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PHARMACOLOGICAL EVALUATION OF ANTIDIARRHOEAL ACTIVITY OF *MOMORDICA CYMBALARIA*

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ABSTRACT

The antidiarrhoeal activity with fruit extracts of *Momordica cymbalaria* was evaluated on castor oil-induced diarrhea and gastrointestinal movement in rats (charcoal meal). A significant antidiarrhoeal effect of the tested plant extracts against castor oil-induced diarrhoea in rats was achieved. The tested plant extracts decreased the gastrointestinal movement as indicated by the significantly ($p<0.05$ to 0.001) decreased distance travelled by the charcoal meal. The large dose of the tested plant extracts was slightly more effective than the small one. It can be deduced that the extract may act through inhibition of prostaglandin and reduction in propulsive movement of small intestinal tract. Antidiarrhoeal activity recorded with the two extracts can be accounted with difference in phytoconstituents. Presence of sterols and flavonoids only in alcoholic extract can be considered for the better antidiarrhoeal activity.

Keywords: Antidiarrhoeal activity, *Momordica cymbalaria*, Flavonoids, Prostaglandins.

INTRODUCTION

Diarrhoeal disease is a leading cause of mortality and morbidity, especially among children in developing countries resulting in a major health care problem [1].The major causative agents of diarrhoea in humans include: *Shigella flexneri*, *Staphylococcus aureus*, *Escherichia coli* and *Salmonella typhi* [2]. *Candida albicans* has also been known to cause diarrhoea in humans [3]. Despite the availability of vast spectrum of approaches for diarrhoeal management, vast majority of people in developing countries rely on herbal drugs for the management of diarrhoea. WHO has encouraged studies for treatment and prevention of diarrhoeal diseases depending on traditional medical practices [4].

Consumption of medicinal herbs is tremendously increasing over the past decade as alternative approach to improve the quality of life and maintain good health. Medicinal plants have been used for centuries as remedies for human diseases. Extensive studies of the adverse effects of these herbal medicines and establishment of a good correlation between biomarkers and plants are essential for ensuring the efficiency and quality of herbal medicines. Recently, there has been growing interest in exploiting biological activities of flora and fauna owing to their natural origin, cost effectiveness and lesser side effects. Plant-based natural constituents can be derived from any part of the plant like bark, leaves, flowers, roots, fruits, seeds, etc. Medicinal properties of plants unique to particular plant species or groups are consistent with the concept that combination of secondary products in a particular plant is taxonomically distinct [5].

Since no reports are available regarding anti-diarrhoeal activity with fruit extracts of *Momordica cymbalaria* it is aimed to validate the ethnical medicinal uses of the plant for the activity, which includes assessing the anti-diarrhoeal activity of AEFMC and AQEFMC by using rats. Antidiarrhoeal activity recorded with the two extracts can be accounted with difference in phytoconstituents [6] .Presence of sterols and flavonoids only in alcoholic extract can be considered for the better antidiarrhoeal activity.

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METHODOLOGY

Castor oil induced diarrhea [7]

Albino rats of either sex weighing between (150-200 g) were divided into 8 groups of 6 rats in each. Group A was served as normal control, given with vehicle only. Group B with standard drug. Groups C, D, E and F, G, H treated with low, medium and high doses of AEFMC and AQEFMC respectively. Animals of all groups are placed separately in individual cages lined with filter paper. The filter papers were changed every hour and the severity of diarrhoea was assessed hourly for 6 hrs. The total number of feces excreted and the total weight of a feces are recorded within a period of 6 hr and compared with control group. The results were expressed as percentage of inhibition of diarrhea (Table 1).

Statistical analysis

The values expressed as mean ± SD from 6 animals. The results were subjected to statistical analysis by using one way ANOVA followed by Dunnett's-'t'- test to verify the significant difference if any among the groups. P<0.05*, 0.01**and 0.001***were considered significant.

Gastrointestinal motility test

Albino rats of either sex weighing between (150-200 g) were divided into 8 groups of 6 rats in each. This experiment was done by using charcoal meal as diet marker .Group A was served as normal control, given with vehicle only. Group B with standard drug. Groups C, D, E and F, G, H treated with low, medium and high doses of AEFMC and AQEFMC respectively.30 mins later each animal was given with 1 ml of charcoal meal in 5 % gum acacia orally. Each animal is sacrificed 30 minutes administration of charcoal meal. The distance covered by charcoal meal in the intestine was expressed as percentage of the total distance travelled from pylorus to the ceacum (Table 2).

