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INVESTIGATION ON ANTI-DIARRHOEAL ACTIVITY OF MUCUNA EXTRACTS

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ABSTRACT

Diarrhoea is the common disease mostly seen in developing countries. It is caused by contaminated food, variety of virus, and bacteria and parasitic organisms. 70% of acute diarrhoaea is due to food borne disease. Chronic diarrhoea is caused by inflammatiory bowel disease, microscopic collitis. The antibiotics and their resistance are used for the bacteria clostridium difficile which increases the diarrheal incidence. Herbal medicines are used mostly on india and plays important role in the world. Plants consist of astringent properties, anti inflammatory properties, and also bulk forming agents are used for the treatment of diarrhea. In this study,the different folklore claims are involved in the plant Mucuna pruriens, and isolated saponins extracts ethanol from fruits. In conclusion, the EEMP showed marked reduction in the number of diarrhoea stools and the reduction in the weight and volume of the intestinal contents, as well as a modest reduction in intestinal transit. This study did not go further, to demonstration as to whether the extract altered the activity of Na/K ATPase or activation of chloride channels.

Key Words: Diarrhoea, Herbal medicine, Traditional, *Mucuna pruriens*.

INTRODUCTION

Diarrhoea is the common disease mostly seen in developing countries. It is caused by contaminated food, variety of virus, and bacteria and parasitic organisms. 70% of acute diarrhoaea is due to food borne disease. Chronic diarrhoea is caused by inflammatiory bowel disease, microscopic collitis. The antibiotics and their resistance are used for the bacteria clostridium difficile which increases the diarrheal incidence. Herbal medicines are used mostly on india and plays important role in the world. Plants consist of astringent properties, anti inflammatory properties, and also bulk forming agents are used for the treatment of diarrhea. In this study,the different folklore claims are involved in the plant Mucuna pruriens, and isolated saponins extracts ethanol from fruits. Mucuna pruriens (Fabaceae) is an established herbal drug used for the management of male infertility, nervous disorders, and also as an aphrodisiac. It has been shown that its seeds are potentially of substantial medicinal importance. In the present study investigation is to be done to prove the antidiarrhoeal activity of the plant of Mucuna Pruriens.

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MATERIALS AND METHODS

Preparation of extracts

The fruits are dried in shade, separated and made to dry powder. It was then passed through the 40 mesh sieve. A weighed quantity (60gm) of the powder was subjected to continuous hot extraction in Soxhlet Apparatus. The extract was evaporated under reduced pressure using rotary evaporator until all the solvent has been removed to give an extract sample. Percentage yield of ethanolic extract of *Mucuna Pruriens* (EEMP) was found to be 21.5 % w/w.

Preliminary phytochemical screening

The phytochemical examination of ethanolic (90%) extract of fruits of *Mucuna Pruriens* was performed by the standard methods [7].

Animals used

Albino wistar rats (150-230g) of either sex were obtained. The animals were maintained in a well-ventilated room with 12:12 hour light/dark cycle in polypropylene cages. The animals were fed with standard pellet feed (Hindustan Lever Limited., Bangalore) and water was given *ad libitum*. Ethical committee clearance was obtained from IAEC (Institutional Animal Ethics Committee) of CPCSEA.

Castor oil-induced diarrhoea

Rats were divided into four groups of six animals each, diarrhea was induced by administering 1 ml of castor oil orally to rats. Group I treated as control (2 ml/kg, i.p. saline), group II received atropine (3mg/kg, i.p.) served as standard and group III and IV received EEMP (100 and 200 mg/kg, i.p.) 1 h before castor oil administration. The number of both wet and dry diarrheal droppings were counted every hour for a period of 4 h mean of the stools passed by the treated groups were compared with that of the positive control group consisted of animals given an intraperitoneal injection of saline (2ml/kg, i.p) [8].

Small intestinal transit

Rats were fasted for 18 h divided into five groups of six animals each, Group I received 2 ml normal saline orally, group II received 2 ml of castor oil orally with saline 2 ml/kg intraperitoneally, group III received atropine (3 mg/kg, i.p.), group IV and V received EEMP 100 and 200 mg/kg intraperitoneally respectively, 1 h before administration of castor oil. One ml of marker (10% charcoal suspension in 5% gum acacia) was administered orally 1 h after castor oil treatment. The rats were sacrificed after 1h and the distance traveled by charcoal meal from the pylorus was measured and expressed as percentage of the total length of the intestine from the pylorus to caecum [10].

Statistical analysis

The data were expressed as mean ± standard error mean (S.E.M).The Significance of differences among the groups was assessed using one way and multiple way analysis of variance (ANOVA). The test followed by Dunnet's test *P* values less than 0.05 were considered as significance.

RESULTS

The results of preliminary phytochemical screening of the ethanolic extract of inner bark of *Mucuna pruriens* revealed that presence of alkaloids, flavonoids, triterpinoids, carbohydrates, tannins, phenols, gums and mucilage and absence of saponins and steroids.

Castor oil-induced diarrhoea

30 min after administration of castor oil the diarrhoea was clinically apparent in all the animals of control group, for the next 4 h. This was markedly reduced by the intraperitoneal injection of atropine, 3 mg/kg (69.83%). A similar marked reduction in the number of defecations over four hours was achieved with *Mucuna pruriens* at the doses of 100 or 200 mg/kg i.p. EEMP 100 and 200 significantly inhibited the defecation.(43.56% and 64.25%) EEMP 100 and 200 mg/kg, i.p. dose of extract delayed the onset of diarrhoea and only 30% of animals showed diarrhoea at first hour (P<0.001) (Table 1).

Small intestinal transit

The percent intestinal transit was increased with castor oil (91.83%), but it was reduced in both doses of extract, and much more markedly by atropine (38.14%). EEMP 100 mg/kg, i.p. dose of extract produced 77.02% intestinal transit induced by castor oil respectively. Whereas, EEMP 400 mg/kg, i.p. dose produced 58.29% of castor oil induced charcoal meal transit (Table 2).

Table 1. Effect of *EEMP* on castor oil-induced rats

Group	Treatment	Mean Defecation in 4hr	% Inhibition of Defecation
I	Castor oil (1ml p.o) + saline (2ml/kg i.p)	25.34±2.41	---
II	Castor oil (1ml p.o) + atropine (3mg/kg i.p)	8.67±0.35**	69.83
III	Castor oil (1ml p.o) + EEMP (200mg/kg i.p)	17.91±1.03*	43.56
IV	Castor oil (1ml p.o) + EEMP (400mg/kg i.p)	10.49±0.92**	64.25

Effect of EEMP on castor oil-induced diarrhoea in rats: EEMP was administered i.p 1 h before castor oil administration. Values are expressed as mean ± SEM from the experiments. *P<0.01, **P<0.001 when compared with Castor oil + saline-treated group.

CONCLUSION

In conclusion, the EEMP showed marked reduction in the number of diarrhoea stools and the reduction in the weight and volume of the intestinal contents, as well as a modest reduction in intestinal transit. This study did not go further, to demonstration as to whether the extract altered the activity of Na/K ATPase or activation of chloride channels. Whatever, may be the mechanism of action, the ethanolic extract of *Mucuna pruriens* may be useful in a wide range of diarrhoeal

states, due to both disorders of transit e.g. functional diarrhoeas, radiation diarrhoea or due to abnormal secretory mechanisms like in cholera or E.coli enterotoxin induced diarrhoea. Further studies are needed to completely understand the mechanism of anti-diarrhoeal action of *Mucuna pruriens.*

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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