

Evaluation of Anti Diarrheal Potential of Cinnamon Leaves

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ABSTRACT

The objective of present study was to evaluate in vivo anti-diarrheal potential of Cinnamon leaves. Sample was analyzed for quantities estimation of photochemical and anti-diarrheal activity of aqueous leaf extract, at 100, and 200 mg/kg body weight (b.w) was investigated using castor oil induced model. The aqueous leaves extract of Cinnamon leaves (100, and 200 mg/kg body weight) was administered orally to three groups of rats (five animals per group) in order to evaluate the activity of the extract against castor oil-induced diarrhea model in rat. Two other groups received normal saline (5mg/kg) and Loperamide (2mg/kg) as positive control. The effect of the extract on castor oil-induced diarrhea, gastrointestinal transit and intestinal fluid accumulation (enter pooling) was assessed respectively. In this study, the phytochemical analysis of aqueous leaves extract of Cinnamon leaves revealed the presence of alkaloids, terpenoids, flavonoids, saponins, tannins and phenols. At oral doses of 100, and 200 mg/kg body weight, the plant extract showed pronounced significant ($p < 0.05$) antidiarrhoeal activity compared to the control group. No mortality and visible signs of general weakness were observed in the rats following the extract administration of up to a dose of 2000 mg/kg. The results showed that the aqueous leaves extract of Cinnamon leaves has a significant antidiarrhoeal activity which supports its use in traditional herbal medicine practice.

Keywords: Anti Diarrheal Potential, Cinnamon Leaves, effect on gastrointestinal transit time

INTRODUCTION^[1,2,3,7]

Diarrheal diseases are one of the leading causes of morbidity and mortality in developing countries and are responsible for the death of millions of people each year.^[4] Diarrhea is still one of the major health threats to population in tropical and subtropical countries. There are large numbers of epidemiological and experimental evidence pertaining to worldwide acute diarrheal disease, which is one of the principal causes of death in the infants. Despite immense technological advancement in modern medicine, many people in the developing countries still rely on the healing practices and

medicinal plants for their daily health care needs. Therefore, the World Health Organization encouraged studies for the treatment and prevention of diarrheal diseases depending on traditional medical practices. India has a great environmental and biological diversity compared with the rest of the world. A range of medicinal plants with anti-diarrheal properties has been widely used by the traditional healers; however the effectiveness of many of these anti-diarrheal traditional medicines has not been scientifically evaluated^[1].

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Cinnamon is amongst the world's oldest and most frequently consumed spices, and is used as an herbal remedy]. The medicinal use of this plant has been documented in Ayurveda (the Indian system of medicine), for over 6000 years. The genus *Cinnamomum* consists of 250 species of aromatic evergreen trees and shrubs, primarily located in Asia and Australia. The term *Cinnamomum* is derived from Greek *kinnamomon*, meaning "sweet wood". Cinnamon is classified in the botanical division: Magnoliophyta, class: Magnoliopsida, order: Magnoliales and family: Lauraceae. The cinnamon of commerce is the dried inner stem-bark of a small evergreen tree 10-15 meters tall. It is native to tropical southern India and Sri Lanka. There are two types of cinnamon, common cinnamon (vernacular name: dalcini) or true cinnamon (*Cinnamomum zeylanicum*, *C. verum*) and cassia (*Cinnamomum aromaticum*)². The main properties of cinnamon are astringent, warming, stimulating, carminative, anti-septic, anti-fungal, anti-viral, blood purifying, and aiding digestion. All these properties of cinnamon make it a good medicinal plant⁶. The present work was undertaken to investigate the potential *in vivo* anti-diarrheal effect of the aqueous extract of *Cinnamon* leaves in **Castor oil-induced** experimental models of diarrhoea in rats.

MATERIALS AND METHODS^[4,5,6,7]

Cinnamon bark (*Cinnamomum zeylanicum*), which was taxonomically identified, was purchased from the local market at Nimar Institute of Pharmacy Dhamnod M.P.A specimen has been preserved in our laboratory for further references.

The leaf was dried and finely powdered in a mechanical mixer. 10g of finely-powdered cinnamon was weighed and mixed with 100ml of water and this was kept on a water bath at 60°C for two hours and filtered. This extract was diluted with distilled water and was administered orally to mice.

Animals

Albino mice (M/F) which weighed between 25-30 gms was used in this study. The cages of the animals were placed at room temperature with controlled cycles of 12 hours of light and 12 hours of darkness. The relative humidity was maintained at 44-45 %. All the animals were fed with a standard pellet diet and water *ad libitum*. The standard pellet diet comprised of 21% protein, 5% lipids, 4% crude fiber, 8% ash, 1 % calcium, 0.6% phosphorous, 3.4% glucose, 2 % vitamin, and 55% nitrogen-free extract (carbohydrate) and it provided a metabolizable energy of 3600 kcal /kg. The study protocol was approved by the institutional animal ethical committee of NIP Dhamnod. The animal beds in the cages were renewed thrice a week to ensure hygienic conditions and the maximum comfort of the animals.

