

EVALUATION OF ANTIDIARRHEAL ACTIVITY ON *CORIANDRUM SATIVUM* LINN., IN WISTAR ALBINO RATS

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ABSTRACT

Plants have been a valuable source of natural products for maintaining human health for many years. More recently, there has been a greater search for natural therapies. The use of herbal drugs in the treatment of diarrhea is a common practice in many countries. A range of medicinal plants with anti-diarrhoeal properties is widely used by traditional healers. The antidiarrhoeal effect of the aqueous extract of *Coriandrum sativum* Linn., leaves were investigated by employing four experimental models of diarrhea in wistar albino rats. Loperamide (3 mg/kg) was taken as standard, aqueous bulb extract of *Coriandrum sativum* 150 & 300 mg/kg was used as a test doses. The water extract of *Coriandrum sativum* treated mice showed significant reduction in the

faecal output and protected them from castor oil-induced diarrhoea. The extract tested at 150 and 300 mg/kg shown similar effect as that of standard drug (loperamide) by significantly inhibiting the frequency of defecation droppings compared to untreated control rats. Results obtained in this study substantiate the antidiarrheal effect of the aqueous extract of *Coriandrum sativum* L. leaves and its use by traditional practitioners in the treatment of diarrhoea.

KEYWORDS: Castrol-induced diarrhea, *Coriandrum sativum* Linn., albino rats, Antidiarrhoeal activity.

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]. Diarrhoea can be regarded as a global menace which can culminate in mortality and morbidity of the incumbent due to

loss of fluids and electrolytes from the body. Diarrhea, which could be infectious or non-infectious, is one of the principal causes of death, particularly in the malnourished infants ^[2]. An anti-diarrhoeal drug (or anti-diarrheal drug in American English) is any medication which provides symptomatic relief for diarrhoea. It is therefore important to identify and evaluate available natural drugs as alternatives to current antidiarrheal drugs, which are not always free from adverse effects. Plant extracts are some of the most attractive sources of new drugs and have been shown to produce promising results in the treatment of diarrhoea. *Coriandrum sativum* L. is a widely used medicinal plant in traditional system with a wide range of biological activities.

Coriander, *Coriandrum sativum* Linn., also known as cilantro, Chinese parsley or dhania, is an annual herb in the family Apiaceae. All part of the plants is edible but the fresh leaves and the dried seeds are the most common parts used in cooking. In the Indian traditional medicine, a coriander is used in disorders of digestive, respiratory and urinary system, as it has diaphoretic, diuretic, carminative and stimulant. In Iranian traditional medicine, coriander has been indicated for a number of medical problems such as dyspeptic complaints, loss of appetite, convulsion and insomnia ^[3-7]. Hence, the present study has been made to investigate the phytochemical screening and the antidiarrheal activity of the *Coriandrum sativum* L. in wistar albino rats.

Collection of plant materials

The fully mature *Coriandrum sativum* L. were collected from Tiruchirappalli district, Tamil nadu, India. The plant was identified and confirmed with the voucher specimen kept in the Rapinat Herbarium, St. Joseph's College, Tiruchirappalli, TamilNadu, India.

Aqueous extract

500 g parts of *Coriandrum sativum* L. were collected, washed thoroughly and dried in shade. It was then crushed and taken in a round-bottomed flask. 500 ml distilled water was added to cover the material, refluxed in a water bath for 1hr at 90 - 95°C. The supernatant was removed and the extraction repeated once again. The supernatant obtained were combined and filtered through a Whatman No. 1 filter paper. The filtrate was concentrated at low temperature by lyophilization. The residue was designated as aqueous extract.

Animals used

Wistar albino rats (150-180g) were used as experimental models and six rats were taken for four group. The rats were used after an acclimatization period of 7 days to the laboratory environment. They were provided with food and water *ad libitum*. The work was carried out in CPCSEA approved (Reg. No: 265/ CPCSEA) Animal House of Periyar College of Pharmaceutical Sciences, Tiruchirapalli, India.

Evaluation of antidiarrhoeal activity**Castor oil-induced diarrhoea**

24 rats were allowed to fast for 18 hr and divided into 4 groups of 6 animals each.

Group I - received 10 ml/kg 0.5% v/v aqueous Tween 80 orally and served as a negative control.

