



## Research Article

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### STUDY ON ANTIDIARRHEAL ACTIVITY OF RASA PARPATI IN RATS

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#### ABSTRACT

Background: Diarrheal disease is a leading cause of mortality and morbidity, especially in developing countries and is responsible for the death of millions of people each year. Rasa parpati is mainly indicated in Gastro Intestinal disorders which is recommended for Irritable Bowel Syndrome and diarrhea. However, there is no scientific data available on anti diarrheal activity. Hence the research work has been undertaken to find out the safety and efficacy of Rasa parpati. Aims and objectives: To evaluate the antidiarrheal property of Rasa parpati. Methods: The oral toxicity study using Albino rats was performed in accordance with OECD guidelines. The antidiarrheal activity of Rasa parpati was investigated against castor oil induced diarrhea in rats using Loperamide as the standard reference drug. The antidiarrheal activity was evaluated using parameters such as number of episodes, enteropooling and intestinal motility. Results: Rasa parpati was safe even in its higher dose and efficacious in reducing the frequency and severity of diarrhea against castor oil induced diarrhea and caused a significant decrease of the intestinal fluid accumulation and it delayed the intestinal transit of charcoal meal in trial animals as compared to the control and the results were statistically significant. Conclusion: Experimental findings showed that Rasa Parpati possess significant antidiarrheal activity by inhibiting the intestinal hyperactivity and hypersecretory effect in diarrhea.

**Key words:** Rasa parpati, castor oil induced, enteropooling, intestinal motility, anti diarrheal activity.

#### INTRODUCTION

Parpati Rasayana Kalpanas are the most popular among the formulation of mercury and are widely used. Parapati Rasayanas have high therapeutic value, potent, less toxic and cost-effective medicine. Rasa parpati is a type of pota bandha<sup>1</sup> and It is a pharmaceutically prepared by homogenous mixture of purified parada(*Mercury*) and purified Gandhaka(*Sulphur*) which is heated till it melts, then spread on the plantain leaf placed on the platform of cowdung and compressed by another plantain leaf to make it crisp, thin wafer. Parpati is indicated in Grahani, Aruchi, Amlapitta, Atisara, Rakta-pitta<sup>2</sup>.

Diarrhoea is characterized by increased frequency of bowel movement, wet stool and abdominal pain. Diarrheal disease is a leading cause of mortality and morbidity, especially in developing countries and is responsible for the death of millions of people each year<sup>3</sup>. Rasa parpati is mainly indicated in GI (Gastro Intestinal) disorders which is recommended for ulcerative colitis and diarrhea. However, there is no scientific data available on the anti diarrheal activity of Rasa Parpati. Hence the research work has been undertaken to find out the safety and efficacy of Rasa parpati.

#### MATERIALS & METHODS

**Preparation of Rasa Parpati:** Rasa parpati was prepared after procuring the genuine raw drugs and their methodological processing as per the classical reference in the teaching Pharmacy of GAMC, Mysore.

#### Experimental study

**Acute Toxicity Study:** The acute oral toxicity of Rasa parpati was performed as per OECD guidelines. Acute toxicity Study and Animal experimentation was done in Sharada vilas College of Pharmacy, Mysore (Registration No.706/CPCSEA). A total of 6 rats were fasted overnight (but water was allowed) prior to dosing. Food was withheld for a further 3 to 4 hours after dosing. The animals were observed for 48 hours after the administration of the Rasa Parpati for the onset of clinical or toxicological symptoms. Mortality, if any, was observed over a period of 2 weeks. Throughout the experiments, all animals will be treated humanely according to the CPCSEA guidelines.

After Acute toxicity study, the prepared medicine Rasa Parpati was taken to evaluate anti diarrheal activity by Castrol oil induced diarrhea model

**Procedure:** For the first seven days, the control group, standard group and Trial I, II &III groups were given with the drugs mentioned in the Table1. On 7<sup>th</sup> day, all the animals were fasted overnight and provided only with tap water. Next day the control drug, standard drug and trial drugs were given 1hour prior to the administration of Castrol oil(1ml) orally and placed in cages lined with adsorbent papers and observed for 4 hours for the presence of diarrhoea and consistency of stools. The control group result was considered as 100%. The activity of each group expressed as percent inhibition (%) of diarrhoea. The percent inhibition of defecation calculated as

% Inhibition of defecation= $[(A-B)/A] \times 100$ , Where A indicates mean number of defecation caused by castor oil; B indicates mean number of defecation caused by Rasa parpati<sup>4</sup>.