PHYTOCHEMICAL SCREENING^[2,6,7,8]

The phytochemical analysis of the crude extract was carried out to determine the active phytochemical constituents which were responsible for the anti-diarrhoeal activity [Table/Fig-2].

ACUTE TOXICITY STUDY^[2,6,7,8,10]

Different doses (50–2000mg/kg, p. o) of the aqueous extract of the leaf of *Cinnamomum zeylanicum* were administered to groups of mice and they were observed continuously for 1 hour and then at half – hourly intervals for 4 hours, for any gross behavioral changes and further up to 72 hours, followed 14 days for any mortality as per the OECD Guideline 425. The leaf extract of *Cinnamomum zeylanicum* was found to be non-toxic up to the maximum dose of 2000mg/kg body weight.

CASTOR OIL INDUCED DIARRHOEA^[2,6,7,8]

The animals were kept in fasting for 24 hours before the test, with free access to water. The mice were divided in to 4 groups of 5 animals each. Diarrhea was induced by administering

0.5ml of castor oil orally. Group I was taken as the control group (0.5ml of distilled water), Group II which received Loperamide (5mg/kg) served as the standard group, and Groups III and IV received the extract (100, 200 mg/kg, oral) 30 minutes before the castor oil administration. Each animal was placed in an individual cage, the floor of which was lined by blotting paper. The floor lining was changed every hour. The consistency of the faecal matter and the number of both the wet and the dry diarrheal droppings were counted every hour for a period of 4 hours. During an observation period of 4 hours, the total number of faeces which were excreted by the animals was recorded. The numerical score which was based on the stool consistency was assigned as follows; normal stool=1, semi solid=2, and watery stool=3.⁶

EFFECT ON GASTROINTESTINAL TRANSIT TIME^[2,6,7,8,9]

The mice were kept in fasting for 24 hours and were divided into four groups of five mice each and each animal was given 0.1ml of 1% charcoal suspension orally, 60 min after an oral dose of the test drug, the standard and the vehicle. Group I was administered 0.5ml distilled water, Group II received Loperamide 5mg/kg and Groups III and IV received the extract at the dose of 100mg/kg and 200mg/kg body weight respectively. The faecal boluses which were expelled were collected. Each faecal bolus was pressed on a white sheet of paper to examine the presence of the charcoal meal. The time for the appearance of the 1st faecal bolus with the charcoal meal was recorded.

Table 1

Anti-diarrheal activity of various extracts of *Cinnamonleaves* and loperamide

Treatment (oral)	Dose	% protection	Weight of stools (g) (Mean± SEM)
Castor oil	10ml/kg	0.0	1.2846 ± 0.029
Aqueous extract	100mg/kg	61.32%	0.463 ± 0.0314*
	200mg/kg	72.42%	0.351 ± 0.0293**

STATISTICAL ANALYSIS

The data which was obtained in the studies were subjected to one way analysis of variance (ANOVA) for determining the significant difference. The inter group significance was analyzed by using Dunnet's t-test. A p value of < 0.05 was considered to be significant. All the values were expressed as mean ± SEM.

RESULTS AND DISCUSSION

The acute toxicity study showed that oral administration of aqueous extracts of *Cinnamonleaves* to the mice up to 2000 mg/kg dose neither showed mortality nor any visible clinical signs of general weakness in the animals. The aqueous extract of *Cinnamonleaves* administered at the dose of 100, and 200 mg/kg showed 61.32% and 72.42% diarrhea respectively. This reduction in diarrheal episodes is significant and maximum effect is observed at the dose of 200mg/kg. This shows significant reduction in diarrheal episodes with maximum effect at 200mg/kg dose level. Whereas the standard group, Loperamide a standard, anti-diarrheal drug treated animal at the dose of 1mg/kg and 2 mg/kg showed significant reduction in diarrhoeal episodes (80.44% and 90.91% respectively). The study reveals that the aqueous and alcohol extracts exhibited significant diarrheal activity. The remarkable anti-diarrheal effect of *Cinnamonleaves* extracts against castor oil-induced diarrhea model proves to its efficacy in an extensive range of diarrheal conditions.

Loperamide	1mg/kg	80.44%	0.204 ± 0.0232**
	2mg/kg	90.01%	0.127 ± 0.0642*

**P < 0.01 and *P < 0.05 statistically (Mean±SEM) significant from control group (n=5)

TABLE 2-
PHYTOCHEMICAL SCREENING

Chemical constituents	Aqueous extract	Aqueous extract
Tannins		+
Alkaloids		+
Flavonoids		+
Sugars		+
Glycosides		+
Terpenes		+
Starch		+

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