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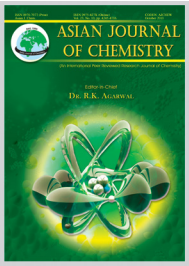

Comparative Study on Antidiarrhoeal Effect and Phytochemical Screening of Aqueous and Alcoholic Extract of *Aerva lanata*

SUNDER SINGH[1,*], ANIL BHANDARI[1], A.K. RAI[2], PRAVEEN SHARMA[3], YOGESH BIRSHILIYA[4], MANDEEP K. GUPTA[5] and MOHINI SIHARE[6]

[1]Faculty of Pharmaceutical Science, Jodhpur National University, Jhanwar Road, Boranada Jodhpur-342 006, India
[2]Pranveer Singh Institutes of Technology, Kanpur-208 020, India
[3]College of Pharmacy, IPS Academy Indore-452 012, India
[4]Vinayaka College of Pharmacy, Kullu-175 141, India
[5]Venkateshwara School of Pharmacy, N.H. 58, Delhi-Roorkee Bypass Road, Jatoli, Meerut-250 001, India
[6]Malhotra College of Pharmacy, Badwai, Near Karond,Gandhi Nagar Bypass, Bhopal-462 038, India

*Corresponding author: E-mail: sunder4usingh@rediffmail.com

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The plant *Aerva lanata* is also called as Pasanabheda, Chaya belongs to the family amaranthaceae. It is distributed throughout India, in waste land. *Aerva lanata* has been widely used in Indian folk medicine for treatment of urinary disorder, boils, cephalalgia, cough, strangury and lithiasis. This study was undertaken for comparative study on antidiarrhoeal effect of alcoholic and aqueous extract of *Aerva lanata* by using castor oil induce diarrhoea. It was found that both doses of extract showed protection against diarrhea. Antidiarrhoeal effect of both extracts of *Aerva lanata* was evaluated by castor oil induced diarrhea. Loperamide (2 mg/kg) was used as standard drugs. Alcoholic and aqueous extract was used in 400 and 800 mg/kg dose. The result of this study revealed that aqueous extract found to be more effective from alcoholic extract and may possible to explain the use of the plant in traditional medicine.

Key Words: *Aerva lanata*, Castor oil diarrhea, Alcoholic extract, Aqueous extract.

INTRODUCTION

Diarrhoea is a leading cause of malnutrition and death among children in the developing countries of the world today. Many governments and international organizations are trying to control this disease but the rate of incidence is still high, about 7.1 million per year[1].

Diarrhoea caused by intestinal pathogens is a global health concern and one of the primary causes of infant mortality especially in developing countries. According to the world health report, diarrhoea is the cause of 3.3 % of all deaths. In young children, it can lead to death due to dehydration and in survivor's impaired growth and malnutrition. In adults, while the impact is less severe, it nevertheless can lead to nutritional deficiencies especially in the case of persistent diarrhoea[2]. Many synthetic chemicals like diphenoxylate, loperamide and antibiotics are available for the treatment of diarrhoea but they have some side effects. Therefore, the search for safe and more effective agents has continued to be an important area of active research. Since ancient times, diarrhoea has been treated orally with several medicinal plants or their extracts based on folklore medicine.

The plant *Aerva lanata* is also called as Pasanabheda, Chaya belongs to the family amaranthaceae. It is distributed throughout India, in waste land. Ethyl acetate and alcoholic extracts of *Aerva lanata* whole plant showed antimicrobial activities while petroleum ether, ethyl acetate and alcoholic extracts, showed significant cytotoxic activity[3]. *Aerva lanata* was screened for its diuretic and hepatoprotective activity. The alcoholic extracts were prepared from leaves, stem and roots for screening. All the extracts were found to have significant diuretic activity, while hepatoprotective activity was found in case of leaf and root extracts only[4]. Alcoholic extract of *Aerva lanata* was tested for diuretic activity, while the effect of bezene and alcoholic extracts of *Aerva lanata* were investigated in the rat to evaluate the antiinflammatory activity. Carrageenan -induced rat hind paw edema method was employed to test antiinflammatory activity. Alcoholic extract (800 mg/kg) produced inhibition of carrageenan-induced rat paw edema (P more or less then-0.05). The parameters measured for diuretic activity were total urine volume, sodium, potassium and chloride content. The results indicate that the alcoholic extract at a dose of 800 mg/kg act as diuretic, with respect to control[5]. The plant *Aerva lanata* showed its effect on cisplatin and gentamycin model of acute renal failure[6] and also reported for antidiabetic activity[7] and anthelmintic activity[8].

