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Research Article

Evaluation of laxative activity of an ethanolic extract of *Alangium Salvifolium* and *Pavonia Zeylanica* in rats

Hepcy Kalarani D^{1*}, Dinakar A², Senthilkumar N³

¹P.Rami Reddy Memorial College of Pharmacy, Department of Pharmaceutical Chemistry, Kadapa-516 003, Andhra Pradesh, India

²Sun Institute of Pharmaceutical Education and Research Centre, Nellore-524 346, Andhra Pradesh, India

³JKK Munirajah Medical Research Foundation-College of Pharmacy, B.Komarapalayam-638 183, Tamil Nadu, India

ABSTRACT

Alcoholic extracts of stem and leaves of *Alangium Salvifolium* (EEAS) and *Pavonia Zeylanica* (EEPZ) at doses 400 and 800mg was investigated for laxative activity in albino rats that were compared with standard drug sodium picosulfate (5mg/kg) in normal saline. The rats were fasted for 12 hours before the experiment. After 8 and 16 hours of drug administration, the faeces were collected and weighed. The extracts were found to produce significant laxative activity.

Keywords: *Alangium Salvifolium*, *Pavonia Zeylanica*, Laxative, sodium picosulfate, Faeces

INTRODUCTION

Constipation and illness have historically been associated with each other. Constipation is the infrequent or delayed evacuation of the faeces. It is a battle between the bowl and bowel. Regularity of the bowel movement is necessary to avoid a vague feeling of discomfort. Constipation is different from dyschezia (i.e., difficulty in defecation). In a normal adult, approximately nine liters of fluid and partly undigested food reach the cecum per day: fecal fluid content of 200-300ml usually results in some softening of stool. Large amounts of fluids can be retained in the large intestine due to hydrophilic properties of laxative. This increased pressure then facilitates the process of defecation.

Laxatives are the drugs which stimulate peristalsis, promote evacuation through the powerful contractions of the bowel. Defecation results due to powerful peristalsis. Fluid and electrolyte changes develop in both, the large and small intestine with laxative use. Laxatives are classified based on their mode of action as, stimulant or irritant laxatives, bulk-forming laxatives, emollient laxatives (lubricants) and saline laxatives (osmotic laxatives) (Kadam S.S. et al., 2011).

Many Indian medicinal plants are reported to be useful as a laxative. However, search for new laxative drug continued. *Alangium Salvifolium* belongs to the family

Alangiaceae. It is commonly known as sage leaved alangium, stone mango, hill sack tree and ancole fruit plant in English, nalla oodaga, oodaga chettu, aankolam and urgu in Telugu. It is a deciduous shrub or tree. It is commonly distributed in most parts of Chittoor district of Andhra Pradesh like Tirupati, Talakona, Chandragiri and Aragonda. The root bark is used for snake bite, cutaneous troubles, anthelmintic, astringent, purgative, diaphoretic and colic. Leaves are used in diabetes, and the fruits are used as astringent, tonic and laxative, whereas the seeds are used in hemorrhage. *Pavonia Zeylanica* belongs to the family Malvaceae. It is commonly known as karubenda, China mutharapulagam, peramuthi and chittimulli in Telugu. It is very commonly distributed in farm fields, wastelands and rare in forest fringers, throughout the Chittoor district of Andhra Pradesh. Whole plant is used as febrifuge and anthelmintic (Madhava Chetty K. et al., 2008).

An extended literature review shows that an Anti-arthritis activity of bark extracts of *Alangium Salvifolium* Wang (Jubie S. et al., 2008) and Anti-fertility activity of the stem bark of *Alangium Salvifolium* Wang in Wistar female rats (Murugan V. et al., 2000) has been reported. Larvicidal efficacy of medicinal plant extracts against *Anopheles Stephensi* and *Culex quinquefasciatus* (Kamaraj C et al., 2010) for *Pavonia Zeylanica* has been reported.

However, the plant is not scientifically explored for its laxative activity. Hence an effort has been made to screen the plants for laxative activity.

* Corresponding Author

Email: hepcykr@rediffmail.com

Contact: +91-9985362230

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MATERIALS AND METHODS

Collection of Plant Material

The proposed plant material of fresh stem and leaves of *Alangium Salvifolium* and *Pavonia Zeylanica* were collected from Tirupati, Chittoor district of Andhra Pradesh, India. The species of the proposed study was identified and authenticated by Dr.K.Madhava Chetty, Assistant Professor of Department of Botany, Sri Venkateswara University, Tirupati, Andhra Pradesh, India. Voucher specimens were deposited at Dept. of Pharmacognosy for further reference.

Extraction and phytochemical screening

The shade dried powder of the stem and leaves of plants was packed well in Soxhlet apparatus and was subjected to continuous hot extraction with ethanol after defatting with hexane until the completion of extraction. The extracts evaporated to dryness and kept in a desiccator until experimentation. The extract was subjected to qualitative chemical investigation for the identification of different phytoconstituents like sterols, glycosides, saponins, alkaloids, flavonoids, carbohydrates, tannins and proteins (Yarnalkar S., 1991; Khandelwal K.R., 2004).

