM), $NaHCO_3$ (11.0 mM), glucose (2 mM), under a resting tension of 1 g. The preparation was maintained at 37°C and aerated with 95% O_2/5% CO_2. The preparation was allowed to equilibrate for 25 min and the solution was replaced every 10 min and the tension was readjusted; acetylcholine was used as reference drug.

Muscle contractions were monitored on a force transducer model FT.03 and recorded on a Grass polygraph model 7pD. The effect of extract (150 and 300 mg/ml) was tested. The effect of 1 ng/ml atropine pretreatment was tested on each extract induced muscle contraction.

Statistical analysis

The results are expressed as mean ± SEM. Significance of difference between control and treated groups were determined using Student's *t*-test.

Results

The extract, in doses of 150 and 300 mg/kg, reduced the writhing count. The effect was dose-dependent and showed a significant effect when compared to the reference (Table 1). The extract showed a contractile effect on isolated rat stomach strip which mimicked an acetycholine-induced contractile effect; both effects were blocked by atropine (1 ng/ml), a known specific muscarinic receptor blocker. The extract reversed dimethytubocurarine blocking effect on the twich responses of the rat diaphragm, which suggested anticholinesterase properties.

Discussion

The reduction of writhing counts is indicative of the analgesic potential of the extract. Acetycholine and the extract produced a dose-dependent contractile effect on the stomarch strip; both effects were blocked by atropine suggesting a muscarinic receptor activity. The reversal effect of the extract on dimethytubocurarine blocking effect on the phrenic nerve diaphragm indicated neuromuscular and cholinomimetic activities.

Phytochemical analysis of the extract indicated the presence of saponin, tannis, glycosides and flavonoids. These constituents are known to be bioactive agents. Overall, these results tend to support the various herbal uses of this substance in Nigeria traditional medical practices. Further studies will focus on elucidating its mechamism and bioactive principles.

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