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Research Article

# LAXATIVE ACTIVITY OF HYDROALCOHOLIC LEAVES EXTRACT OF *PUTRANJIVA ROXBURGHII*.

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### ABSTRACT

**Background:** This study was aimed to assess the possible laxative effect of *roxburghii* hydroalcoholic leaves extract of *Putranjiva* in albino's Wistar rats.

**Method:** Rats were divided in 5 groups of 6 animals each, I group served as control, II group as standard (sodium picosulfate) while group III, IV and V were treated with leaves extract of *Putranjiva roxburghii* at doses of 250, 500 and 750 mg/kg respectively. The statistical analysis of results were carried out using one-way analysis (ANOVA) followed by Student t-test.

**Result and Discussion:** The laxative activity was determined based on the weight of the faeces matter. The effects of the hydroalcoholic leaves extract of *Putranjiva roxburghii* and reference also evaluated. The hydroalcoholic leaves extract of *Putranjiva roxburghii* administered orally at three different doses produced significant laxative activity and reduced loperamide induced constipation in dose dependent manner. The effect of the extract at 500 mg/kg (p.o.) was similar to that of reference drug sodium picosulfate (5 mg/kg, p.o).

**Conclusion:** The results showed that hydroalcoholic leaves extract of *Putranjiva roxburghii* has a significant laxative activity.

**Keywords:** Laxative, Loperamide, Constipation.

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### INTRODUCTION

Constipation is costiveness refers to movements of bowel that are infrequent and/or hard to pass<sup>1</sup>. Constipation is a symptom with many causes. These causes are obstructed defecation. About 50% of patients evaluated for constipation at tertiary referral hospitals have obstructed defecation. This type of constipation has mechanical and functional causes. Constipation causes include diet, hormones, adverse effects and toxicity of heavy metals<sup>2</sup>. Laxatives are among the most widely used drugs. However, their consumption is limited due to insufficient efficacy, especially when used regularly or with contraindications. Cardiotoxic and arrhythmogenic effects have been occurred with magnesium purgatives and cisapride<sup>3</sup>. Cramping, diarrhoea, hypercalcemia, hyperphosphatemia and hypokalemia are among the most common side effects<sup>4</sup>. The use of laxatives such as senna compounds and bisacodyl may be associated with colonic neoplasia<sup>4-6</sup>.

The search for novel safe laxative drugs seems, therefore, inevitable. The traditional use of *Putranjiva roxburghii* in constipation we have evaluated the laxative effect of *Putranjiva roxburghii* and that provide the scientific ground on the use of laxative.

### MATERIAL AND METHODS

#### Collection and Extraction of Plant Material:

The leaves of *Putranjiva roxburghii* were collected from Lucknow city and authenticated by Department of Botany, IFTM University, Moradabad. A voucher specimen was preserved in the Department for future reference. The dried leaves were powdered mechanically. The powdered material exhaustively extracted with hydroalcoholic solvent for 48 hours. The extract was filtered and concentrated in vacuum under reduced pressure using rotary flash evaporator, dried in the dessicator. The yield was recorded and the extract was kept in refrigerator.

**Animals:**

Wistar albino rats, weighing 120-150 g, were used for acute toxicity study and evaluation of pharmacological studies. Animals were housed in standard environmental conditions and fed with standard rodent diet and water.

**Acute Oral Toxicity Study and Selection of Doses:**

Acute oral toxicity studies of hydroalcoholic extract was determined as per Organization of Economic Co-Operation and Development (OECD) guideline no. 423 (Acute oral toxicity class method). It was observed that the *Putranjiva roxburghii* is not producing any toxicity up to 2000 mg/kg dose orally. Hence (250 and 500 and 750 mg/kg) were selected for this study.

**Laxative Activity Test:**

Rats fasted for 12 h before the experiment were placed individually in cages lined with clean filter paper. Rats were divided in five groups with the I group acting as the control and administered saline (5 ml/kg, p.o.) that acted as the negative control. The II group received sodium picosulfate (5 mg/kg, p.o.), this served as the positive control. The III, IV and V groups received 250, 500 and 750 mg/kg per os of the *Putranjiva roxburghii* hydroalcoholic leaves extract. The administration was done using metal oropharyngeal cannula. The faeces production (total number of normal as well as wet faeces) in all five groups was monitored for 16 h<sup>7</sup>.

**Laxative Activity on Loperamide Induced Constipation in Rats:**

This study was carried out, as earlier described by Takahura et al<sup>8</sup>. Rats were placed individually in cages lined with clean filter paper, allowed to fast for 18 hours and divided into five groups of six animals each. The I group received normal saline (5 ml/kg, p.o) and served as a negative control. The II group received per os the

standard drug sodium picosulfate (5 mg/kg). The hydroalcoholic leaves extract of *Putranjiva roxburghii* (250, 500, and 750 mg/kg, p.o.) was administered per os to the last three groups of rats respectively. After one hour, all the animals received loperamide (5 mg/kg, p.o.) by gavage. The faeces production (total number of normal as well as wet faeces) in all five groups were monitored for 8 hours.

