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ANTIDIARRHOEAL ACTIVITY OF LEAF EXTRACT OF *ANOGEISSUS LATIFOLIA* WALL IN EXPERIMENTALLY INDUCED DIARRHOEA IN RATS

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ABSTRACT:

Aim: To evaluate the antidiarrhoeal activity of methanolic leaf extract of *Anogeissus latifolia*.

Material and Methods: The methanolic extract was evaluated using rodent animal models like castor-oil induced diarrhoea and castor-oil induced enteropooling. The phytochemical constituents were also planned to screen by using standardized methods. The plant is traditionally used for the treatment of dysentery, snakebite, leprosy, diabetes, wounds and ulcers & skin diseases. Thus, the present study is therefore undertaken to investigate the antidiarrhoeal activity.

Result: The methanolic extract of *Anogeissus latifolia* given orally at the dose of 200 and 300 mg/kg, showed significant antidiarrhoeal activity in castor oil induced diarrhoea by decreasing fecal episodes, and castor oil induced enteropooling by decreasing the volume of intestinal fluid.

Conclusion: The results suggested that the extract may contain biologically active component that may be useful against diarrhoea, thereby validating its mention in the ancient Indian texts and justifying its use in ethnomedical practice.

INTRODUCTION: Diarrhoea is the passage of 3 or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection, which can be caused by a variety of bacterial, viral and parasitic organisms. Infection is spread through contaminated food or drinking-water, or from person to person as a result of poor hygiene. In developing countries, a majority of people living in rural areas almost exclusively use traditional medicine in treating all sorts of diseases including diarrhoea.

Worldwide distribution of diarrhoea accounts for more than 5-8 million deaths each year in infants and children below 5 years old especially in developing countries¹. According to W.H.O. estimates for 1998, about 7.1 million deaths were caused by diarrhea². Millions of the people in the third world still use the herbal drugs³. It has been estimated by WHO that 80% of the people living in the developing countries rely upon the traditional health practices for their primary health care needs⁴. In India, around 20,000 medicinal plants have been recorded. *Anogeissus latifolia* is also one of the plants in human health management.

Anogeissus latifolia (DC.) is medium sized deciduous tree belonging to the family combretaceae and it is commonly known as gahtti. It is important timber and the leave and bark are used for tanning. The bark is effective in anemic conditions and urinary discharges, piles⁵.

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Stem bark is astringent, haemostatic, constipating, depurative and useful in vitiated conditions of kapha and vata ⁶, diarrhea, dysuria, coughs, colic, liver complaints, snakebite, scorpion sting and skin diseases ⁷. Bark is remedy for chronic cough called 'Dangya Khokala' ⁸. Leaf juice is given in purulent discharges from the ear while, fruit is astringent to bowels and cures kapha and biliousness ⁹.

MATERIALS AND METHODS:

Plant Material: Fresh leaves of *Anogeissus latifolia* were collected from Chittoor district, Andhra Pradesh, India and authenticated by Dr. K. Madhava Chetty, Professor, Department of Botany S.V. University, Tirupathi, and Andhra Pradesh, India.

Animals: Healthy albino rats of either sex weighing 150-250g were used for the present study. The animals were housed individually in polypropylene cages, maintained under standard conditions (12 hours light and 12 hours dark cycle, 25±5°C and 40-60% humidity). They were fed with standard rat pellet diet (National Institute for Nutrition, Hyderabad) and provided water ad libitum. All the animal experiments were conducted according to the ethical norms approved by CPCSEA, Ethical committee IAEC Reg. No. (1447/PO/a/11/CPCSEA).

Experimental Design:

Treatment protocol:

1. **Group 1:** Receives Tween 80 (10 mL/kg).
2. **Group 2:** Receives reference standard drug, loperamide (3 mg/kg) orally as suspension.
3. **Group 3:** Receives the methanolic extract of *Anogeissus latifolia* orally at 200 mg/kg dose.

4. **Group 4:** Receives the methanolic extract of *Anogeissus latifolia* at 300 mg/kg dose.

