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RESEARCH ARTICLE

EVALUATION OF ANTIULCER ACTIVITY OF *Crossandra infundibuliformis* FLOWER EXTRACT USING ASPIRIN INDUCED ULCER MODEL IN ALBINO RATS

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ABSTRACT

The present study is aimed at investigating the antiulcer effects of *Crossandra infundibuliformis* flowers methanol extract against aspirin induced ulcer in albino rats. Anti-ulcer activity was evaluated by measuring the ulcer index and percentage of ulcer incidence. The standard drug and the extract at 200mg/kg has shown almost similar action as that of ranitidine should be replaced with- the standard drug and the extract at 400mg/kg has shown almost similar action as that of ranitidine.

INTRODUCTION

Peptic ulcer is one of the major gastrointestinal disorders which results in impaired quality of life and is associated with increased morbidity and mortality (Suman sura *et al.*, 2011). It mainly occurs due to the imbalance between gastric aggressive factors (Acid, Pepsin) and defensive factors (Mucus, Bicarbonate, Prostaglandin synthesis). Along with these various other factors like *Helicobacter pylori* infection, frequent use of NSAIDS, alcohol and nicotine consumption, stress also contribute to peptic ulcer formation (Bandyopadhyay *et al.*, 2002). Statistics reveal that 10% or more of adult population are affected within their lifetime and peptic ulcer affects individuals from 20 to 60 years of age with males being predominantly affected. The present therapeutic approach (Proton pump inhibitors etc) causes pneumonia, osteoporosis, vitamin B12 malabsorption etc on chronic term (Reilly *et al.*, 1999) (Franko *et al.*, 1998). Therefore in recent years, focus on indigenous drugs has been increased world wide as they have shown immense potential in peptic ulcer treatment with very minimal side effects. In countries like India, flowers are always used in all its cultural rituals. Flowers are widely used for their beauty and the colour they radiate. Flowers which serve their purpose usually wilt and are thrown a trash (Jeeva *et al.*, 2011) (Joselin *et al.*, 2012) (Ebrahimzadeh *et al.*, 2011).

However due to the presence of phyto constituents, they can be potentially considered as a major source of phyto pharmaceuticals in pharmacy and nutraceutical industries and hence in our present work evaluation of efficacy of *Crossandra infundibuliformis* flowers methanol extract on aspirin induced ulcers was adopted.

Crossandra infundibuliformis (Family: Acanthaceae) is a popular tropical flower known as "Firecracker". The plant is native to Southern India, Malaysia and Srilanka (Elamathi *et al.*, 2011). Due to its medicinal value, the various parts of the plant are used to treat many diseases. As the leaf extracts of *Crossandra* is proved to be a good anti-microbial, aphrodisiac, anti-inflammatory and analgesic, an attempt is made by using the methanol extracts of flowers of *Crossandra* for relieving aspirin induced peptic ulcers (Madhumitha *et al.*, 2010, 2011, 2012) (Mallikarjuna *et al.*, 2012).

MATERIALS AND METHODS

Collection and drying of plant material

The fresh flowers of *Crossandra infundibuliformis* were collected from in and around Narasaraopet, Andhra Pradesh, India. The plant was botanically identified and authenticated by Mr. Rajanala VenuMadhav, Department of Botany, S.S.N College, Narasaraopet, Guntur. Healthy flowers were chosen from the collected flowers and are dried in shade.

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Extraction

The dried plant material was extracted in its entire form by Soxhalation using methanol as a solvent for 24 hrs. The extraction is repeated for three times. The extracts obtained were concentrated with the help of a vacuum evaporator and stored in a dessicator. The concentrated extracts were then subjected to preliminary phytochemical screening.

Qualitative phytochemical evaluation

Methanol extract of flowers was screened for the presence of various secondary metabolites like tannins, glycosides, alkaloids, terpenoids and flavonoids as well for proteins, carbohydrates and amino acids using standard methods (Kokate *et al.*, 2009).

Animals used

Albino rats weighing 150-200g of either sex were used for the study. They were acclimatized to laboratory conditions and were fasted 36hrs before the study. Animals were kept in plastic cages under controlled conditions of temperature $23\pm 2^{\circ}\text{C}$ and were given free access to rat chow and water till 36hrs prior study. The animals were transferred to the lab one hour before the start of the experiment.

Experimental design

The animals were divided in to four groups of six rats each.

Group-I: Control (Aspirin 100mg/kg body wt p.o)

Group-II: Ranitidine (20mg/kg body wt p.o) in ulcer rats

Group-III: Serves as treated ulcer group was given standard diet and 200mg/kg body wt plant extract orally.

Group-IV: Serves as treated ulcer group was given standard diet and 400mg/kg body wt plant extract orally.

Aspirin induced gastric ulcer model in rats

The albino rats weighing between 150-200g are divided into four groups each of six rats. The animals were fasted 36hrs prior to study. Group-I was kept as control. Group-II was treated with standard drug ranitidine (50mg/kg i.p). Group-III was treated with methanol extract of *Crossandra infundibuliformis* at the dose of 200mg/kg body wt. Group IV was treated with methanol extract of *Crossandra infundibuliformis* at the dose of 400mg/kg body wt. After 1h aspirin (100mg/kg) was administered orally to group I, II, III, IV respectively to induce ulcers. The animals were sacrificed after 5hr of aspirin administration and their stomachs were excised and gastric contents were aspirated. The contents were subjected to centrifugation at 1000rpm for 10 min and then analyzed for p^{H} . Later the stomachs were washed with normal saline and ulcer index is determined by the following procedure (Mohammad Arshad *et al.*, 2012).