Medicinal plants have attracted the attention of not only professionals from various systems of medicine, but also the scientific communities belonging to different disciplines, plants are promising source of drugs[9].

However, there is no literature available on any comparative study on the antidiarrhoeal activity of *Aerva lanata*. Hence, this leads us to comparative study on antidiarrheal activity between aqueous and alcoholic extract of *Aerva lanata* in castor oil induced diarrhea.

EXPERIMENTAL

Whole plant of *Aerva lanata* was collected and authenticated. The whole plant is then dried, powdered and stored in airtight containers for further use. The powdered material was subjected to Soxhlet extraction with various solvents ranging from non-polar to polar. The solvents used were petroleum ether, benzene, chloroform, alcohol and water. Each time before extraction with next solvents the marc was air-dried. All the extracts were concentrated by distilling the solvent at low temperature. They were then weighed and percentages of different extractive values were calculated with respect to air-dried substance. Alcoholic extract and aqueous extract was selected for antidiarrheal activity on the basis of phytochemical screening and TLC pattern.

Comparative phytochemical analysis of both extracts: The extracts of *Aerva lanata* were subjected to qualitative analysis for the detection of various phytoconstituents like carbohydrates, glycosides, steroids, flavonoids, alkaloids, tannins, resins, phenols, *etc*.

Detection of carbohydrates: Extracts were dissolved individually and filtered. The filtrates were used to test for the presence of carbohydrates.

Detection of alkaloids: The small portions of extracts were treated with some drops of dil. HCl and filtered then subjected to test for alkaloids.

Detection of glycosides: Extracts were hydrolyzed with dil. HCl and then subjected to test for glycosides. The test gave positive response for anthraquinone glycoside.

Detection of saponins: The froth test confirm the presence of saponins.

Detection of phytosterols: Both Salkowski and Libermann Burchard test suggest the presence of triterpenes and phytosterols.

Detection of phenols: Formation of bluish black colour wtih ferric chloride indicates the presence of phenols.

Detection of tannins: Extracts were treated with 1 % gelatin solution containing sodium chloride. Formation of white precipitate indicates the presence of tannins.

Detection of flavonoids: Shinoda test, alkaline reagent test and lead acetate test indicates the presence of flavonoids.

Experimental animals: Albinos Wister rats of both sex weighing between 150-240 g were used. Institutional animal ethics committee approved the experimental protocol; animals were housed under standard conditions of temperature (24 ± 2 ºC) and relative humidity (30-70 %) with a 12:12 light: dark cycle. Animal handling was performed according to Good Laboratory Practice (GLP). The animals were given standard diet and water *ad libitum*.

Evaluation of antidiarrheal activity

Castor oil induced diarrhea[10]: Rats of either sex (150-200 g) fasted for 18 h were divided into 6 groups (Group I - Group VI) of 6 animals each. The groups received the following treatment by oral garvage: Group I: Served as control received aqueous 1 % tragacanth solution, Group II: received standard drug, Loperamide (2 mg/kg) orally as suspension, Group III: received *Aerva lanata* alcoholic extract 400 mg/kg body weight, Group IV: received *Aerva lanata* alcoholic extract 800 mg/kg body weight, Group V: received *Aerva lanata* aqueous extract 400 mg/kg body weight, Group VI: received *Aerva lanata* aqueous extract 800 mg/kg body weight. (In Groups III-VI, the extract was dissolved in 0.2 mL of distilled water). Sixty minutes after the treatments, castor oil (0.2 mL) was administered by garvage to groups II, III, IV, V and VI.

Following the administration of castor oil, the animals were placed in separate wired cages for observation. The total number of faeces and the number of wet faeces passed was recorded over a period of 4 h after the administration of castor oil. Weight of paper before and after defecation was noted.

Statistical analysis: The data are represented as mean ± SEM.