Castor oil induced diarrhoeal model ¹⁰: Rats of either sex (150-250 gm) were fasted for 18 hr. They were divided into four groups (n=6). The first group of animals, which served as control was administered with Tween-80 (10 mL/kg). The second group received Reference standard drug, loperamide (3 mg/kg) orally as suspension. The methanolic extract of *Anogeissus latifolia* was administered orally at 200 mg/kg dose to third and 300 mg/kg dose to fourth group. After 60 min of drug treatment, the animals of each group received 1ml of castor oil orally and the watery fecal material and frequency of defecation was noted up to 4 hr in the transparent metabolic cages with pre weighed plastic dishes placed at the base. Weight of plastic dish before and after defecation was noted and compared to control.

Castor oil induced enteropooling model ¹⁰: Rats of either sex (150-250gm) were fasted for 18 hr. They were divided into four groups (n=6). The first group of animals, which served as control was administered with Tween-80 (10 mL/kg). The second group received standard drug, loperamide (3 mg/kg) orally as suspension. The methanolic extract of *Anogeissus latifolia* was administered orally at 200 mg/kg dose to third and 300 mg/kg dose to fourth group. After 60 min of drug treatment, the animals of each group received 1ml of castor oil orally. 30 mins after castor oil administration, all rats were sacrificed by using ketamine, whole length of the intestine from pylorus to caecum was dissected out, its content are collected in measuring cylinder and volume is measured.

RESULTS:

TABLE 1: EFFECT OF METHANOLIC EXTRACT OF *ANOGEISSUS LATIFOLIA* LEAVES ON CASTOR OIL INDUCED DIARRHOEA IN RATS

Group	Treatment	Dose Mg/Kg	Mean frequency of Diarrhoea ± SEM	Mean wt of fecal drops (g) ± SEM	Mean wt of Dry feces (g) ± SEM after 4 hr	% Protection
I	Control (Tween 80)	10 mL/kg	2.83 ± 0.33	9.66 ± 0.33	1.5 ± 0.22**	0.00 %
II	Loperamide	3 mg/kg	0.5 ± 0.22**	1.66 ± 0.33**	0.16 ± 0.16**	83.33 %
III	MEAL	200 mg/kg	1.5 ± 0.22**	5.33 ± 0.55**	0.33 ± 0.21**	50.77 %
IV	MEAL	300 mg/kg	1.16 ± 0.16**	4.5 ± 0.42**	0.16 ± 0.16**	71.67 %

The values are Mean ± SEM (n=6). Statistical significant test for comparison was done by one ANOVA followed by Dunnet's test. Symbols statistical significant: *p < 0.01, **p < 0.001.

TABLE 2: EFFECT OF METHANOLIC EXTRACT OF *ANOGEISSUS LATIFOLIA* ON CASTOR OIL INDUCED ENTEROPOOLING IN RATS

Group	Treatment	Dose Mg/Kg	Mean Volume of Intestinal fluid (ml) \pm SEM	% Protection
I	Control (Tween 80)	10 mL/kg	2.33 \pm 0.42	0.00 %
II	Loperamide	3 mg/kg	0.16 \pm 0.16**	86.67 %
III	MEAL	200 mg/kg	0.83 \pm 0.30**	49.17 %
IV	MEAL	300 mg/kg	0.33 \pm 0.21**	74.17 %

The values are Mean \pm SEM (n=6). Statistical significant test for comparison was done by one ANOVA followed by Dunnet's test. Symbols statistical significant: *p < 0.01, **p < 0.001.

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;

- Increased luminal osmolarity (osmotic diarrhoea),
- Increased electrolytes secretion (secretory diarrhoea),
- Decreased electrolytes absorption, and
- Deranged intestinal motility causing a decreased transit time.

Castor oil or its triglyceride is hydrolyzed by lipases in the small bowel to glycerol and ricinoleic acid, which acts primarily in the small intestine to stimulate secretion of fluid and electrolytes and speed up the intestinal transit.

Further, it is supported by the release of prostaglandins, which results from the inflammation and irritation effect of the ricinoleic acid. These prostaglandins then cause an increase of intestinal motility and secretions into the lumen of the intestine¹¹. The antidiarrhoeal activity of the extract against experimentally induced diarrhoea by castor oil may be attributed to an anti-electrolyte permeability action.

