

Anti-Diarrhoeal Activity of Ethanolic Leaf Extract of *Luffa Acutangula* against Castor Oil Induced Diarrhoea in Rats

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Abstract: Diarrhea is a symptom marked by rapid and frequent passage of semisolid or liquid fecal material through the gastrointestinal tract and involves both an increase in the motility of the gastrointestinal tract along with increased secretions and a decrease in the absorption of fluid and thus loss of electrolytes particularly Na⁺ and water. Due to limitations associated with various treatments available, the need for developing newer drugs is imperative. This study aimed at investigating the anti-diarrheal activity of ethanolic leaf extract of *Luffa acutangula* against castor oil induced diarrhoea. Loperamide 10mg/kg was used as reference control. Two dose levels (200 and 400mg/kg) of ethanolic leaf extract of *Luffa acutangula* were used to screen the efficacy of as anti-diarrhoeal. The ethanolic leaf extract of *Luffa acutangula* at 200 & 400mg/kg significantly (P<0.001) reduced the weight of wet stool and total weight of stool against castor oil induced diarrhoea. The effect produced by ethanolic leaf extract of *Luffa acutangula* was comparable to that produced by the standard loperamide. In conclusion, the results obtained showed that ethanolic leaf extract of *Luffa acutangula* exhibited anti-diarrhoeal activity against castor oil induced diarrhoea in rats.

Keywords: *Luffa acutangula*, Castor Oil, Anti-diarrheal Activity and Loperamide

INTRODUCTION

Diarrhea is a common cause of death in developing countries. It is also one of the primary causes of morbidity and mortality on a global scale, leading to 1 billion disease episodes and 1.8 million deaths each year, among children under five years of age. Due to limitations associated with various treatments available, the need for developing newer drugs is imperative. There have been numerous reports of the use of traditional plants for the treatment of diarrheal diseases. The main chemical constituents in plants found to be responsible for anti-diarrheal activity are tannins and tannic acid, flavonoids, alkaloids, sesquiterpenes, diterpenes, terpenes and terpenoids [1]. The chemical compounds present in herbal products are a part of the physiological functions of living organisms, and hence they are believed to have better compatibility with the human body [2].

Luffa acutangula L. belongs to the family Cucurbitaceae, is commonly known as ridge gourd and it is used as vegetable in Asian countries. The ethnobotanical survey revealed that fruits of *L. acutangula* are used to protect jaundice, swollen hemorrhoids [3]. Seed kernels is an efficient remedy for dysentery and headache [4]. Ribbed gourd has diuretic properties; used as an expectorant, laxative and purgative; hypoglycemic agent, bitter tonic; used in the enlargement of spleen. It is mixed with milk or water is helpful in the removal of kidney stones and used to cure the swollen lymph glands. The leaves of the ridge gourd are useful in the treatment of dysentery, in the diseases such as inflammation of spleen, ringworms, piles and even in leprosy [5]. Various parts of *Luffa acutangula* was reported to possess hepatoprotective [6], antidiabetic [7], antiulcer [8], antiproliferative and anticancer [9],

antioxidant [10], analgesic [11], fungistatic [12], antimicrobial [13] activity. The present study was conducted to evaluate the anti-diarrhoeal activity of ethanolic leaf extract *Luffa acutangula* against experimentally induced diarrhoea in laboratory animals.

MATERIALS AND METHODS

Plant material

The leaves of *Luffa acutangula* were collected from the local farm of pondicherry. It was identified and authenticated as *Luffa acutangula* by Scientist 'F' Botanical survey of India, Southern Regional Centre, Tamilnadu Agriculture University, Coimbatore. The voucher specimen (BSI/SRC/12/42/2017-18/Sci/01203) has been deposited in department for further references.

Preparation of Extract

The fresh leaves of *Luffa acutangula* were washed, dried and cut into small pieces. The leaves were shade dried and subjected to steam distillation. The distillate collected was subjected to extraction with ethanol. The resulted ethanolic extract was dried, and stored in airtight container, protected from light.

Animals

Healthy male Wistar albino rats weighing between 180–200 g were used for the study. The animals were obtained from animal house of Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry, India. On arrival the animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of $24 \pm 2^\circ\text{C}$ and relative humidity of 30–70 %. A 12:12 light: dark cycle was followed. All animals were allowed free access to water and fed with standard commercial pelleted rat chaw (Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee and were in accordance with the guidelines of the IAEC.

Castor Oil Induced Diarrhea

The animals were randomly divided into five groups of 6 animals each. Group I served as normal

control, received the vehicle (0.1% Carboxy Methyl Cellulose solution), group II served as diarrhoeal control. Animals of group III, IV and V were treated orally with Loperamide (10mg/kg), ethanolic leaf extract of *Luffa acutangula* 200 and 400mg/kg respectively.

Following grouping, each animal fasted for 24 h was placed in individual cage, the floor of which was lined with white paper and replaced every hour. Diarrhea was induced by administering 2 ml of castor oil orally to each rat. Each animal received either vehicle or treatment one hour before castor oil according to the respective grouping. Onset of diarrhea, number of diarrheal episodes, frequency of defecation, weight of wet stools, and total weight of stools were recorded for each animal, for a total of 4 h. The results were recorded by taking the vehicle groups as 100% and calculated as percentage inhibition [14].

STATISTICAL ANALYSIS

The values were expressed as mean \pm SEM. The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by Dunnet's 't' – test using graph pad version I. P values <0.05 were considered significant.

RESULT

Table-1: Anti-diarrheal activity of ethanolic leaf extract of the leaves of *Luffa acutangula* against castor oil induced diarrhea in rats

Drug Treatment	Weight of Wet Stool (g)	Total Weight of Stool (g)	% Inhibition of Defecation	% Inhibition of Diarrhoeal Faeces
Diarrhoeal Control	2.69 \pm 0.16	3.19 \pm 0.22	-	-
Reference Control (Loperamide 10mg/kg)	0.00	0.00	100	100
<i>Luffa acutangula</i> (200mg/kg)	0.09 \pm 0.002***	0.16 \pm 0.001***	96.65	95.89
<i>Luffa acutangula</i> (400mg/kg)	0.03 \pm 0.001***	0.09 \pm 0.002***	98.84	97.18

Values are in mean \pm SEM (n=6),
*P<0.05, **P<0.01, ***P<0.001 Vs Diarrhoeal Control

Castor Oil-Induced Diarrhea

Anti-diarrheal activity of ethanolic leaf extract of the leaves of *Luffa acutangula* against castor oil induced diarrhea was studied in rats and the results were given in table 1. Castor is an irritant purgative which increases the peristaltic movement and the intestinal secretions. In the diarrhoeal control, castor oil enhanced the weight of wet stool and total weight of stool which indicate the increase in peristaltic movement and secretions. The reference control loperamide completely suppress the intestinal motility and secretions. The ethanolic leaf extract of *Luffa acutangula* at 200 & 400mg/kg significantly (P<0.001) reduced the weight of wet stool and total weight of stool

against castor oil induced diarrhoea. The % inhibition of diarrhoea and diarrhoeal faeces of 200mg of *Luffa acutangula* was 96.65% and 95.89% respectively. The % inhibition of diarrhoea and diarrhoeal faeces of 400mg of *Luffa acutangula* was 98.84% and 97.18% respectively.

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