



ANTI DIARRHOEAL ACTIVITY OF A POLYHERBAL FORMULATION IN VARIOUS ANIMAL MODELS OF DIARRHOEA

Gupta Kunal^{1*}, Karale Sanjiv², Warad Vijayanand³

¹Department of Pharmacology, Shree Devi College of Pharmacy, Airport Road, Kenjar, Mangalore, Karnataka, India

²Department of Pharmacology, Shree Devi College of Pharmacy, Airport Road, Kenjar, Mangalore, Karnataka, India

³Department of Pharmacognosy, Shree Devi College of Pharmacy, Airport Road, Kenjar, Mangalore, Karnataka, India

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*E-mail: pharmacology1985@yahoo.com

ABSTRACT

Diarrhea is a condition where there is an increase in defecation of a person. The subject passes watery stools. Diarrhea affects many people in developed and developing countries. Millions of people die each year due to this disease. Keeping this in mind World Health Organization encourage studies on diarrhea which include research on traditional herbal medicine. Kutaja parpati vati is a licensed polyherbal formulation which are known to be anti diarrheal in nature. But no scientific report is available for its combined anti diarrheal potential. Hence, the present study is aimed to investigate the anti diarrheal activity of the licensed polyherbal formulation Kutaja parpati vati. In this study castor oil induced diarrhea and enteropooling models were used on male wistar rats. High and low doses of the polyherbal offered significant dose dependent protection in diarrheal conditions. It significantly reduced watery diarrhea and intestinal contents conditions. Standard drug used was loperamide. Hence we can conclude that Kutaja parpati vati possesses anti diarrheal properties and the drug look promising in the treatment of diarrhea.

KEYWORDS: Polyherbal, diarrhea, castor oil.

INTRODUCTION

According to world health organization diarrhea means having three or more loose liquid stools per day or as having more stools than is normal for that person. Diarrhea disease reflects increased water content in the stools. This derangement can occur due to improper water absorption or increased water secretion in the bowel. In severe cases of diarrhea defecation can reach 20 per day or every half an hour per day. A study in 2000 showed that around 211 million cases of diarrhea were reported in USA. In USA around 300-400 deaths of children occur per year. More than a billion dollars get spent in the treatment of diarrhea per year in USA.¹

In developing countries diarrhea is one of the main causes of childhood morbidity and mortality. This disease occurs in children, who are less than 5 years of age, 1000 million cases every year. In this category 5 million deaths occur each year.² Mankind looked towards plant, centuries ago for its beneficial property in restoring normal health from diseased conditions. In recent years mankind's inclination towards plants as medicines have increased. Medicinal plants provide promising results in the treatment of diarrhea. It is used also in the treatment.³

The World Health Organization in 2004 introduced a programme for control of diarrhea. It involved and encouraged the use of traditional herbal medicine. This was introduced keeping in mind centuries old efficacy, experience, accessibility and cost.⁴

Numerous medicinal plants possess potent anti diarrheal properties which include:

Holarrhena antidysenterica,⁵ *Cyperus rotundus*⁶

Kutaja parpati vati, a licensed anti diarrheal polyherbal formulation contains the extract of the above medicinal plants with sankha bhasma⁷ but no scientific report available for its combined anti diarrheal potential. Hence, the present study is aimed to investigate the anti diarrheal activity of the licensed polyherbal formulation Kutaja parpati vati.

MATERIALS AND METHODS

Chemicals

Kutaja parpati vati used is a licensed anti diarrheal polyherbal formulation manufactured by Om Pharmaceutical Limited, Bangalore. Loperamide used as Lopamide tab, Torrent Pharmaceuticals, India.

Animals

Male wistar rats were used in the study. They were used after having obtained necessary clearance from Institutional Animal Ethics Committee. CPCSEA guidelines were followed. Before the experiment animals were fed with standard chow diet and water ad libitum. Temperature 24-28°C, 12 hours day and night cycle were followed. They were kept in polypropylene cages in hygienic conditions.

Dose selection⁸

Acute oral toxicity study was performed according to OECD 423 guideline for dose selection. Administration of dose upto 5000mg/kg failed to show any toxicity in the respective animals. One tenth and one twentieths of the safe dose i.e high and low was selected for the study.