**Castor oil-induced enteropooling:** Thirty Rats of either sex were divided into five groups and were fasted for 18 hours prior to the test. All the animals were given with the drugs mentioned in the Table 1. One hour later, all the rats were given with 1 ml of castor oil orally. After 1 hour of receiving castor oil the rats were sacrificed and the small intestine from the pylorus to the caecum was isolated. Then the intestinal contents was weighed and volume was measured by graduated tube<sup>4</sup>.

**Gastrointestinal motility test:** This test was performed according to the method using charcoal as a diet marker. Animals of either sex were divided into five groups of six rats in each and fasted for 18 hours before test. After 1 hour of drug administration, all the rats were challenged with 1 ml of castor oil orally. One hour later, all animals received 1 ml of charcoal meal (10% charcoal suspension in 5% gum acacia) orally. One hour later, all animals were sacrificed, and the distance covered by the charcoal meal in the intestine from the pylorus to the caecum was measured and expressed as percentage of distance moved<sup>4</sup>.

Table 1: Experimental design of the present study

Group	Purpose	Number of Rats	Drug
Group I	Control	6	Tween80(1ml)
Group II	Standard	6	Loperamide (0.45 mg/kg)
Group III	Trial I	6	Rasa Parpati(11 mg/kg)
Group IV	Trial II	6	Rasa Parpati(22 mg/kg)
Group V	Trial III	6	Rasa Parpati(44 mg/kg)

Table 2: Stool episodes in Castrol oil induced diarrhea model

Group	No. of Stool Episodes	Solid Stools	Semi Solid Stools	Liquid Stools	Score	% of inhibition
Control	9.16+1.04	1.16+0.16	4.66+0.95	3.33+0.42	6.00+0.00	-
Standard	2.00+ 0.36	0.50+0.22	1.16+0.30	0.33+0.21	3.16+0.79	78.17%
Trial 1	2.83+0.60	0.50+0.22	1.50+0.34	0.83+0.75	4.50+0.67	69.1%
Trial 2	1.00+0.36	0.33+0.21	0.50+0.22	0.16+0.16	1.83+0.79	89.08%
Trial 3	1.00+0.36	0.66+0.21	0.33+0.21	0.00+0.00	1.330+0.55	89.08%
F	31.564	2.372	12.751	27.540	9.139	
Significance	.000	.080	.000	.000	.000	

Table 3: Intestinal content weight and volume in Castrol oil induced diarrhea model

Group	Weight	Volume
Control	3.10+0.31	2.36+0.35
Standard	1.23+0.08	1.10+0.08
Trial 1	1.55+0.45	1.33+0.15
Trial 2	1.36+0.14	1.28+0.13
Trial 3	1.43+0.03	1.26+0.06
F	17.908	7.373
Significance	.000	.000

Table 4: Total intestinal length, distance covered by charcoal meal & % of distance moved in Castrol oil induced diarrhea model

Group	Total intestinal length	Distance covered	%of distance moved
Control	73.33	50.33	68.75+2.53
Standard	83.5	45.5	54.66+1.30
Trial 1	85.33	52.83	62.04+2.14
Trial 2	84.33	45.66	54.30+1.13
Trial 3	84.33	45	58.59+1.33

## RESULTS

**Acute toxicity study:** There was no visible toxicity and death in animals treated with Rasa parpati at the dose of 440mg/kg. There were no abnormal signs, behavioral changes, body weight changes or macroscopic finding at any time during the observation period of 14 days.

