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Studies on the Anti-diarrheal Profiles of *Bauhinia purpurea* Linn Leaves (Fam. Caesalpiniaceae) Extract

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Abstract – To evaluate the anti-diarrheal potential of the leaves of *Bauhinia purpurea* Linn., investigations were performed on different animal models e.g. castor oil induced diarrhea in rats and gastrointestinal motility test by using charcoal meal. In both the models the ethanolic extract of the leaves showed significant activity when compared to control group. The group treated with standard anti-diarrheal agent also showed significant activity comparing with control. Thus this study establishes the efficacy of *Bauhinia purpurea* Linn. leaves as an anti-diarrheal as claimed in folklore.

Key words – *Bauhinia purpurea*, leaf extract, anti-diarrheal, animal model, rats.

Introduction

The world health organization has constituted a diarrheal diseases control program (CDD), which includes studies on traditional medical practices, together with the evaluation of health education and prevention approaches to reduce the mortality through diarrhea (Syder *et al.*, 1982; WHO 1964, DDCP 1979, Lutterdot, 1989).

Bauhinia purpurea Linn (Family. Caesalpiniaceae) commonly known as "Mandari" (Tamil), "Kanchan" (Bengali) and Rakta puspha-Kovidara (Sanskrit) is a small ever green tree with dark green colored leaves which are lobed to almost half-way down to the base, rigidly sub-coriaceous, glabrous, shallow lycordate (Jain *et al.*, 1991: Anonymous, 1998). The tree is found in the sub-himalayan tract from the Indus eastward and throughout the forests of India and Burma. It is common everywhere perferring the low hills of India but largely cultivated as ornamental tree through the plains in India (Raghunathan *et al.*, 1982). The leaves commonly known as "Kanchan" are considered as a constituent of food having cocking values and are used in folklore as diuretic, anti-diabetic, hemorrhoids, dropsy, rheumatism, and diarrhea (Jain *et al.*, 1991; Kirtikar and Basu, 1987).

B. purpurea leaves has been claimed in folklore medicine of Tamilnadu, India to have anti-diarrheal potential (Jain *et al.*, 1991; Raghunathan *et al.*, 1982). Leaves of other species of *Bauhinia* e.g., *Bauhina variegata, Bauhina valhii* has been reported to have anti-diarrheal potential and also reduce abdominal pain (Singh 1995, Manandhar 1993). In support of all these references our present study was undertaken to evaluate the anti-diarrheal potential of *B. purpurea* leaves using different animal model and is being reported

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here under.

Experimental

Plant material – Leaves of *B. purpurea* were collected from Barlier in Niligiris district of Tamilnadu, India. Taxonomic identification of the plant was established by Botanical survey of India, Coimbatore, the leaves were dried under shed, sliced into small pieces, pulverized by a mechanical grinder and passed through a 60 mesh sieve. A Voucher specimens has been kept in our laboratory for future references.

Preparation and extract – The powdered leaves were extracted successively with ethyl alcohol in a soxhlet extractor. on evaporation of ethanol from the ethanolic extract in vacuo, a greenish brown residue was obtained (Yield 10.64% w/w with respect to the dry starting material). This mass was passed through a column of silica gel with the mobile phase Chloroform: Methanol (1:1). The eluates were collected and a yellowish colored liquid was obtained, which yield to a yellowish semisolid mass after removal of the solvent under vacuum (yield 1.32% w/w with respect to dry powdered material). On preliminary screening this eluates showed the presence of steroidal compounds (Treas and Evans, 1985) which was confirmed by TLC with the solvent system Hexane:Ethyl acetate (1:1) over silica gel G (Stahl, 1969). It was stored in a desiccator and used for further studies. For pharmacological experiments, weighed amount of the dried extract was suspended in a 2% (w/v) aqueous tragacanth solution and were used in specific doses.

Animal used – Wister rats weighing between 180-220 g of either sex were used. The animals were housed in standard metal cages and provided with food and water *ad libitum*.

Castor oil induced diarrhea in rats – In the present study, rats of either sex (180-200 g) were fasted for 28 hours. Animals were housed in five perforated steel cages, containing six in each. None of the animals died even at an oral dose of 2.5 gm/kg of the extract. The doses of ethanol extract were selected on trial basis and was administered orally (100, 200, and 300 mg/kg) by gavage as suspension to three groups of animals. The fourth group received diphenoxylate (5 mg/kg) orally in the form of suspension as standard drug for comparison. Fifth group which served as control received 2% (w/w) aqueous tragacanth suspension only. The method followed here was like the same as reported by Mukherjee *et al.* (1995), Aowters *et al.* (1978). One hour after such treatment each animal received 1 ml of caster oil orally by gavage and then observed for defecation. Up to 4th hour after the caster oil challenges the presence of characteristic diarrheal droppings were noted in the transparent plastic dishes placed beneath the individual rat cages (Mukherjee *et al.*, 1998).