Group II - received the standard drug loperamide (3 mg/kg, p.o.) as positive control,

Groups III and IV - received aqueous extracts of *Coriandrum sativum* L. at a dose of 150 and 300 mg/kg body weight, respectively. After 1 hr of treatment, all the animal groups were challenged with 1 ml of castor oil orally, by oral gavages and observed for consistency of faecal material. After this administration, the animals were placed separately in metabolic cages with filter paper, which was changed every hour. The severity of diarrhoea was assessed each hour for 6 hours. The total number of diarrhoeal droppings excreted and the total weight of faeces were recorded within a period of 24 hr and compared with the control group. The total number of diarrhoeal droppings of the control group was considered 100%. The results were expressed as a percentage of inhibition of diarrhea.^[8]

Statistical analysis

All the data was expressed as Mean \pm S.E.M. Statistical significance between more than two groups was tested using one way ANOVA.

RESULTS

The curative properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, sterols and tannins etc.

Anti-diarrhoeal activity

In the castor oil-induced diarrhoea experiment, aqueous bulb extract of *Coriandrum sativum* L. significantly prolonged the time of diarrhoeal induction in a dose dependent manner. The

frequency of stooling (number of wet faeces and total number of faeces) as well as fresh weight and water content of the faeces decreased significantly as shown in Table 1. There was more reduction in these parameters at 300 mg/kg body weight when compared with loperamide. There was also increase in the percentage inhibition of defecation. However, the highest dose (300 mg/kg body weight) produced inhibition of defecation that compared favourably with the loperamide.

Table 3: Effect of Aqueous extract of *Coriandrum sativum* L. on castor oil induced diarrhea

Animals	Treatment	Defecation in 4hrs. (no. of stools)	weight of faeces in 4 hrs.(g)	inhibition of defecation (%)
Group I (Control)	----	18.2±2.34	1.9±0.14	----
Group II (Standard)	Loperamide (3 mg/kg)	4.03±1.08***	0.79±0.63**	75.03
Group III (Test sample-I)	Aqueous extract of <i>Coriandrum sativum</i> L. (150 mg/kg)	9.08±0.84**	0.75±0.14*	58.53
Group IV (Test sample- II)	Aqueous extract of <i>Coriandrum sativum</i> L. (300 mg/kg)	4.09±0.79***	0.81±0.36**	82.09

The above data have Mean ± S.E.M, N=6. *P<0.05. ***indicates significant anti-diarrhoeal activity at ** P< 0.01 Vs Control.

DISCUSSION

Diarrhoea may be characterized as the abnormally frequent defecation of faeces of low consistency which may be due to a disturbance in the transport of water and electrolytes in the intestines. Despite the multiplicity of aetiologies, the four major mechanisms responsible for the pathophysiology in water and electrolytes transport are (i) increased luminal osmolarity (osmotic diarrhoea), (ii) increased electrolytes secretion (secretory diarrhoea), (iii) decreased electrolytes absorption, and (iv) deranged intestinal motility causing a decreased transit time ^[9]. Several mechanisms have been supposed to be involved in the diarrhoeal effect of castor oil. Castor oil produces diarrhoeal effect due to its active metabolite ricinoleic acid, activation of adenylate cyclase, stimulation of prostaglandin E & F formation, and recently nitric oxide was found to contribute to the diarrhoeal effect of castor oil ^[10]. Diarrhoea results from an imbalance between the absorptive and secretory mechanisms in the intestinal tract accompanied by hurry resulting in an excess loss of fluid in the feces. In some

diarrhoea the secretory component predominates while other diarrhoea is characterized by hypermotility^[11]. Castor oil causes diarrhoea due to its active metabolite, ricinoleic acid^[12,13], which stimulates peristaltic activity in the small intestine, leading to changes in the electrolyte permeability of the intestinal mucosa. Its action also stimulates the release of endogenous prostaglandin^[14]. In this study, the aqueous extract of *Coriandrum sativum* L. significantly prolonged the time of diarrhoeal induction in a dose dependent manner. The results were compared with that of standard loperamide. Hence, this plant material from this preliminary study may be claimed as a potent anti-diarrhoeal agent. The underlying mechanism appears to be spasmolytic and anti-enteropooling properties by which the plant extract produced relief in diarrhoea. Tannic acid and tannins are present in many plants and they denature proteins forming protein tannate, which makes the intestinal mucosa more resistant and reduces secretion by virtue of which so many different plant species has been reported to possess antidiarrhoeal potential^[15,16]. The tannins present in the plant extract may be responsible for the anti-diarrhoeal activity.

CONCLUSION

The present study revealed that aqueous extract of *Coriandrum sativum* L. contains pharmacologically active substance(s) with antidiarrhoeal properties. The use of the plant extract of *Coriandrum sativum* L. as an anti-diarrhoeal drug by traditional healers. Further research is to be carried out to fractionate and purify the extract, in order to find out the molecule responsible for the anti-diarrhoeal activity. Further study, however, is necessary to isolate and identify the active ingredients and their precise mechanism of action.

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