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Antidiarrhoeal Activity of Aqueous Leaf Extract of *Momordica Spp.* (CUCURBITACEAE)

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Abstract - Antidiarrhoeal activity of aqueous leaf extract of Momordica charantia (CUCURBITACEAE) was evaluated on castor oil induced diarrhea, gastro-intestinal transit, intestinal fluid accumulation and gastric emptying in mice. The aqueous extract of its leaves showed inhibitory activity against castor oil induced diarrhoea. Inhibition of the gastrointestinal population and fluid secretion by the extract suggest that the existing extract exert the anti-diarrhoeal activity by anti-secretory mechanism.

Keywords - Momordica charantia, anti-diarrhoeal activity, castor oil, gastrointestinal transit.

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INTRODUCTION

Momordica charantia Linn. (CUCURBITACEAE) is an extensive climber, with tap-root stock (Oliver, 1986) and varied therapeutic values. The decoction of its leaves is used to cure diabetes, expel intestinal gas, promote menstruation and hepatic problems (Sofowora, 2006; Taylor, 2005). The paste of entire plants is applied externally to cure psoriasis, scabies and other diseases (Burkil, 1985).

Diarrhoea is one of the prime causes of high mortality rate in developing countries where infants under the age of five die annually from this disease (WHO, 1996). It is a major contributor to malnutrition and also causes rapid dehydration in infant and elderly people, which could lead to death if treatment is not given (Yadzi and Chang, 1993; Gore *et al*., 1992; Bhan *et al*., 1992; Mahalanabis, 1998). There is well-documented report on the hypoglycaemic property of *Momordica charantia* with no scientific evidence on its antidiarrhoeal potential. Previous study showed that it contains appreciable amount of nutrients and its purported medicinal actions may be as a result of the phytochemicals present in the plant (Bakare *et al*, 2010). In another study, the aqueous extract of its leaves enhances the absorptive roles of hydrolytic enzymes in the small intestine of diarrhoeagenic patient (Bakare *et al*. 2010).

MATERIALS AND METHOD

Materials :

- Leaves of *Momordica charantia*
- Air oven
- Distilled water
- Whattman filter paper - No. 1
- Funnel
- Glasswool
- Lyophilizer
- Castor oil
- Methyl cellulose
- Morphine
- Albino mice

Methods : The leaves of *Momordica charantia* were collected and dried in a hot air oven. Later on, dried leaf samples were extracted in 5500 ml boiling distilled water for 30 minutes and filtered in Whattman filter paper followed by a funnel plunged with glass wool. The resultant filterates were pooled together and concentrated in a lyophilizer. The dried powder was placed in an air tight container and stored at 4ºC till further use. (Akueshi *et al.* 2002; Oben *et al*., 2006). A stock solution of the dried powder was reconstituted in distilled water at a concentration of 800 mg/ml and different doses i.e. 100, 200 and 400 mg/kg were prepared from the stock solution and administered orally to mices on test.

Oral toxicity test :

The mices were randomly divided into nine groups, each containing 5 mices. The mice were fed on pellets and water. The mices were starved for 12 hours prior to test. Eight doses of the extract were administered by oral intubation. The mice in the control group received 0.2 ml distilled water. As animals were observed for 24 hours. General

symptoms of toxicity and mortality were recorded (Lorke, 1983; Amida *et al*., 2007).

Tests for anti-diarrhoeal activity (= Castor oil induced diarrhoea) : Mices of either sex fasted for 18 hours were randomly allocated to five group of 6 mices each as such –

- Group -I : 10 mg/kg distilled water.
- Group II, III, IV : 100, 200 and 400 mg/kg of body weight of the aqueous leaf extract orally.
- Group V : 10 g/kg body weight morphine subcutaneously.

After 1 hour, diarrhoea was induced by administration of 1 ml of castor oil orally to each mice and observed for 4 hours. The characteristic diarrhoeal droppings were noted in the absorbent paper placed beneath the individual mice perforated cages (Izzo *et al*. 1992; Mukherjee *et al*., 1995).

RESULTS AND DISCUSSIONS

Acute toxicity studies : Oral administration of the aqueous leaf extract of *Momordica charantia* produced no visible signs of toxicity except for an initial hudding observed at the highest dose of 20 g/kg body weight. No mortalities were recorded in all the doses.

Castor oil induced diarrhoea : The aqueous leaf extract of *Momordica charantia* at different doses significantly inhibit the frequency of defaecation when compared to the untreated (= control) mice (Table : 1). Normal gastrointestinal transit when treated with aqueous leaf extract of *M. chanantia* :

As shown in table-2, the extract decreases intestinal propulsion of the charcoal meal when compared with the control group. In control a mice, the charcoal meal travelled 61.33 ± 7.55 of the total length of the small intestine. The aqueous leaf extract (200 - 400 mg / kg) produce significant reduction in normal intestinal transit. This effect was lower to that produced by morphine 16.48 ± 1.84 (73 13 % inhibition).

