

## GASTROPROTECTIVE ACTIVITY OF *CELOSIA ARGENTEA* LEAVES AGAINST STRESS INDUCED ULCERS IN RATS

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### ABSTRACT

The rationale of the present study was to assess gastroprotective activity of plant celosia argentea (200mg/kg) methanolic leaf extract against swimming stress induced ulcers in rats. Celosia argentea plant is known as troublesome weed in india and china. Gastric ulcers were induced in rats by forcing the animals to swim inside a vertical cylinder containing water up to 15 cm height for a period of 3hrs. Methanolic extract of the leaves of celosia argentea plant (200mg/kg) was administered to wistar rats orally 60 minutes prior to swimming test. After 3hrs of swimming period, the rats were sacrificed by decapitation method and the stomachs were removed and observed under compound microscope under 10X magnification for the presence of ulcers. Ulcer incidence and severity were quantified by an ulcer index. Rats pretreated with celosia argentea (200mg/kg) had

shown a significantly lower ulcer index  $1.5 \pm 0.31$  than control rats with ulcer index  $3.81 \pm 0.73$ . Standard (lansoprazole 30mg/kg, p.o) treated rats has shown an ulcer index of  $0.13 \pm 0.51$ . Methanolic extract of celosia argentea leaf has shown a significant reduction in ulcer index with an ulcer inhibition up to 60.62%. Whereas standard lansoprazole has exhibited ulcer inhibition up to 96.58%. Phytochemical studies indicated the presence of flavonoids, glycosides, alkaloids, cardenolides and phenolics in celosia argentea leaves<sup>1</sup>. Hence the

present antiulcer activity of celosia argentea leaves may be attributed to these chemical constituents.

**Key words:** celosia argentea, swimming stress, gastro protective activity.

## INTRODUCTION

Ulcer is an open sore that occurs in the lining of stomach and duodenum. Ulcers in the stomach are called gastric or stomach ulcers. Those in the duodenum are called duodenal ulcers. In general, peptic ulcers occur to that part of GIT which are highly exposed to acid and pepsin. Burning-type abdominal pain is the most common symptom of peptic ulcers. With gastric ulcers, the pain is felt predominantly in the middle of the abdomen, although it can be felt from the navel to the sternum and clavicles, and posteriorly in the thoracic region of the spine<sup>2</sup>. Ulcers occur in the esophagus or in the first portion of the duodenum, the duodenal bulb<sup>3</sup>. Stress is defined as a response to severe demands on the human body resulting in the disruption of homeostasis through physical and psychological stimuli<sup>4</sup>. It has long been recognized that severe physiologic stress can cause gastric mucosal damage. Stress-related gastric mucosal injury seems to be related to local ischemia, although progression to significant mucosal injury also requires acid<sup>5</sup>. Critically ill patients developing acute gastric mucosal lesions show a significant decrease in gastric mucosal blood volume compared with controls<sup>6</sup>. The phytochemical profile of the plant celosia argentea reveals the presence of flavonoids, glycosides, alkaloids, saponins, phenolic acids,, cardenolides and glucosinolates. Since there are no reports of stress induced antiulcer activity of plant celosia argentea, the present study is planned to exploit the antiulcer activity of Celosia argentea leaaves by using swimming stress ulcer model in rats.

## MATERIALS AND METHODS

Fresh leaves of celosia argentea were collected from the surrounding gardens of the Guntur district, Andhra Pradesh, india. After the leaves were authenticated by a botanist, leaf specimens have been deposited at the museum of the college for future reference. Fresh mature leaves were shade dried at room temperature, coarse powdered and extracted with methanol by soxhlet's extraction method. Thereafter, the extract was concentrated by placing them in a china dish and allowing them for evaporation of solvent at room temperature until semisolid extract is formed. The percentage yield of the leaf extract was found to 11.6%. The extract was stored in airtight container in refrigerator below 10°C. Appropriate concentration

of stock solution of extract were prepared using distilled water and 2% acaia suspension and used for the following studies.