Groupings

Male Wistar rats were taken for the research study. Number of animals in each group was 6. Group 1 animals were treated with normal saline orally. Group 2 animals were treated with standard drug loperamide 5mg/kg dissolved in water orally. Group 3 animals were treated with lower dose, 500mg/kg dissolved in water of the polyherbal, Kutaja parpati vati orally. Group 4 animals were treated with higher dose, 1000mg/kg dissolved in water of the polyherbal, Kutaja parpati vati orally.

Castor oil induced diarrhea^{9,10}

Rats were fasted for 12 hours prior to the experiment. Then the drugs were administered accordingly as per the groupings. One hour later 2ml/rat castor oil was given orally to all the groups. Later their faeces were collected. Severity of diarrhea was assessed each hour for 6 hours. Total number of faeces expelled were compared with the control group. Here total number of watery diarrhea was taken into account of.

Castor oil induced enteropooling^{3,9}

Rats were fasted 24 hours prior to the experiment. Then the drugs were administered accordingly as per the groupings. After one hour 2ml/rat castor oil was given orally to all the groups. Two hours later the rats were sacrificed. Small intestine from pylorus to caecum were isolated. Their intestinal contents were collected by milking into graduated tube. Volume was measured in ml.

Statistical analysis

Statistical analysis was carried out using Graph Pad Prism Version 4 software (Graph Pad Inc., USA). ANOVA followed by Dunnett's multiple comparison test used. Data presented as Mean \pm SEM. N=6. Confidence level was taken as 95%.

RESULT

By analyzing the results obtained we can tell that Kutaja parpati vati has got anti diarrheal property. Moderately significant protection was offered by low and high dose of Kutaja parpati vati in castor oil induced diarrhea and castor oil induced enteropooling models in rat. Protection was seen in a dose dependent manner. Watery diarrhea parameter and small intestinal content decreased, dose dependently with 1000mg/kg showing maximum protection when compared to the lower dose of 500mg/kg orally. Low and high doses of Kutaja parpati vati offered 42.22% and 62.22% protection in diarrheal condition respectively in castor oil induced diarrhea. See table no. 1. Low and high doses of kutaja parpati vati offered 51.25% and 67.5% protection in diarrheal condition respectively in castor oil induced enteropooling. See table no. 2. The protection offered was less than that of the standard drug loperamide.

DISCUSSION

More than 90% of castor oil is ricinoleate. This is then hydrolysed to its active metabolite known as ricinoleic acid. This active metabolite is responsible for cascade of events eventually leading to diarrhea. They are, irritation in gastric mucosa, change in composition of mucosal fluid, change in

electrolyte transport system and other pathological changes which occurs in diarrhea. This active metabolite ricinoleic acid also diminishes permeability of various ions such as chloride, sodium in the intestine and responsible for autocoids release. Castor oil inhibits intestinal Na K ATPase activity. It also activates adenylate cyclase cAMP mediated active secretion. Nitric oxide also plays a role in castor oil mediated diarrhea. Kutaja parpati vati offered moderately significant protection in animal models of diarrhea. But this was seen in a dose dependent manner. The higher dose of the polyherbal offered better protection than the lower dose. Due to its moderately significant action against diarrhea, the drug looks promising in the treatment of diarrhea.^{3,4,9,10}

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TABLE NO.-1. CASTOR OIL INDUCED DIARRHEA.

Group No.	Group	Watery diarrhea No.	% Inhibition
1	Normal Saline	45 \pm 0.47	-
2	Loperamide (5 mg/kg po)	4 \pm 0.59**	91.11
3	Kutaja parpati vati low dose (500mg/kg po)	26 \pm 0.62**	42.22
4	Kutaja parpati vati high dose (1000mg/kg po)	17 \pm 0.31**	62.22

Values are expressed as MEAN \pm SEM. ANOVA followed by Dunnett's multiple comparison test used. n=6.

**Values are moderately significant (P<0.01) when compared with normal saline group.

TABLE NO.-2. CASTOR OIL INDUCED ENTEROPOOLING.

Group No.	Group	Volume (ml)	% Inhibition
1	Normal Saline	8 \pm 0.12	-
2	Loperamide (5 mg/kg po)	1.6 \pm 0.87**	80
3	Kutaja parpati vati low dose (500mg/kg po)	3.9 \pm 0.45**	51.25
4	Kutaja parpati vati high dose (1000mg/kg po)	2.6 \pm 0.69**	67.5

Values are expressed as MEAN \pm SEM. ANOVA followed by Dunnett's multiple comparison test used. n=6.

**Values are moderately significant (P<0.01) when compared with normal saline group.

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