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Antidiarrhoeal Activity of Extracts of Leaves of *Eugenia jambolana*

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ABSTRACT

Diarrhoea is a symptom marked by rapid passage of faecal material through the gastrointestinal tract and frequent passage of semisolid and liquid faeces. Prolonged diarrhoea leads to electrolyte loss. More than five millions of people under the age of five years die every year of diarrhoea of worldwide. However on prolonged use, they do have some adverse effects. For this reason, use of ayurvedic or herbal based formulations has increased as alternative. *Eugenia jambolana* is among the most commonly found Indian fruit tree. Various part of it are used for many therapeutic purposes such as hypoglycaemic and antioxidant property. The leaves have been used for antidiarrhoeal purposes, however detail investigation of this aspect has been not carried out so far hence it lead to study of antidiarrhoeal activity using castor oil induced diarrhoea in albino rats. Leaves of *Eugenia jambolana* were collected, authenticated, cleaned, washed, dried and coarsely powdered, subjected to successive extraction with different solvents in increasing order of polarity such as ethanol and water. The antidiarrhoeal activity of leaves of *Eugenia jambolana* was evaluated using a model of castor oil induced diarrhoea in albino rat at doses of 600mg/kg of all extract and loperamide as standard drug (1mg/kg). The possible mode of action was determined by gastric motility test at dose of 600mg/kg of all extracts, atropine as standard drug (1mg/kg). In castor oil induced diarrhoea the ethanol and water extract of *Eugenia jambolana* leaves significantly reduced the mean weight of faeces when compared with control group. Thus the present study established the use of *Eugenia jambolana* as an antidiarrhoeal as claimed.

Introduction

Worldwide diarrhoeal diseases constitute morbidity and mortality. Diarrhoea is a symptom marked by rapid passage of faecal material through the GIT and frequent passage of semisolid and liquid faeces. Prolonged diarrhoea leads to electrolyte loss. More than five millions of people under the age of five years die every year of diarrhoea throughout worldwide.

Objective

Eugenia jambolana is among very commonly found Indian fruit trees. Various parts of the java plum part were being used for various therapeutic purposes. The leaves can hence, be used for antidiarrhoeal activity. Thus the objective of the present study is to validate the Ethan botanical claim: determination of antidiarrhoeal activity by using castor oil induced diarrhoea and also to determine the possible mechanism of action by using GI motility test.

Material and methods

1. Selection of animals:

Healthy adult, mixed sex rat of Albino strain weighing 150-200gm were used after approval of institutional ethnic committee.

2. Grouping of animals:

The experimental design of investigation was carried out in four groups with six animals in each group and carried out in the following regimes.

Group I – Castor oil 1ml.

Group II – Castor oil 1ml and loperamide (1mg/kg) in 2% w/v acacia solution.

Group III – Castor oil 1ml and aqueous extract (600mg/kg) in 2% w/v acacia solution.

Group IV – Castor oil 1ml and ethanolic extract (600mg/kg) in 2% w/v acacia solution.

3. Preparation of Solutions:

- The different extracts of leaves of *Eugenia jambolana* such as ethanol, water were dissolved in 2% w/v aqueous gum acacia for oral administration to rat.

- Ethanol and water extracts of *Eugenia jambolana* were administered at 600mg/kg body weight in 2% w/v aqueous gum acacia.

4. Preparation of drug solutions:

- For positive control, loperamide tablet was used. The selected loperamide suspension was a marketed formulation i.e. Andial tablet.

Method:**1. Castor oil induced diarrhoea:**

Castor oil induced diarrhoea reported by a Wouters et al with modification has been used in the present study. Albino rats of either sex fasted for eighteen hours and the dose regime given as above. One hour after treatment, each rat received 1ml castor oil orally and placed in separate cage, observed the defecation upto four hours after treatment. The presence of characteristic diarrhoeal dropping was noted on non-wetting paper sheet of uniform weight. The observations were quoted in table 1.

2. Gastrointestinal motility test:

The animal fasted for eighteen hours prior to experiment with the tap water and libitum. The animals were randomly divided into four groups of six animals. Each group received the divided dose regimen as mention above. After thirty minutes, each rat was administered orally with 1ml of charcoal meal (3% deactivated charcoal in 2% aqueous tragacanth). Thirty minutes later, each rat was sacrificed and intestinal distance moved by charcoal meal from pylorus sphincter was measured and expressed as mean distance from pylorus to caecum. The observations were quoted in table 2.

Observation Table 1:

Comparison of Antidiarrhoeal activity of *Eugenia jambolana* leaf extracts in castor oil induced diarrhoea.

Sr. No.	Treatment	Dose (mg/kg)	Mean wt of stool \pm SE after 4 hr (gm)	Percentage of inhibition (%)
1.	Control (Castor oil)	-	3.867 \pm 0.2374	-
2.	Loperamide	1	1.214 \pm 0.0357	68.61%
3.	Aqueous extract	600	1.592 \pm 0.0791	58.33%
4.	Ethanollic extract	600	2.525 \pm 0.1534	34.70%

Values are mean \pm S.E (n=4) p<0.01 as compared with control

Observation Table 2:

Comparison of *Eugenia jambolana leaf* extracts on gastrointestinal motility.

Sr. No.	Treatment	Dose (mg/kg)	Mean distance traveled by charcoal \pm SEM
1.	Control(Vehicle)	-	84.3 \pm 3.67
2.	Atropine	1	21.0 \pm 1.84
3.	Aqueous extract	600	41.1 \pm 2.15
4.	Ethanollic extract	600	62.4 \pm 2.64

All values are given in mean \pm SEM $p < 0.01$ as compared with control.

Result and discussion:

The plant *Eugenia jambolana* was subjected for ethanol and aqueous extraction by successive extraction and this extracts were evaluated for antidiarrhoeal effect. The result of this study shows that the ethanolic and aqueous extract had been found to be significantly reducing the mean weight of faeces when compared with controlled group. Both types of extracts reduce the total number of diarrhoeic faeces. The aqueous extracts of leaves 600mg/kg was found to be having similar activity as loperamide, the reference standard drug and also more than the alcoholic extract (600 mg/kg). The extracts also significantly decrease the propulsion of charcoal meal through the GIT, as compared with controlled group.

Conclusion:

From the results, it can be concluded that the aqueous extract (600mg/kg) of leaves of *Eugenia jambolana* is more active than the alcoholic extract (600mg/kg). Thus, the present study established the use of *Eugenia jambolana* as an antidiarrhoeal as claimed.

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