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ANTIDIARRHOEAL ACTIVITY OF AQUEOUS LEAF EXTRACT OF *XANTHIUM STRUMARIUM* ON CASTOR OIL INDUCED DIARRHEA IN RATS

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ABSTRACT

The present study was conducted to evaluate the antidiarrhoeal activity of aqueous leaf extract of *Xanthium strumarium* on castor oil induced diarrhea in rats. The test drugs *Xanthium strumarium* extract at a dose of 250 & 500 mg/kg and reference standard loperamide at a dose of 3 mg /kg were administered orally. After 60 min of test drug administration, the animals received 1ml of castor oil orally and the frequency of defecation and the weight of faecal material was noted up to 4 h and compared to control.

Key words: *Xanthium strumarium*, Antidiarrhoeal activity, Loperamide.

INTRODUCTION

Worldwide diarrhea is an important health problem especially in the developing countries [1]. It was estimated that nearly 5 – 8 million deaths in infants and children under 5 years of age each year due to diarrhea. Many plants were used as folklore medicine to treat infectious diseases such as urinary tract infections, diarrhea, cutaneous diseases, bronchitis and parasitic infections [2]. Nearly 80% of world populations depend on traditional medicines and the plant based products for various disorders. Medicinal plants are the major components of traditional medicine practiced worldwide availability and safety [3]. Therefore search for new effective agents from plant origin has been attracted a considerable researchers towards a safer new drug development.

Xanthium strumarium L. (Family: Compositae) is a cocklebur or burweed commonly found as a weed in roadsides, rice fields, hedges throughout the tropical parts of India. The word "*Xanthium*" is derived from an ancient Greek word "xanthos" meaning yellow and "*strumarium*" means "cushionlike swelling," with reference to the seedpods which turn from green to yellow as they ripen (later they become deep yellow to brown). It is commonly called chotagokhru due to the shape of its fruit which look likes the cow's toe. In many parts of India, it is known as adhasisi, as this weed is used for the treatment of common disease hemicrania." The genus *Xanthium* includes 25 species, all of American origin. *Xanthium spinosum* Linn. and *Xanthium strumarium* Linn. are used medicinally in Europe, North America and Brazil; *Xanthium canadens* Mill. is used in North America and Brazil and *Xanthium strumarium* Linn. in China, India and Malaysia [4].

The plant extract of *Xanthium strumarium* exhibited antimicrobial activity against *Proteus vulgaris*,

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Staphylococcus aureus, Bacillus subtilis, Candida albicans and *Candida pseudotropicalis*. The activity is due to presence of xanthol [5]. It also has potent antifungal activity against pathogenic as well as non-pathogenic fungi due to the presence of terpenes, d-limonene and d-carveol [6].

Xanthatin an active principle isolated from *Xanthium strumarium* showed the strongest gastric protective and hypoglycaemic activity [7]. Previous studies showed that the *Xanthium strumarium*, exhibited anticancer activity against these various human cell lines was screened by NCI against 60 human cancer cell lines organised into sub-panels representing leukaemia, melanoma, cancer of the lung, colon, kidney, ovary, CNS, breast and prostate [8]. The extract possesses significant antitussive activity in a dose-dependent manner in mice [9]. The *n*-butanol fraction of *Xanthium strumarium* possesses potent analgesic effects which are likely to be mediated by its anti-inflammatory activity [10]. The plant also possesses vasorelaxant activity and relaxes vascular smooth muscle via endothelium-dependent nitric oxide [11]. Xanthumin another compound of *Xanthium strumarium* showed CNS depressant activity [12] and diuretic activity [13].

Most of the activities mentioned in Indian system of medicine on *Xanthium strumarium* were proved but there is no scientific evidence for the antidiarrhoeal activity. Current study was undertaken to establish the antidiarrhoeal activity of the leaves of *Xanthium strumarium.*

MATERIALS & METHODS

Plant Material

The aerial parts of *Xanthium strumarium* were collected from the out skirts Erode, South India, in the month of February. The plant samples were identified and authenticated by the botanist, Botanical Survey of India, Agricultural University, Coimbatore, India. The voucher specimen (A/6675) has been deposited in Herbarium for further reference.

Extract Preparation

The collected leaves of *Xanthium strumarium* were washed, air dried, powdered and boiled in sufficient quantity of distilled water for 2 hours and the aqueous extract was filtered, concentrated in vacuum and lyophilized to give a dry extract.

Animals

Healthy Wistar albino rats (150 – 200 gm) of either sex were used for the study. The animals were obtained from animal house of Sri Lakshminarayana Institute of Medical Sciences, Pondicherry, India. On arrival the animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of 24 ± 2^{o}C and relative humidity of 30–70 %. A 12:12 light: dark cycle was followed. All animals were allowed free access to water and fed with standard commercial pelleted chaw (Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by Ethics Committee (932/a/06/CPCSEA) of Sri Lakshminarayana Institute of Medical Sciences, Pondicherry and were in accordance with the guidelines of the Institutional Animal Ethics Committee.

Castor Oil Induced Diarrhea

Rats of either sex (150-200gm) were fasted for 18 h. They were divided into four groups (n=6). The first group of animals, which served as control was administered with 0.5% Carboxy Methyl Cellulose (CMC) solution. The second group received standard drug, loperamide (3 mg/kg) orally by suspending in CMC solution. The aqueous leaf extract of *Xanthium strumarium* was administered orally at 250 and 500 mg/kg dose to third and fourth group respectively. After 60 min of drug treatment, the animals of each group received 1ml of castor oil orally and the frequency of defecation and the weight of faecal material was noted up to 4 h and compared to control animals [14].

Statistical Analysis

Results were expressed as mean ± SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnet's t test. P values < 0.05 were considered as significant.

RESULT & DISCUSSION

Table 1. Effect of aqueous leaf extract of *Xanthium strumarium* on castor oil induced diarrhea in rats.

S.No	Drug Treatment	Onset Time (min)	Total Number of Faecal Matter	No. of Wet Faecal Matter	% Reduction
1	Control	22.65±2.13	62.89±1.46	58.52±3.26	-
2	Loperamide (3mg/kg)	62.66±3.45***	16.40±0.97***	08.26±0.007***	73.92
3	*Xanthium strumarium* (250 mg/kg)	42.96±2.19**	37.17±1.23***	21.68±1.11***	40.89
4	*Xanthium strumarium* (500 mg/kg)	58.43±3.82***	21.32±0.62***	14.09±0.06***	66.09

Values are in Mean ±SEM; *P<0.05, ** P<0.01 and** *P<0.001 Vs Control

Table 1 shows the antidiarrhoeal activity of aqueous leaf extract of *Xanthium strumarium* on castor oil induced in rats. *Xanthium strumarium* at a dose of 250 & 500 mg/kg and loperamide (3 mg/kg) were used for the study. After the test drug and castor oil administration the onset, total number of faecal matter and percentage reduction were observed. 250 and 500 mg of *Xanthium strumarium* significantly ($P<0.01$ and $P<0.001$ respectively) enhanced the onset of diarrhea as compared to control. There was a significant ($P<0.001$) percentage reduction in total number of faecal matter was observed with both the doses of *Xanthium strumarium* when compared to control. The antidiarrhoeal effect produced by the aqueous leaf extract of *Xanthium strumarium* was comparable to the reference standard loperamide.

CONCLUSION

From the above it was concluded that, aqueous leaf extract of *Xanthium strumarium* exhibited antidiarrhoeal activity against castor oil induced diarrhea in rats.

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