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# Evaluation of Anti-Diarrhoeal Property of Crude Aqueous Extract of *Alternanthera Sessilis* Linn.

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**Abstract**

This study investigated the anti diarrhoeal activity of the aqueous extract of dried entire plant material of *Alternanthera sessilis* Linn (Amarantaceae). Diarrhea was induced in mice by the administration of 0.3 ml of castor oil, with the control group receiving water. The administration by oral garvage of 200 and 400 mg/kg body weight of *Alternanthera sessilis* Linn extract reduced castor oil induced diarrheoa by reducing the number of wet stools by 41.71and 48.41% respectively. This was as a result of the ability of the extract to stimulate the re-absorption of water from the intestinal lumen as well as significantly reducing the intestinal transit time and intestinal motility. This antidiarrhoeal property could be as a result of the tannins and flavonoids, which were found to be present in *Alternanthera sessilis* Linn.

**Key words:** *A. sessilis*, Antidiarrhoeal activity, Castor oil induced

## Introduction

India is a developing and over populated country where the most of the people are living below the poverty level especially in rural area. Most of the people in India are habituated with the local and indigenous food. Vegetables are very common in their everyday food menu and play an important role in the food chain. More than sixty, indigenous and exotic, vegetables are grown in India, most of which are very cheap, available and popular to people for daily food intake. The enriched food value as well as medicinal property are still unexplored and may play a pivotal role in the development of potential new drugs. The traditional medicinal methods, especially the use of vegetable may play a vital role to cover the basic health needs in the developing countries like India.Diarrhoea literally means in (Greek and Latin: dia, through and rheein: to flow or run) Diarrhoea is defined by scientists as excessive fluid weight, with 200g per day representing the upper limit of normal stool water weight for healthy adults. Since stool weight is largely determined by stool water, most cases of diarrhoea result from disorders of intestinal water and electrolyte transport [1]. Diarrhoea is the leading cause of malnutrition and death

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among children in the developing countries of the world today. Several pharmaceuticals such as diphenoxylate and anti-microbial agents are available for the treatment and management of both adult and infantile diarrhoea. In recent times, emphasis has been focused on the use of oral rehydration solution (ORS) as a replacement therapy to replenish the lost fluid and electrolytes in diarrhoeic cases[2]. However, there is still need for a continuing search for more effective antidiarrhoeal agents with probably minimal side actions.

*Alternanthera sessilis* (Linn.) belongs to the plant family Amaranthaceae. *A. sessilis* is a rostrate or procumbent, annual or perennial herb. A decoction is recommended as an herbal remedy to treat wounds, flatulence, nausea, vomiting, cough, bronchitis, diarrhea, dysentery and diabetes. Its root can relieve inflamed wounds [3]. *A. sessilis* is used as a local medicine often in mixtures with other medicinal plants, to treat hepatitis, tight chest, bronchitis, asthma and other lung troubles. The leaves and shoots boiled and drunk as an antihypertensive remedy [4]. *Alternanthera sessilis* was reported for antioxidant activity [5], hepatoprotective activity [6], antimicrobial and wound healing activities [7], and antiviral activity [8]. In the present study, we evaluated the aqueous extract of *Alternanthera sessilis* for a possible antidiarrhoeal activity in animal models of secretary diarrhoea and its inhibitory effect on intestinal transit.

## Material and Methods

### Collection and identification of Plant material:

Fresh plant material *Alternanthera sessilis* were collected during the month of May and June from Dibrugarh, Assam, India. It is authenticated by Division of Taxonomy, National Botanical Research Institute Lucknow, U. P. Ref. No: NBRI/ CIF/ 205/ 2011.

### Extraction and Preparation of the Extract:

After collection, the plant materials were air dried for one week. This was further subjected to another one week of drying in an oven maintained at $40^0$C. The leaves were pulverized into a smooth powder. The pulverized plant material was mixed with distilled water and left for 72 hours. The mixture was stirred at 6 hours intervals using a sterile glass rod. At the end, the extract was passed through filter paper. The filtrates were concentrated with the aid of a vacuum pump and rotavapour at $40^0$ C. The concentrated extract was refrigerated prior to use.

### Antidirrhoeal Evaluation.

### Animals:

Albino Swiss mice weighing between 20-30g of either sex were purchased from the Chennai. They were kept in the departmental animal house in a well cross-ventilated room at 27 ± 2 °C, and relative humidity 44–56%, light and dark cycles of 10 and 14 h, respectively, for one week before and during the experiments. Animals were provided with the standard rodent pellet diet (Amrut, India) and the food was withdrawn 24 h before the experiment but water was allowed ad libitum. All the experiments were performed in the morning according to the current guidelines for the care of laboratory animals and the ethical

guidelines for the investigation of experimental pain in conscious animals [9].

**Castor-oil Induced Diarrhoea:**

Mice were divided into four groups of five animals each group. Diarrhoea was induced by administering 0.3ml of castor oil orally to mice. Group one served as control (distilled water 10ml/kg), groups 2 and 3 received the aqueous extract of *A. sessilis* orally (200 and 400 mg/kg body weight), respectively as test while group 4 received atropine (0.1mg/kg i.p) reference. This was done 30 minutes before castor oil administration.

