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Anti-diarrhoeal activity of *Murraya koenigii* Linn root extracts

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Abstract

Objective: The present study was aimed to evaluate the root extracts of *Murraya koenigii* for acclaimed anti-diarrhoeal activity using albino rats. Materials and Methods: Anti-diarrhoeal activity of *Murraya koenigii* was evaluated by gastro-intestinal motility and castor oil-induced diarrhoea model in rats. Atropine sulphate and Diphenoxylate were used as standard drug. Result: The study revealed that the ethanol and aqueous extract showed significant inhibition in the frequency of defecation as well as reduction in the number of wet faecal droppings in castor oil-induced diarrhoea model and there was significant reduction in the propulsion of charcoal meal through GIT in gastro-intestinal motility model. Conclusion: The *Murraya koenigii* showed significant anti-diarrhoeal activity as compared to Diphenoxylate and can be recommended for further studies.

Key words: *Murraya koenigii*, Diphenoxylate, anti-diarrhoeal activity, albino rats.

1. Introduction

In order to combat the problems of diarrhoea globally, the World Health Organization (WHO) in its Diarrhoeal Disease Control Programme has given a special emphasis on the use of folk-lore medicines in the control and management of diarrhoea. In developing countries the children very often suffer from diarrhoea and the major cause of this disease is malnutrition. With the aim to wiping out the problem of diarrhoea - a leading cause of increasing mortality rate in developing countries [1], it was planned to study anti-diarrhoeal potential of *Murraya koenigii* root. *Murraya koenigi*, Linn, (Rutaceae), commonly known as curry leaf tree is a handsome, aromatic and more or less deciduous small tree up to 6 m in height, is found almost throughout India. It is called Mithanim in Hindi and Karipat in Marathi. The leaves, bark and roots are bitter, astringent, aromatic, anthelmintic, anti-inflammatory, antiseptic and antidiarrhoeal. In Srilanka a decoction of the leaves is given internally in snake bite and the bark and root are applied externally to the bitten part [2, 3, 4].

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2. Material and Method

2.1 Plant material

The roots of *Murraya koenigii* were collected from Mangladevi of district Yavatmal, Maharashtra, in the month of August. The plant was identified and authenticated by the Botanist of Plant Anatomy Research Centre, Chennai, and Tamilnadu. The roots were cleaned, dried under shade and powdered by a mechanical grinder. The pulverized roots were passed through sieve (coarse 10/44) and subjected to solvent extraction using ethanol and distilled water in a soxhlet extraction apparatus [5, 6] and concentrated to get a semisolid residue. Extracts were vacuum dried and finally suspended to get them in 1%w/v Tween 80 solutions.

2.2 Experimental Animals

Wistar albino rats of either sex (180-250g) were kept in air conditioned room at constant temperature (22°C), humidity (65%) and under light and dark cycle and were given standard diet and water *ad libitum*. The animals were divided into six groups each containing six rats. All experimental protocols were approved by the Institutional animal and ethical committee.

Table 1. Effect of *Murraya koenigii* Linn root extracts on rat gastrointestinal motility after charcoal meal

Sl. No.	Group	Dose/kg body wt.	Mean movement of charcoal meal ± SEM
1	Control (Vehicle)	1% w/v	84.7 ± 7.2
2	Atropine sulphate	100 µg	30.2 ± 2.6*
3	Ethanolic extract	100 mg	41.5 ± 3.4**
4	Ethanolic extract	200 mg	34.6 ± 2.7*
5	Aqueous extract	100 mg	52.7 ± 4.7**
6	Aqueous extract	200 mg	45.9 ± 2.6**

Values are expressed as mean ± SEM; *P<0.001 vs respective control group; n=6; one-way analysis of variance (ANOVA)

Table 2. Effect of *Murraya koenigii* Linn root extracts on Castor oil- induced diarrhoea in Rats.

Sl. No.	Groups	Dose (mg/kg body wt.)	Onset of Diarrhoeal episode Time (min)	Total number of faeces	Number of wet faeces	Total wt. of wet faeces
1	Control (Vehicle)	1%w/v	45.3 ± 2.5	20.9 ± 01.6	19.6 ± 0.7	197.3 ± 15.3
2	Diphenoxylate	5	98.4 ± 2.6	7.8 ± 0.4	2.8 ± .004	28.5 ± 2.1
3	Ethanolic extract	100	91.5 ± 4.7	8.4 ± 0.5	5.1 ± 0.4	62.5 ± 4.8
4	Ethanolic extract	200	125 ± 9.4	6.3 ± 0.9	3.4 ± 0.08	41.5 ± 3.6
5	Aqueous extract	100	72.8 ± 4.7	12.4 ± 1.3	5.9 ± 0.04	71.7 ± 4.7
6	Aqueous extract	200	116.2 ± 8.5	9.8 ± 2.6	4.1 ± 0.07	50.3 ± 6.1

Values are expressed as mean ±SEM; *P<0.001 vs respective control group; n=6; one-way analysis of variance (ANOVA).

2.3 Intestinal motility test

Animals were starved 24 h prior to the experiment with free access to water and placed in six cages containing six animals in each case (Table-1). They were given the extracts at dose level of 100 and 200 mg/kg body wt. orally. The control group was given equal volume of vehicle and drug control group was given atropine sulphate 100µg/kg body wt. (i.m.). Subsequently, after 30 min, individual rat was administered 1ml of charcoal meal (5% activated charcoal in 10% aqueous tragacanth suspension) by oral route. These animals were sacrificed after 30 min and the abdomen was opened. The movement of charcoal meal in small intestine from pylorus was measured and it was expressed as a percentage of distance moved from pylorus to caecum [7].

2.4 Castor oil - induced diarrhoea

The method of Awouters et al was used [8]. The rats were divided into six groups each containing six animals (Table-2). The extracts (100, 200 mg/kg body wt.) were given p.o. The animals of control group were given equal volume of vehicle and drug control group was given Diphenoxylate (5 mg/kg body wt.) as a standard drug. Castor oil (10 ml/kg body wt.) was administered orally after 30 min and each rat was then housed in the cages, each provided with a clean filter paper at the bottom. These animals were observed for the characteristic stool and time of onset of diarrhoeal episodes. The observations were recorded every hour up to six hours.

2.5 Statistical Analysis

For the determination for the significant intergroup difference, each parameter was analyzed separately and student *t*- test was used for comparison ($p<0.001$) Vs control.

3. Result

Ethanol and aqueous extract (100 and 200mg/ kg body wt.) and atropine sulphate showed significant decrease in the propulsion of the charcoal meal through the gastrointestinal tract as compared to the control group. (Table-1) In castor oil - induced diarrhoea model, the ethanol and aqueous extract (100 and 200 mg/kg body wt.) and Diphenoxylate (5 mg/kg body wt.) showed significant reduction in diarrhoeal episodes.

4. Discussion

The ethanol and aqueous extract at 100 and 200 mg/kg dose, like the standard anti-diarrhoeal agent Diphenoxylate, inhibited significantly the frequency of defecation and faecal dropping when compared with untreated control rats.

The antimuscarinic drug atropine, ethanol and aqueous extract of *Murraya koenigii* decreased intestinal propulsive movement in charcoal meal treated animal model. This inhibition of motility may be due to the non specific spasmolytic activity of *Murraya koenigii*. These observations suggest that the *Murraya koenigii* reduces diarrhoea by inhibiting intestinal peristalsis and gastrointestinal motility. Literature data and preliminary phytochemical investigation of *Murraya koenigii* root revealed the presence of carbazole alkaloids [9].

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