Castor oil induced transit :

The charcoal meal moved farther in the castor oil induced intestinal transit compared to the normal intestinal transit in the castor oil - induced intestinal transit, the standard antidiarrhoeal agent morphine reduced the mortality of the intestine to a greater extent. The antimortality effect of the extract at the dose of 200 mg/kg was significantly higher than the other concentrations. This effect was significantly lower than that produced by morphine (Table-3).

Table 1 : Effects of leaf extract of *M. charantia* on castor oil induced diarrhea.

Group	Treatment	Doses	Mean weight of faeces after 4 hours	% Inhibition of defaecation
I	Control	-	2.28 ± 0.09	-
II	L. Extract	100	1.17 ± 0.11	48.69
III	L. Extract	200	0.66 ± 0.19	71.05
IV	L. Extract	400	0.47 ± 0.06	79.39
V	Morphine	10	0.25 ± 0.11	89.04

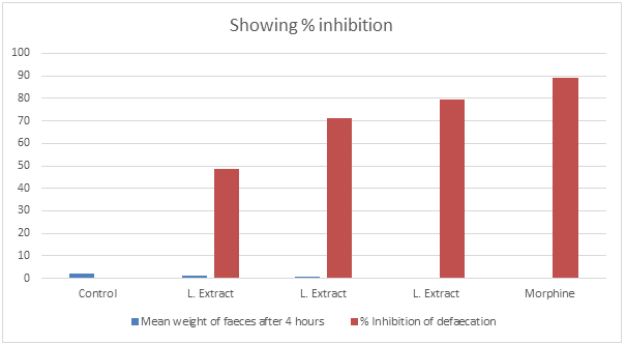


Table 2 : Normal gastrointestinal transit when treated with aqueous leaf extract of *Momordica charantia.*

Group	Treatment	Body weight	Peristaltic Index	Inhibition %
I	Control	-	61.33 ± 7.55	-
II	L. Extract	100	54.89 ± 3.56	10.50
III	L. Extract	200	47.50 ± 4.17	22.55
IV	Leaf Extract	400	49.28 ± 6.06	19.65
V	Morphine	10	16.48 ± 1.84	73.13

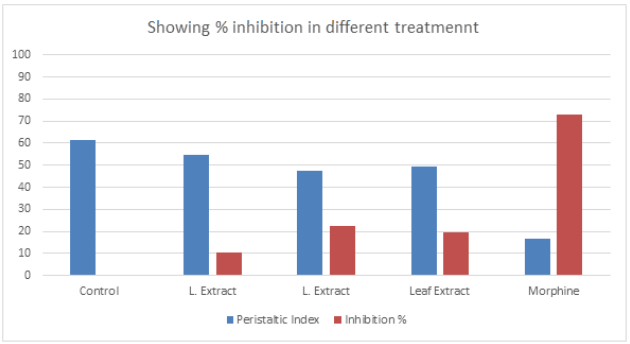
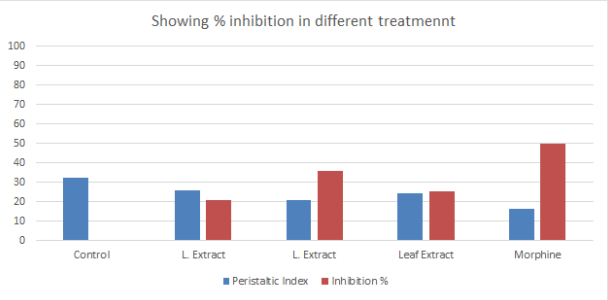


Table 3 : Castor oil-induced gastrointestinal transit.

Group	Treatment	Body weight	Peristaltic Index	Inhibition %
I	Control	-	32.55 ± 2.22	-
II	L. Extract	100	25.85 ± 2.00	20.58
III	L. Extract	200	20.89 ± 0.81	35.82
IV	Leaf Extract	400	24.36 ± 1.42	25.16
V	Morphine	10	16.36 ± 1.51	49.74



The extract was well-tolerated when administered orally, no sign of acute toxicity like restlessness or seizures were observed over the period of observation.

Castor oil was used to induce diarrhoea. It is well documented that castor oil produces diarrhoea due to its most active metabolite, ricinoleic acid by hypersecretory response which stimulates peristaltic activity in the small intestine (Zavala *et al*. 1988; Hardman and Limbird, 2001).

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