### **Preliminary phytochemical screening<sup>7</sup>**

Preliminary phytochemical tests were performed for the methanolic extract of *Celosia argentea* leaf to detect the presence of phytochemicals by following the standard methods described in the practical pharmacognosy of kokate and khandelwal. The results have been tabulated in table I.

### **Experimental animals**

Male albino rats (150-200g) were used in the experiments. They were procured from sainath agencies, musheerabad. After randomization into various groups and before initiation of experiment, the rats were acclimatized for a period of 10 days. Animals were housed in sanitized polypropylene cages containing sterile paddy husk as bedding and maintained under standard environmental conditions such as temperature ( $26 \pm 2^\circ\text{c}$ ), relative humidity (45-55%) and 12hr dark/light cycle. The animals were fed with rodent pellet diet (Golden Mohur Lipton India Ltd.) and water *ad libitum*. The study protocol was approved from the institutional animal ethics committee (IAEC) before commencement of experiment (1230/a/08/CPCSEA).

### **Determination of acute toxicity**

The *celosia argentea* methanolic extract was studied for acute toxicity study at a dose of 5 mg/kg, 50mg/kg, 300 mg/kg, and 2000 mg/kg P.O in albino mice. For each dose 3 mice were used (up and down procedure, OECD guidelines No. 425). The methanolic extract was found safe in all mice at 5, 50,300 & 2000mg/kg doses. Further the mice were subjected to a dose of 5000 mg/kg. At 5000 mg/kg all the mice were died exhibiting mortality and confirming acute toxicity of the extract. Hence a dose of 2000mg/kg is selected as safer dose and 1/10<sup>th</sup> cut off dose of 2000mg/kg i.e 200mg/kg of *celosia argentea* extract was selected for our invivo study.

### **Procedure for experimental gastric ulcer formation and effect of *celosia argentea* leaf extract on stress induced gastric ulcers in rats**

The experiment was performed on male albino rats (150 – 200gms) procured from Sainath agencies, Musheerabad. The animals were housed in colony cages at an ambient temperature of  $26\pm 2^\circ\text{C}$  and, relative humidity (45 - 55%), with a 12h/12h light dark cycle and free access

to food and water ad libitum. Food was restricted during experiments. Methanolic extract of celosia argentea 200 mg/kg was prepared in distilled water whereas standard lansoprazole (30mg/kg) were prepared in 2% gum acacia suspension. Weigh and Mark the animals. Divide the animals in to 3 groups each group containing 3 rats.

Group I - control (distilled water, p.o)

Group II - Standard (lansoprazole 30 mg/kg p.o.)

Group III – Methanolic extract of celosia argentea 200mg/kg

Control rats fasted for 24-36 hrs and are forced to swim inside the vertical cylinder containing water upto 15 cm height, maintained at 23°C. Three hours after the stress, they are removed from cylinders and sacrificed by decapitation method and ulcer index is determined. Celosia argentea methanolic extract was given orally to the test group rats and standard lansoprazole was administered orally to standard group rats. After 1 hour of administration of test extract and standard, the rats were forced to swim test for 3 hrs as mentioned above and microscopic examination of stomachs was carried out by observing in 10 x magnifications and the presence of ulcer was scored as follows: **0**=Normal coloured stomach, **0.5** =Red colouration, **1.0** =Spot ulcer, **1.5** = haemorrhagic streaks, **2.0** =Ulcers  $\geq 3 \leq 5$ , **3.0**=Ulcers  $> 5$  and ulcer indices were determined.

The percentage of ulcer inhibition was determined as follows:

$$\% \text{ inhibition} = \frac{\text{Control mean ulcer index} - \text{Test mean ulcer index}}{\text{Control mean ulcer index}} \times 100$$

### STATISTICAL ANALYSIS

The values are represented as mean  $\pm$  S.E.M, and statistical significance between treated and control groups was analyzed using One way ANOVA, followed by Dunnetts test where  $P < 0.001$ ,  $P < 0.01$  and  $P < 0.05$  was considered statistically significant.