Gastro intestinal motility tests – Rats were fasted for 18h and placed in five cages containing six in each. Each animal was administered orally with 1 ml of charcoal meal (3% deactivated charcoal in 10% aqueous tragacanth). Immediately after that, the first three groups of animals were administered orally with the extract suspension (100, 200, 300 mg/kg). The fourth group received atropine (0.1 mg/kg, i.p.), the standard drug for comparison. The fifth group was treated with tragacanth suspension which served as control. Thirty minutes later, each animal was killed and intestinal distance moved by the charcoal meal from the pylorus to the caecum was cut and measured. The distance travelled by the charcoal meal was expressed as a percentage of the distance from the pylorus to the caecum (Mandal *et al.*, 1997, Mukherjee *et al.* 1995), i.e. out of the total length from pylorous to caecum how much percentage of the total distance has been travelled by the

Table 1. Effect of *Bauhinia purpurea* on castor oil induced diarrhoea in rats (Mean±SE)

Oral pre treatment at 1hr	Mean defecation/group	Mean. no of wet Faeces/group
Ethanol extract (100 mg/kg)	1.75*±0.50	1.31*±0.41
Ethanol extract (200 mg/mg)	1.49**±0.62	1.11±0.21*
Ethanol extract (300 mg/kg)	1.45**±0.59	1.08±0.26**
Diphenoxylate (5 mg/kg)	1.33***±0.41	0***
Tragacanth Suspension (5ml/kg)	3.82±0.32	3.00±0.28

Significance was calculated by comparing with control by student's t-test (N=6); *P<0.05; **P<0.01; ***P<0.001.

charcoal meal with effect of either the extract or the standard drug as well as the saline treated control group was calculated.

Results and Discussion

Inhibition of castor oil-induced diarrhea – The effects of different doses of extract on castor oil induced diarrhea has been shown in Table 1. The extract like the standard anti-diarrheal agent, diphenoxylate, inhibited significantly the frequency of defecation when compared to untreated rats (Table 1). Both substances also reduced greatly the wetness of faecal droppings.

Effects on gastro-intestinal motility – Effect of the extract on gastrointestinal propulsion of charcoal meal has been shown in Table 2. The extract decreased propulsion of charcoal meal through the gastrointestinal tract when compared with the control group. Atropine reduced the motility of the intestine significantly.

There has been a statistically significant reduction in the incident and severity of diarrhoea produced in experimental models. The ethanol extract of *B. purpurea* (100, 200 and 300 mg/kg) like the standard anti-diarrheal agent, diphenoxylate inhibited significantly the frequency of defecation, wetness of faecal droppings (Table 1) when compared with untreated control rats (i.e. rats receiving neither ethanol extract nor diphenoxylate but castor oil only). The anti-muscarinic drug atropine and ethanol extract (in graded doses) decreased intestinal propulsive movement in charcoal meal treated animal model, the former being more potent than the later (Table 2).

Table 2. Inhibition of gastrointestinal motility by *Bauhinia purpurea* leaf extract

Treatment after charcoal meal	Movement of charcoal meal (%)	p-value
Ethanol extract (100 mg/kg)	49.33±2.42	<0.05
Ethanol extract (200 mg/kg)	47.22±2.13	<0.05
Ethanol extract (300 mg/kg)	45.21±2.09	<0.01
Atropine (0.1 mg/kg)	43.24±2.12	<0.001
Saline (5 ml/kg)	63.66±2.66	-

P-Value was calculated with respect to control group (N=6) by student's t-test.

The history of drug discovery implies that the ethno-botanical approach is the most produvctive of the plant surveying methods (Cox *et al.*, 1994). The search for new active chemical compounds in high biological diversity region has become a challenge to the modern Pharmaceutical industries. The above observations suggest that the petroleum ether (60°-80°C) extract of *B. purpurea* in graded doses reduced diarrhea by inhibiting intestinal peristalsis and gastro-intestinal motility. These inhibitory effects support the use of the leaves of *B. purpurea* in folklore medicine. This may led to compile and study the informations provided in traditional medicine in India. Thus this study justifies the use of *B. purpurea* as a non specific anti-diarrheal agent and supports its use as mentioned in ethnobotanical informations and folklore medicine.

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