RESULTS AND DISCUSSION

Phytochemical screening: Aqueous extract of *Aerva lanata* showed presence of phenols, tannins and flavonoids while ethanolic extract of *Aerva lanata* showed presence of carbohydrate, phytosterols, phenols, tannins and flavonoids. The comparative phytochemical result of both extracts summarized in Table-1.

TABLE-1
COMPARATIVE PHYTOCHEMICAL ANALYSIS OF BOTH EXTRACTS

Chemical constituents	Tests	Ethanolic extract	Aqueous extract
Carbohydrates	1. Molisch's test	+	-
	2. Benedicts test	-	-
	3. Fehling's test	+	-
Glycosides	1. Modified Borntragers test	-	-
	2. Legal test	-	-
Alkaloids	1. Dragendroff's test	-	-
	2. Wagners test	-	-
	3. Hagers test	-	-
Phytosterols	1. Salkowski test	+	-
	2. Libermann Burchard test	+	-
Tannins and phenols	1. FerricChloride test	+	+
	1. Alkaline Reagent	+	+
Flavonoids	1. Gelatin test	-	-
	2. Lead acetate test	+	+
	3. Shinoda test	+	+
Saponin	1. Foam test	-	-
	2. Forth test	-	-

Antidiarrheal activity: Castor oil brings about changes in electrolyte and water transport and increases peristaltic activity. These changes are associated with prostaglandins that contribute to the patho-physiological functions in the gastro intestinal tract. Release of prostaglandins is also a major cause of arachidonic acid-induced diarrhea. This is characterized by

TABLE-2
COMPARATIVE STUDY ON ANTIDIARRHEAL ACTIVITY OF ALCOHOLIC AND AQUEOUS EXTRACT OF *Aerva lanata* BY CASTOR OIL INDUCED DIARRHEA

Treatment	Mean wet defecation	Mean increase in weight of paper (gm)	Delay in defecation time (min)
Control	8.807 ± 0.97	2.923 ± 0.39	33.166 ± 8.005
Loperamide (2 mg/kg)	1.533 ± 1.15	0.433 ± 0.26	188.00 ± 22.500
Alcoholic extract (400 mg/kg)	4.557 ± 0.95	2.340 ± 0.27	71.833 ± 2.855
Alcoholic extract (800 mg/kg)	3.227 ± 0.77	1.107 ± 0.61	133.33 ± 39.261
Aqueous extract (400 mg/kg)	3.78 ± 0.0833	1.8 ± 1.933	87.166 ± 2.56
Aqueous extract (800 mg/kg)	2.933 ± 0.111	0.85 ± 0.0562	152.33 ± 2.485

Number of animals (N) = 6; Values are expressed as mean ± S.E.M.

an increase in the secretion of water and electrolytes, an increase in intestinal transit time and an increase in wet faeces. Evaluation of antidiarrhoeal activity of alcoholic extract of *Aerva lanata* by castor oil induced diarrhea is given in Table-2 and Evaluation of antidiarrhoeal activity of aqueous extract of *Aerva lanata* by castor oil induced diarrhea is also given in Table-2.

Both extracts also inhibited the onset time and severity of diarrhea induced by castor oil. Castor oil is reported to cause diarrhea by increasing the volume of intestinal content by prevention of reabsorption of water.

In case of alcoholic extract, castor oil induced diarrhea dose 800 mg/kg showed delay in defecation time (min) 133.33 ± 39.261 and 400 mg/kg showed delay in defecation time (min) 71.833 ± 2.855, while loperamide (2 mg/kg) showed delay in defecation time (min) 188.00 ± 22.500. Finally the reading showed that doses 800 mg/kg showed significant antidiarrhoeal effect from 400 mg/kg of alcoholic extract of *aerva lanata*.

In case of aqueous extract, castor oil induced diarrhea dose 800 mg/kg showed delay in defecation time (min) 152.33 ± 2.485 and 400 mg/kg showed delay in defecation time (min) 87.166 ± 2.56, while loperamide (2 mg/kg) showed delay in defecation time (min) 188.00 ± 22.500.

Finally aqueous extract at doses 800 mg/kg showed significant antidiarrhoeal effect from 800 mg/kg alcoholic extract of *aerva lanata*.

Conclusion

This study revealed that the aqueous extracts has potential pharmacological activity against diarrhea from alcoholic extract and may possible to explain the use of the plant in traditional medicine.

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