The following parameters were observed for a period of 4 hours, the time elapsed between the administration of the cathartic agent and the excretion of the first diarrhoeic faeces, the total number of both dry and wet diarrhoea droppings in 4 hours and the total weight of both the wet and dry diarrhoeal stool in that period of time[10, 11].

**Gastrointestinal Motility Test**

In this method the mice were fasted for 18hrs divided in four group (n=4). The first two groups of animals were administered aqueous extract of *A. sessilis* orally (200 & 400 mg/kg body weight). The third group received atropine (0.1mg/kg body weight, i.p) as standard for comparison. The fourth group was treated with normal saline as control. After 30min of dosing, each animal was given 1ml of charcoal meal (3% deactivated charcoal in normal saline). 30min after administration of the charcoal meal, animals of each individual group were killed and the movement of charcoal from pylorus to caecum was measured. The charcoal movement in the intestine was expressed as percentage [12].

**Statistical Analysis:**

All data were expressed as mean +SEM and where applicable, the data were analyzed statistically by Student's t-test using graph pad. The level of significance was from $P < 0.001$.

**Results and Discussion**

Castor oil brings about changes in electrolyte and water transport and increases peristaltic activity [13, 14]. These changes are associated with prostaglandins that contribute to the patho-physiological functions in the gastro intestinal tract [15]. Release of prostaglandins is also a major cause of arachidonic acid-induced diarrhea [14]. This is characterized by an increase in the secretion of water and electrolytes, an increase in intestinal transit time and an increase in wet faeces.

The aqueous extract of *A. sessilis* showed significant antidiarrhoeal activity ($P<0.01$) against castor oil induced diarrhoea in mice. It reduced the number of wet faeces produced by castor oil administration from 41.71% and 48.41% when experimental animals were respectively administered 200 and 400 mg/kg plant extract (Table 1). The plant extract thus stimulates the reabsorption of water from the intestinal lumen, resulting to the normalization of the deranged water transport across the mucosal cells which are seen in the type of faeces produced.

**Table 1: Effect of *A .sessilis* Linn aqueous extracts on castor oil induced diarrhoea in mice.**

| Treatment | Dose | Total number of faeces | Total weight of faeces. | % Inhibition |
|---|---|---|---|---|
| **Control (Water)** | 10 ml/kg p.o. | 25.45 ± 2.55 | 20.45 ± 3.69 | 0.00 |
| **Test-1** | 200 mg/kg p.o. | 11.76 ± 2.24[a] | 11.92 ± 1.34[a] | 41.71 |
| **Test-2** | 400 mg/kg p.o. | 12.65 ±1.76[a] | 10.55 ± 1.74[a] | 48.41 |
| **Atropine** | 0.1mg/kg I.p | 7.96 ± 4.12[a] | 2.30 ± 0.45[b] | 88.75 |

Values are mean ± SEM (n=5)
[a] $P < 0.01$, [b] $P < 0.001$ vs. control, student's t- test.

**Table 2: Effect of *A .sessilis* Linn aqueous extracts on gastrointestinal motility test in mice**

| Treatment | Dose | % distance traveled by charcoal | % inhibition |
|---|---|---|---|
| **Control** | 10 ml/kg p.o. | 90.50 ± 7.62 | -- |
| **Test-1** | 200 mg/kg p.o. | 56.57 ±7.91[a] | 37.49 |
| **Test-2** | 400 mg/kg p.o. | 52.32 ±4.39[a] | 42.19 |
| **Atropine** | 0.1mg/kg I.p | 16.43 ±2.92[b] | 81.85 |

Values are mean ± SEM (n=4)
[a] $P < 0.01$, [b] $P < 0.001$ vs. control, student's t- test.

The aqueous extracts of *A. sessilis* decreased propulsion of the charcoal meal through the gastrointestinal tract at the oral dose of 200 and 400 mg/kg; as compared with control group. A similar reduction in the gastrointestinal transit of charcoal meal in mice was achieved with the intraperitoneal injection of atropine sulphate (0.1 mg/kg) (Table 2).

In developing countries, a quarter of infant and childhood mortality is related to the diarrhea [16]. The highest mortality rates have been reported to be in children less than five years of age. During the past decade oral dehydration therapy has reduced mortality from acute diarrhoeal disease, whereas chronic diarrhoea remains a life-threatening problem in those regions, in which malnutrition is a

common co-existing and complication factor. Number of factors, such as infective, immunological and nutritional has been involved in the perpetuation of the diarrhoeal syndrome [17]. Many plants conveniently available in India are used in traditional folklore medicine for the treatment of diarrhoea and dysentery. In the present study, aqueous extracts of *A. sessilis* that have not been studied so far, was evaluated for its antidiarrhoeal potential against castor oil induced diarrhoea, and gastrointestinal motility test in Albino Swiss mice.

The results indicate that the aqueous extract of *A. sessilis* possesses significant antidiarrhoeal activity due to its inhibitory effect both on gastrointestinal propulsion and fluid secretion. The inhibitory effect of the extract justified the use of the plant as a non-specific antidiarrhoeal agent in folk medicine. Further detailed investigations are underway to determine the exact phytoconstituents which are responsible for the antidiarrhoeal activity.

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