**Castrol oil Induced diarrhea:** In the present study, it was observed that Rasa parpati significantly reduced the frequency of diarrhea, number of defecation and the general diarrhea score at all the doses(11 mg/kg, 22 mg/kg and 44 mg/kg) when compared with control, but % of inhibition was less in RP11mg/kg when compared with RP22mg/kg & RP44mg/kg. Both RP22mg/kg & RP44mg/kg showed equal and significant inhibitory effect against diarrhea (Table 2). In general, the antidiarrheal activity of Rasa parpati was significant( $p < 0.05$ ).

**Castor oil-induced enteropooling:** All the 3 doses of Rasa Parpati(11 mg/kg, 22 mg/kg and 44 mg/kg) showed noticeable effect in castor oil induced enteropooling tests in rats. The intestinal volume and weight of the content was decreased in all the 3 doses of Rasa Parpati when compared with control. The values were statistically significant ( $p < 0.01$ ). The effect was less potent when compared with the standard drug Loperamide (Table 3)

**Gastrointestinal motility test:** The gastrointestinal distance traveled by the charcoal meal in the rats given with Rasa Parpati(11mg/kg) was 62.04%, Rasa Parpati(22mg/kg) was 54.30%, Rasa Parpati(44mg/kg) was 58.59% and Loperamide(0.45mg/kg) was 54.66%. The distance travelled was significantly ( $p < 0.001$ ) less in trial groups when compared with the control group. Rasa Parpati(22mg/kg) produced a marked

decrease in the propulsion of charcoal meal through gastrointestinal tract which is almost similar to the standard drug Loperamide (Table 4)

## DISCUSSION

Acute toxicity study of Rasa parpati showed that it is quite safe even at its higher dose of 440mg/kg. It was found that there was no mortality of animals or any visible clinical signs of general weakness in the animals. Hence the study was carried out in 3 doses i.e., 11mg/kg, 22mg/kg and 44mg/kg.

Diarrhea may be caused due to several mechanisms. It is usually considered as a result of altered motility and fluid accumulation within the intestinal tract. So the symptomatic treatment includes the use of G. I. protectives and drugs acting on G. I. motility<sup>5</sup>.

Castor oil is a triglyceride characterized by a high content of the hydroxylated unsaturated fatty acid ricinoleic acid. About 90% of ricinoleate present in castor oil is mainly responsible for diarrhea production. Presence of ricinoleate in small intestine, the peristaltic activity of small intestine increases as a result of permeability of Na<sup>+</sup> and Cl<sup>-</sup> changed in the intestinal mucosa. Secretion of endogenous prostaglandin is also stimulated by ricinoleate. Prostaglandin of E series are considered to be good diarrheogenic agents in experimental animals as well as in human beings. Many anti-diarrheal agents act by reducing the gastrointestinal motility and/ or the secretions<sup>6</sup>.

Rasa parpati in all the 3 doses exhibit significant anti-diarrheal activity. Though Processed Parada(*Mercury*) having its effect on different systems in the body, this unique preparation of Parpati targets in ailing the gastrointestinal ailments. Biliary products present in the Gomaya used as a platform for pressing during the preparation of Parpati gets absorbed into the heated kajjali (homogeneous mixture of purified *Mercury* and Purified *Sulphur*) through the leaf media and thus helps to regulate the gastrointestinal ailments including diarrhea.

It is evident from the present result that Rasa Parpati has potent anti-diarrheal property at a dose of 11mg/kg, 22mg/kg and 44mg/kg, but at the dose of 22mg/kg and 44mg/kg it was more effective. It possesses anti-diarrheal activity due to inhibitory effects on both gastrointestinal propulsion and fluid secretion. It reduced intestinal transit by the decrease in the distance traveled by charcoal meal. Delay in intestinal motility might have caused further absorption of water from feces and may additionally contribute to reducing its watery texture.

So the Rasa parpati affects frequency and consistency of diarrhea, also effects the motility and secretion of the intestine. Rasa parpati dose-dependently inhibits the altered intestinal transit and intraluminal fluid accumulation.

## CONCLUSION

Rasa Parpati possess anti-diarrheal property due to inhibitory effects on both gastrointestinal propulsion and fluid secretion and thereby reducing the number, frequency and consistency of diarrhea.

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