Animals

Wistar albino rats (150-200gm) were used for the evaluation of laxative activity. The animals were maintained on the suitable nutritional and environmental conditions throughout the experiment as per the rules and regulations of the Institutional animal ethics committee. Experimental protocols for the pharmacological and toxicity studies were reviewed and approved by the Institutional animal ethical committee (1423/PO/a/11/CPCSEA).

Toxicity Study

An acute toxicity study was performed to determine LD₅₀ using different doses of the extracts according to the method described by Ghosh M.N. et al, 1984.

Evaluation of laxative activity

The method of Capasso et al. was followed for the evaluation of laxative activity. Rats fasted for 12 h before the experiment were placed individually in cages lined with clean filter paper (Capasso F. et al., 1986).

Rats were divided into six groups of six rats each.

In which,

Group I: Control animals received saline 5ml/kg, p.o. acts as the negative control.

Group II: Test animals received EEAS 400mg/kg p.o. in saline.

Group III: Test animals received EEAS 800mg/kg p.o. in saline.

Group IV: Test animals received EEPZ 400mg/kg p.o. in saline.

Group V: Test animals received EEPZ 800mg/kg p.o. in saline.

Group VI: Standard group animals received sodium picosulfate 5mg/kg p.o. served as the positive control. The faeces production in all the six groups was monitored for 16 hours.

Evaluation of laxative activity on loperamide induced constipation in rats

This study was described as described by Takaharu et al. Rats were placed individually in cages lined with clean filter paper, allowed to fast for 18 hours and divided into six groups of six animals each. The first group received normal saline (5ml/kg p.o) and serves as a negative control. EEAS 400 & 800mg/Kg and EEPZ 400 & 800mg/kg were administered p.o. to the second, third, fourth and fifth group animals respectively. The sixth group received p.o. the standard drug sodium picosulfate (5mg/kg). After 1 hour, all the animals received Loperamide (5mg/kg p.o). The faeces production in all six groups was monitored for eight hours (Takaharu, S. et al., 2002).

Statistical analysis

Data obtained from pharmacological experiments were expressed as mean±SEM. The data were statistically analyzed by one-way ANOVA followed by Dunnett's test.

RESULTS AND DISCUSSION

The preliminary phytochemical studies indicated the presence of alkaloids, flavonoids, terpenoids, tannins and carbohydrates. In acute toxicity study, the EEAS and EEPZ did not produce lethality up to the dose level

Table 1: Laxative activity of EEAS and EEPZ in rats

Groups		Faeces output (gm)	
		0-8 hours	8-16 hours
I	Control	1.42±0.17	0.85±0.18
II	EEAS 400mg	2.40±0.18*	1.94±0.27*
III	EEAS 800mg	4.21±0.24**	3.72±0.22**
IV	EEPZ 400mg	1.86±0.20	1.61±0.24
V	EEPZ 800mg	2.58±0.24*	2.16±0.20**
VI	Standard	5.26±0.38**	4.84±0.44**

Values are expressed as Mean±SEM (n=6). * p<0.05, ** p<0.01. Statistical significant test for comparison was done by ANOVA, followed by Dunnett's test. The faeces output of group II to VI are compared with group I.

of 5000mg/kg.

In the evaluation of laxative activity, the two doses of the extracts showed the increase in fecal output of rats when compared to the control group. There was no significant difference between the EEPZ 400mg/kg and control group. The effect of EEAS 800mg/kg increased significantly fecal output of rats compared to control group ($p < 0.01$). Whereas EEAS 400mg/kg and EEPZ 800mg/kg showed significance at $p < 0.05$. The effect of the EEAS 800mg/kg was comparable to that of the standard drug sodium picosulfate (Table-1).

In the loperamide-induced constipation, the doses of EEAS 800mg/kg and EEPZ 800mg/kg increased the total fecal output, and the results were statistically significant at $p < 0.01$ and $p < 0.05$ respectively (Table-2). There was no significant effect with the dose of EEPZ 400mg/kg of the extract compared to control. The standard drug showed the significant level as $p < 0.01$ which is comparable with that of EEAS 800mg/kg.

Table 2: Effect of EEAS and EEPZ on Loperamide induced constipation in rats

Groups	Faeces output (gm)
I Control	0.81±0.13
II EEAS 400mg	2.17±0.35*
III EEAS 800mg	2.59±0.38**
IV EEPZ 400mg	1.61±0.16
V EEPZ 800mg	2.45±0.43*
VI Standard	3.29±0.49**

Values are expressed as Mean±SEM (n=6). * $p < 0.05$, ** $p < 0.01$. Statistical significant test for comparison was done by ANOVA, followed by Dunnett's test. The faeces output of group II to VI are compared with group I.

CONCLUSION

The results of the present study confirm that ethanolic extract of stem and leaves of *Alangium Salvifolium* and *Pavonia Zeylanica* has laxative activity.

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