**RESULTS****Effect of Hydroalcoholic Leaves Extract of *Putranjiva roxburghii* on Laxative Activity:**

In this study, the different doses of the extract showed dose dependent increase in faecal output of rats when compared to the control group (table 1). There was less significant difference between the extract at the dose of 250 mg/kg (p.o.) and control group. The effects of hydroalcoholic leaves extract of *Putranjiva roxburghii* at doses of 500 mg/kg (p.o.) increased faecal output of rats compared to control group. The effect of the extract at the doses 500 mg/kg (p.o.) was comparable to that of the standard drug sodium picosulfate (5 mg/kg, p.o.).

**Effect of Hydroalcoholic Leaves Extract of *Putranjiva roxburghii* on Loperamide Induced Constipation in Rats:**

In the loperamide-induced constipation, the hydroalcoholic leaves extract of *Putranjiva roxburghii* at the doses of 500 and 750 mg/kg (p.o.), increased the total number of faeces in a dose dependent manner, and the results were statistically significant (Table 2). There was less significant effect with the dose of 250 mg/kg (p.o.) of the extract compared with control. The reduction of the loperamide induced constipation at 500 mg/kg (p.o.) of plant extract treatment was found to be almost comparable with that of treatment by 5 mg/kg of sodium picosulfate.

**Table 1: Laxative Activity of Hydroalcoholic Extract of *Putranjiva roxburghii* in Rats**

Group (Treatment)	Dose (mg/kg)	Faeces output (g)	
		0 - 8 hr	8 - 16 hr
Control (Saline)	5 ml/kg	0.8270 ± 0.0006831	0.8437 ± 0.008732
Sodium picosulfate	5 mg/kg	4.856 ± 0.01438***	4.733 ± 0.03135***
<i>Putranjiva roxburghii</i>	250 mg/kg	3.162 ± 0.01621***	3.443 ± 0.1667***
<i>Putranjiva roxburghii</i>	500 mg/kg	4.205 ± 0.01713***	4.538 ± 0.1079***
<i>Putranjiva roxburghii</i>	750 mg/kg	3.808 ± 0.004475***	3.862 ± 0.03940***

Values are expressed as mean ± S.E.M (n = 6); \*\*\* p < 0.001 compared to control group.

**Table 2: Effect of *Putranjiva roxburghii* Hydroalcoholic Extract on Loperamide Induced Constipation in Rats**

Group (Treatment)	Dose mg/kg	Weight of faeces (g)	
		0 - 8 hr	8 - 16 hr
Control (Saline)	5 ml/kg	0.9085 ± 0.003243	
Sodium picosulfate	5 mg/kg	3.076 ± 0.03930***	
<i>Putranjiva roxburghii</i>	250 mg/kg	1.917 ± 0.003433***	
<i>Putranjiva roxburghii</i>	500 mg/kg	3.081 ± 0.01488***	
<i>Putranjiva roxburghii</i>	750 mg/kg	2.219 ± 0.1403***	

Values are expressed as mean ± S.E.M (n = 6); \*\*\* p < 0.001 compared to control group.

## Statistical Analysis:

Data obtained are presented as means  $\pm$  standard error of mean (S.E.M.) for the number of animals in each group ( $n = 6$ ). The differences between the data obtained from 'test' animal groups and the data obtained from untreated animal groups, were subjected to one-way analysis of variance (ANOVA; 99.99% confidence interval), followed by Dunnett's test. Values with  $p < 0.001$  compared with the control group were considered as being significantly different.

## DISCUSSION

The laxative activity of *Putranjiva roxburghii* was studied in rats. The results showed that an oral administration of the hydroalcoholic leaves extract of *Putranjiva roxburghii* produced significant and dose dependant increase in faeces output of rats. These effects were comparable with that of sodium picosulfate (standard drug) at moderate dose of 500 mg/kg. Sodium picosulfate affects electrolyte transport and smooth muscle contractility in the intestine. Its cathartic action is due to water accumulation in the intestine<sup>9</sup>. Sodium picosulfate is a member of the polyphenolic group of stimulant laxatives. Following oral administration, it is converted in the colon to an active form through the action of bacterial enzymes<sup>10</sup>. As a result, its effects are

directed the colon, where it stimulates peristalsis and, in common with other laxatives, reduces water reabsorption leading to the softening of faeces. The observed activities therefore suggest that laxative activity of hydroalcoholic leaves extract of *Putranjiva roxburghii* may be mediated through this mechanism of action of Sodium picosulfate. Adverse effects associated with use of sodium picosulfate are intestinal blockage, appendicitis, abdominal pain or cramping, nausea, bloating, vomiting, inflamed bowels or fecal impaction etc. that can be overcome possibly by replacing it with *Putranjiva roxburghii* for treatment of constipation<sup>11-12</sup>.

## CONCLUSION

This study showed that hydroalcoholic leaves extract of *Putranjiva roxburghii* has laxative effects in addition to the various physiological effects. Further studies may be directed at characterizing the bioactive ingredients that are responsible for the observed activity in the plant.

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