Statistical analysis

The values expressed as mean ± SD from 6 animals. The results were subjected to statistical analysis by using one way ANOVA followed by Dunnett's-'t'- test to verify the significant difference if any among the groups. P<0.05*, 0.01** and 0.001*** were considered significant.

RESULTS & DISCUSSIONS

In the present investigation, aqueous and alcoholic extract of *M.cymbalaria* has shown dose dependent antidiarrhoeal activity in a castor oil induced model and gastrointestinal motility test in rats. This activity is significant at a dose of more than 100 mg/kg. Furthermore, this observation was also substantiated by significant action.

These observations demonstrate the inhibitory effect of *M.cymbalaria* fruit extract on castor oil induced diarrhoea, gastrointestinal motility and peristaltic activity in small intestine. Prostaglandins contribute to the patho-physiological functions of the gastrointestinal tract, and also act on the local electrical and mechanical activities of ileal circular muscles [8]. Castor oil increases peristaltic activity and produces permeability changes in the intestinal mucosal membrane to electrolytes and water Induction of diarrhoea by castor oil is through elevated prostaglandin biosynthesis [9].

Table 1. Castor oil induced diarrhea

Treatment	Dose (mg/kg)	Onset time(min)	No. of Wet feces	Fresh weight of faeces (g)	Water content of faeces (ml)	Inhibition of Defecation (%)	Inhibition of diarrhoeic drops (%)
Saline	0	61.50 ±2.75	7.83 ±0.30	4.55 ±0.40	3.28 ±0.23	0.00 ±0.00	0.00 ± 0.00
Standard	2.5	334.33 ±13.37*	1.00 ± 0.00*	1.16 ± 0.12	0.63 ±±0.27	71.85 ± 0.17h	87.22 ± 1.00h
Aqueous	100	67.50 ± 3.09	7.16 ± 0.70	4.35 ± 0.45	3.41 ± 0.21	6.20 ± 0.21	8.55 ± 1.33
	200	109.50 ± 4.19	4.33 ± 0.42	4.36 ± 0.44	2.85 ± 0.16	21.85 ± 0.15	44.69 ± 0.40
	400	138.33 ± 4.77	3.50 ± 0.42	4.01 ± 0.64	1.76 ± 0.34	32.83 ± 0.09	55.30 ± 0.40
Alcoholic	100	98.83 ± 3.97	3.50 ± 0.34	3.01 ± 0.19	1.81 ± 0.19	48.40 ± 0.44*	43.30 ± 0.13*
	200	126.33 ±7.42*	2.83 ± 0.16	2.53 ± 0.19	1.16 ± 0.07	46.90 ± 0.55**	63.85 ± 0.46f
	400	202.00±8.65**	1.83 ±0.30**	1.95 ± 0.18	1.11 ± 0.13	67.16 ± 0.06**	76.62 ± 0.00**

n = 6, Significant at P < 0.05*, 0.01** and 0.001***, ns = not significant

Table 2. Gastrointestinal motility test

Group	Dose(mg/kg)	Peristaltic index (%)	Inhibition (%)
Saline	0	72.57±0.63	0
standard	5	24.00±0.48***	66.93
Aqueous	100	66.17±0.53^{ns}	8.82
	200	63.48±0.46**	12.53
	400	47.33±0.38***	34.78
Alcoholic	100	68.25±0.42^{ns}	6.85
	200	65.43±0.41**	10.48
	400	49.21±0.36***	32.20

n = 6, Significant at P < 0.05*, 0.01** and 0.001***, ns = not significant.

CONCLUSION

From these observations, it can be deduced that the extract may act through inhibition of prostaglandin and reduction in propulsive movement of small intestinal tract. Antidiarrhoeal activity recorded with the two extracts can be accounted with difference in phytoconstituents [9]. Presence of sterols and flavonoids only in alcoholic extract can be considered for the better antidiarrhoeal activity.

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