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Antidiarrhoeal activity on leaf extracts of *Pithecellobium dulce*

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ABSTRACT

Ethanolic and aqueous extract of leaves of *Pithecellobium dulce* were studied for its antidiarrhoeal activity using castor oil induced diarrhea model in wistar albino rats. The extracts reduced the frequency and wetnesss of faeces when compared to control group. The aqueous extract showed more significant activity than the ethanol extract at the tested dose level.

Key words: *Pithecellobium dulce*, antidiarrhoeal activity, castor oil.

INTRODUCTION

Pithecellobium dulce Benth. (Leguminosae)[1]is a small to medium sized, evergreen, spiny tree upto 18 m height, native of tropical America and cultivated throughout the plains of India and in the Andamans. It is known as 'Vilayati babul' in Hindi and 'Kodukkapuli' in Tamil. The bark of the plant is reported to be used as astringent in dysentery, febrifuge and it is also useful in dermatitis and eye inflammation. The leaves have been reported to possess astringent, emollient, abortifiacient and antidiabetic properties. The presence of steroids, saponins , lipids, phospholipids, glycosides, glycolipids and polysaccharides have been reported in the seeds[2-5]. The bark contains 37% of tannins of catechol type. Quericitin, kaempferol, dulcitol and afezilin have been reported from the leaves[6,7]. Roots have been reported to possess estrogenic activity[8]. Studies on alkylated resins from seed oil have been reported recently[9].

In the present paper antidiarrhoeal activity[10] of aqueous as well as alcoholic extract of *P.dulce* leaves has been studied using castor oil induced diarrhea model in rats . For comparison purpose, diphenoxylate HCl, a standard allopathic antidiarrhoeal drug was taken.

MATERIAL AND METHODS

Fresh leaves of *Pithecellobium dulce* were collected from Sembulam Village at Kancheepuram District, T.N. in the month of January 2005. The plant was identified by local people of that village and authenticated by Dr. P. Jayaraman, Director, Plant Anatomy Research Centre (PARC), Chennai. A herbarium specimen of the plant (APCP-3/2005) was preserved in the Department of Pharmacognosy of our institute for further reference.

Animals used

Adult wistar albino rats (180-250g) of either

sex maintained under standard condition (temperature: 23° ± 2°C, relative humidity: 55 ± 10% and 12 hr light and dark place) were used for the experiment comprising of six rats in each group. The animals were allowed standard laboratory feed and water *ad libitum*. Ethical clearance for performing the experiments on animals was obtained (Reg. No. - 409/ 2001/CPCSEA)from the Institutional Animal Ethics Committee (IAEC).

Preparation of aqueous and alcoholic extract

The fresh leaves of *P. dulce* were washed with water, air- dried at room temperature and then reduced to coarse powder. The powdered mass of leaf was defatted with petroleum ether (60-80^0 c) followed by extraction with alcohol (95% v/v) and then water for about 18 hr in soxhlet apparatus. The extracts were filtered and the filtrates were concentrated under reduced pressure to obtain the extracts as solid residues. Extractive value (%w/w) of alcohol and aqueous extracts were 17.93 and 18.58 respectively. The freshly prepared extracts were chemically tested for the presence of different constituents using standard methods[11]. The extracts were administered orally as a suspension in 1% CMC (carboxy methyl cellulose).

Screening of anti-diarrhoeal activity[12]

Wistar albino rats of either sex weighing between 180 to 250 gm were selected. They were fasted overnight before the test with free access to water. The animals were divided into four groups each containing six rats. Group I was administered vehicle and served as control. Group II received diphenoxylate hydrochloride at a dose of 5 mg/ kg orally and served as positive control. Group III & IV was treated with aqueous and alcoholic leaf extracts of *P.dulce* respectively in the concentration of 250 mg/kg orally . After half an hour, each group animals received 1 ml of castor oil by oral route. These animals were kept in perforated cafes seperately and observed for frequency of defecations and number of wet faeces for 4 hours. After each hour the filter paper with droppings was changed .

Statistical analysis

The results expressed as mean ± SEM were calculated using[13] Student's 't' test (paired) and Values P< 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

Castor oil, being an irritant purgative was found to produce profuse diarrhea in rats. It is widely known that castor oil or its active component ricinolic acid induces permeability changes in mucosal fluid and induces peristaltic changes and electrolyte transport that results in a hyper secretory response leads to diarrhea. Ricinolic acid markedly increases the PG-E_2 content in the gut lumen and also causes increased secretion of the water and electrolytes into small intestine[14].

Both the extracts showed significant (P< 0.05) anti-diarrhoeal activity (Table 1) at the tested dose level. The aqueous extract showed maximum activity than ethanol extract. The activity was

Table 1: Antidiarrhoeal activity on leaf extracts of *P. dulce* in castor oil induced diarrhea in rats

Group	Dose (mg/kg)	Mean defecation/ group±SEM	Mean number of wet stools/ group±SEM(g)
Control (vehicle)	-	5.50±0.57	4.66±0.38
Diphenoxylate Hcl	5	1.33±0.19*	0.50±0.31*
Ethanol extract	250	3.38±0.64*	3.00±0.57*
Aqueous extract	250	2.50±0.39*	2.16±0.50*

*P<0.05 when compared to control; (Students 't' Test); n=6

comparable to that produced by diphenoxylate, a standard allopathic anti diarrhoeal drug .

The castor oil induced diarrhea model was suggested for evaluation of prostaglandin biosynthesis inhibition. As is known prostaglandin E2 caused increase in intestinal contents. The leaves of *P.dulce* extracts have been reported to have anti inflammatory activity and proposed one of the mechanisms of action was through prostaglandin inhibition. Thus, the results observed in the present studies suggest the same mechanism for this study also[14].

Many plants contain tannins and flavonoids, which denature proteins of the enterocytes, by forming a complex (protein-tannate). The complex thus formed coats the intestinal mucosa and makes it more resistant while simultaneously diminishing gastric secretion. In the present investigation also these secondary metabolites present in the extracts (indicated by preliminary phytochemical studies) may be responsible for the anti-diarrhoeal activity [15&16].

CONCLUSION

From the study it can be concluded that *P.dulce* leaves freely available throughout India, the people in rural area, where they are more aware of decoction procedures of plants than the electrolyte therapy or conventional antidiarrheal drugs,can very well use it. These extracts can be further used to formulate polyherbal preparation using other plant extracts with anti -diarrhoeal activity.

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