### RESULTS AND DISCUSSION

Results of the preliminary phytochemical investigation of methanolic extract of Celosia argentea extract are shown in table.I. The results obtained by using swimming stress induced ulcer model in rats (Table II) indicates that per oral administration of Celosia argentea leaf extract before stress induction lowers ulcer score and ulcer index in stressed rats. Control rats exhibited an ulcer index of  $3.81 \pm 0.73$ . Celosia argentea methanolic extract pretreated

rats exhibited an ulcer index of  $1.5 \pm 0.31$  with an ulcer inhibition to an extent of 60.62% from stress ulcers. Hence *Celosia argentea* leaf extract protected the stress induced lesions in rats in a dose dependent pattern. The exact mode of action is unknown. Several researchers suggested that acute stress-induced gastric lesions are primarily a result of loss of the protective mechanism of the gastric mucosa<sup>8,9</sup>. In this context, it was speculated that *celosia argentea* leaf extract may act as a barrier between gastric mucosa and the excessive gastric acid secreted during stress. However, it could be concluded that *Celosia argentea* leaf extracts (200mg/kg) possesses anti-ulcer principles probably by enhancing mucosal blood flow and thereby protecting gastric mucosa.

**TABLE I. Phytochemical Investigation of *Celosia Argentea* Leaf Methanolic Extract**

Phytoconstituents	Methanolic extract of <i>Celosia argentea</i>
Carbohydrates	-
Steroids	+
Glycosides	+++
Flavonoids	++
Alkaloids	+
Tannins	-

- Absent                      ++ present                      +++ present with more clarity

**TABLE II. Antiulcer Activity of *Celosia Argentea* Leaf Extract (200mg/Kg) By Using Swimming Stress Induced Ulcer Model.**

Groups	Treatment	Dose	Mean ulcer index $\pm$ SEM	% inhibition
I	Control	0.5ml/100g distilled water	$3.81 \pm 0.73$	--
II	Standard (Lansoprazole)	30 mg/kg in 2% acacia	$0.13 \pm 0.51^{***}$	96.58
III	Methanolic extract of <i>celosia argentea</i> leaves	200 mg/kg in distilled water	$1.5 \pm 0.31^{**}$	60.62

$P < 0.001^{***}$ ,  $P < 0.01^{**}$  and  $P < 0.05^*$  was considered statistically significant



Control celosia argentea 200mg/kg



Standard lansoprazole (30mg/kg)

Fig I Photographs showing open stomachs of swimming stress induced ulcers in rats

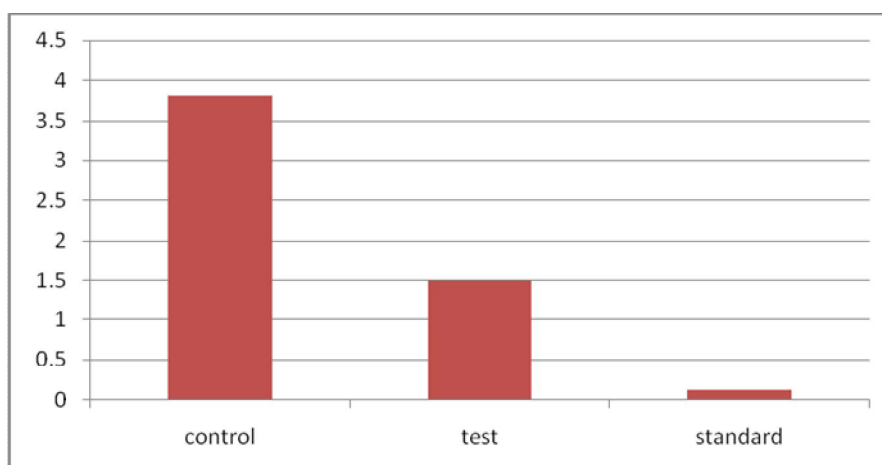


Figure II Graphical representation of ulcer index in Control, Standard and Test (Celosia argentea 200mg/kg) treated groups

## CONCLUSIONS

The findings of the present study describes that the celosia argentea leaves methanolic extract at 200mg/kg possessed significant ulcer-protective activity and thus supports the use of Celosia argentea leaves in treatment of ulcer. Stress induced ulcers in rats are due to reduced mucosal blood flow to stomach resulting in ischaemia and celosia argentea is thought to encounter stress induced ischaemia.

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