Procedure for determining Ulcer index

The stomachs were removed and fixed on a cork plate and the number and severity of ulcers was registered with a microscope using the following scores.

Severity Score

- 0-Normal,
- 1-scattered haemorrhagic spots,
- 2-deeper haemorrhagic spots and some ulcers,
- 3-haemorrhagic spots and ulcers,
- 4-perforation (D.D. Bonny Castle *et al.*, 1964)

$$\text{Ulcer Index} = \frac{\text{Arithmetic mean of the Intensity in a group} + \text{Ulcer positive number} \times 2}{\text{Total number of animals}}$$

In each group, the total score mean score, standard deviation, standard error of mean, P Value, ulcer index and ulcer incidence were calculated.

Statistical Analysis

The treated group is compared with control and standard group; results were expressed as a mean \pm SD of four animals in each group. The results were analyzed statistically using one-way analysis of variance (ANOVA) followed by Dunnett's test. $P \leq 0.05$ when compared with control is considered significant Probability table is used to interpret the results.

RESULTS

The phytochemical analysis of methanol extract of flowers of *Crossandra infundibuliformis* showed the presence of flavonoids, carbohydrates and glycosides.

Table 1: Phytochemical analysis

S.No	Phytoconstituents	Methanol Extract (Soxhalation)
1.	Carbohydrates & Glycosides	+
2.	Alkaloids	-
3.	Saponins	-
4.	Flavonoids	+
5.	Proteins & Amino acids	-

(+) ----- Presence (-) ----- Absence

Anti-ulcer study

In this model ulcer index was reduced from 3.84 in control to 1.33 in standard (i.e Ranitidine group) and to 1.35 & 1.16 in Group-III, Group-IV respectively.

Table 2: Aspirin induced gastric ulcer model in rats

Rat No	Group-I (Control)	Group-II (Control+Standard)	Group-III (Control+Extract 200mg/kg)	Group-IV (Control+Extract 400mg/kg)
1	2	1	2	1
2	3	2	2	1
3	2	1	1	2
4	1	1	1	2
5	3	0	1	1
6	2	1	1	0
Total Ulcer Score	13	6	8	7
Mean Score	2.17	1	1.33	1.16
SD	0.75	0.63	0.54	0.68
SEM	0.31	0.26	0.22	0.27
't-Test'	7.05	3.87	3.90	4.29
P value	$P < 0.001$	$P < 0.05$	$P < 0.05$	$P < 0.05$
Ulcer Index	3.84	1.33	1.35	1.16
Ulcer incidence	83.4%	16.7%	17.2%	16.7%

Table 3. Effect of *Crossandra infundibuliformis* on p^H & Ulcer index in aspirin induced ulcer model

Groups	P ^H of Gastric juice	Ulcer Index
Group-I (Control)	1.62±0.05	3.84
Group-II (Standard)	4.300±0.1528	1.33
Group-III (Test extract 200mg/kg)	4.275±0.1021	1.35
Group-IV (Test extract 400 mg/kg)	4.675±0.1601	1.16

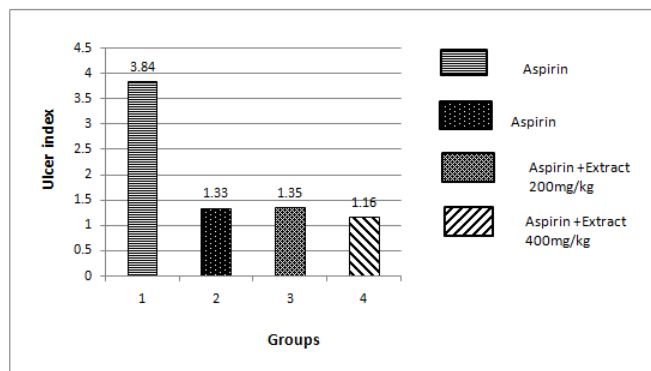


Figure 1. Effect of *Crossandra infundibuliformis* flowers methanolic extract (400mg/kg p.o.) on Aspirin induced mucosal damage in rats



Ulcers developed in Control

(Group-I) Ulcers developed in Standard

(Group- II) aspirin (100mg/kg) Ranitidine (20mg/kg)+aspirin



Ulcers cleared in test

(Group-III) Ulcers cleared in test

(Group-IV) Aspirin + extract (200mg/kg) Aspirin+extract (400mg/kg)

Figure 2. Effect of *Crossandra infundibuliformis* & Ranitidine on Aspirin induced gastric ulcers

The anti-ulcer activity of *Crossandra infundibuliformis* flower extract in aspirin induced ulcer model is evident from its reduction in ulcer index value and increase in gastric p^H.

DISCUSSION

Aspirin causes a dose dependent reduction in mucosal prostaglandin E₂ and prostaglandin I₂ biosynthesis accompanied by an increase in mean of gastric ulceration. It is therefore very reasonable to estimate that the observed lesions occurred due to the deficiency of mucosal prostaglandins. Our study here and all reveals that *Crossandra infundibuliformis* methanolic extract at the dose of 400mg/kg significantly (P<0.05) reduced the ulcer index and increased the gastric p^H in aspirin induced ulcer model.

Conclusion

The methanol extract of flowers of *Crossandra infundibuliformis* plant showed significant anti-ulcer activity which is evident by the data obtained.

Crossandra infundibuliformis due to its tremendous potential can be further explored. However the extract should be formulated and clinical trial should be conducted to establish its efficacy and safety.

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