Most plant species that have antidiarrhoeal potential contain tannins as one of the major constituents, and leaves of these plants also contain tannins. These tannins precipitate proteins of enterocytes, which in turn reduce the peristaltic movements and intestinal secretions. Studies on the functional role of tannins also reveal that they could also bring similar functions by reducing the

intracellular calcium ions inward current or by activation of the calcium pumping system (which induces the muscle relaxation). It seems that the antidiarrhoeal effect of plants also have the similar mechanisms. Antidiarrhoeal property of the extracts, are reported to inhibit release of autacoids & prostaglandins, thereby may inhibit motility and secretion induced by castor oil. This can be due to the fact that the extract increased the reabsorption of water by decreasing the intestinal motility.

Loperamide, apart from regulating the gastrointestinal tract, is also reported to slow down transit in the small intestine, reduce colon flow rate, and consequently any effect on colonic motility.

The antidiarrhoeal activity of the extract may also due to denature proteins forming protein tannates which make intestinal mucosa more resistant and reduce secretion¹².

It also possesses an antienterpooling in castor oil-induced experimental animals by reducing both weight and volume of intestinal content. These effects are direct consequences of reduced water and electrolytes secretion in small intestine; suggest that extract may enhance water and electrolyte absorption from intestinal lumen.

Phytochemical screening revealed the presence of numerous constituents such as flavonoids, saponins, tannins, phytosterols. An antidiarrhoeal property of medicinal plant was found to be due to the constituent's present^{13, 14}.

CONCLUSION: In conclusion, with these preliminary investigations it can be concluded that the methanolic extract of *Anogeissus latifolia* having good antidiarrhoeal activity.

However the isolation of the fractions from the extracts and evaluation of the activity for those fractions is required for the characterization of active constituents responsible for the activity.

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REFERENCES:

1. Fauci AS, Bravnwold E, Isselpacker K, Wilson JD, kasper DL, Hauser SL, Longo DL: Harrison's Principles of Internal Medicine. New York, McGraw Hill Company. 1993
2. Park K: Textbook of preventive and social medicine. Bharat Publishes. 2000.
3. K. C. Audichya, K. V. Billore, T. G. Joseph: Role of indigenous folk remedies for certain acute illness in primary health care. 1983; 25: 199-201.
4. Austin D. F. and Bourne G. R: *In vitro* cell development. Biol Plant. 1992; 33: 111-113.
5. K. R. Kirtikar, B. D. Basu: Indian medicinal plants Jayad press Delhi, 1975.
6. P. K. Warriar: Indian medicinal plants: A compendium of 500 species. 1994.
7. S. K. Jain: Dictionary of Indian folk medicine and ethnobotany. Deep publication. 1991.
8. R. N. Chopra, Nayar, I. C. Chopra: Glossary of Indian medicinal plants. Council of scientific and Industrial research, New Delhi, 1956.
9. K. R. Kirtikar, B. D. Basu: Indian medicinal plants Jayad press Delhi, 1975.
10. Lakshminarayana M, Shiv Kumar. H, Rimaben. P, Bhargava. VK: Antidiarrhoeal activity of *Moringa oleifera* in experimentally induced diarrhea in rats. International J of Phytomedicine 2011; 3: 68-74.
11. Macauder PJ: "Flavonoids affect acetylcholine, prostaglandin E and antigen mediated muscle contraction", Prog. Clin. Biol. Res. 1986; 231: 489-92.
12. Yu LL, Liao JF, Chen CF: "Anti-diarrhoeal effect of water extract of *Evodiae fructus* in mice", J. Ethnopharmacol. 2000; 73: 39-45.
13. Longanga Otshudi A, Vercruysse A, Foriers A: Contribution to the ethnobotanical, phytochemical and pharmacological studies of traditionally used medicinal plant in the treatment of dysentery and diarrhoea in Lomela area, Democratic Republic of Congo (DRC) J.Ethnopharmacol. 2000; 71: 411-23.
14. Galvez J, Zarzuelo A and Crespo ME: Antidiarrhoeic activity of *Scleroarya birrea* barks extract and its active tannin constituent in rats. Phytother Res. 1991; 5: 276-8.

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