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ANTI-ULCER AND ANTIOXIDANT ACTIVITY OF METHANOLIC EXTRACT OF CELOSIA ARGENTEA ROOT IN EXPERIMENTAL ANIMAL MODELS

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ABSTRACT

The present study was undertaken to evaluate the anti-ulcer and antioxidant activities of the methanolic extract of Celosia argentea root in various experimentally induced gastric ulcer models in rats. The roots were extracted successively using petroleum ether, chloroform and methanol. Preliminary phytochemical screening revealed the presence of alkaloids, flavonoids, carbohydrates, saponins, triterpenes and glycosides in the methanolic extract. Acute toxicity studies indicated the safety of the extract up to 1000 mg/kg body weight. Anti-ulcer activity was evaluated using aspirin-induced, alcohol-induced, stress-induced and pylorus ligation-induced gastric ulcer models. The methanolic extract was administered orally at doses of 100 mg/kg and 200 mg/kg, while lansoprazole (8 mg/kg) served as the standard drug. The extract exhibited significant gastroprotective activity in all ulcer models. Methanolic extract at 200 mg/kg showed percentage protection of 94.854%, 91.837%, 81.876% and 93.686% in aspirin-induced, alcohol-induced, stress-induced and pylorus ligation-induced ulcers respectively. The extract also significantly reduced gastric juice volume, free acidity and total acidity while increasing gastric pH in pylorus ligated rats. Antioxidant studies demonstrated inhibition of lipid peroxidation, superoxide anion scavenging activity, hydroxyl radical scavenging activity and reducing power. The observed anti-ulcer activity may be attributed to the presence of flavonoids and other phytoconstituents possessing antioxidant and cytoprotective properties.

KEYWORDS: Celosia argentea, Anti-ulcer activity, Antioxidant activity, Gastric ulcer, Pylorus ligation, Lansoprazole.

1. INTRODUCTION

Peptic ulcer is one of the most common gastrointestinal disorders encountered in clinical practice. It results from an imbalance between aggressive factors such as gastric acid, pepsin, Helicobacter pylori infection, alcohol consumption, stress and NSAIDs, and protective mechanisms including mucus secretion, bicarbonate production and mucosal blood flow.

Reactive oxygen species play an important role in the pathogenesis of gastric ulceration. Increased production of free radicals leads to lipid peroxidation, mucosal damage and impairment of gastric defense mechanisms. Therefore, compounds possessing antioxidant activity may provide protection against ulcer formation.

Celosia argentea Linn. (Family: Amaranthaceae) is widely distributed throughout India and has been used traditionally in the treatment of ulcers, inflammatory conditions and various gastrointestinal disorders. Although different parts of the plant have been reported to possess anti-inflammatory, antidiabetic and antimicrobial activities, the anti-ulcer potential of the root has not been adequately investigated. Hence, the present study was designed to evaluate the anti-ulcer and antioxidant activities of the methanolic extract of Celosia argentea root.

2. MATERIALS AND METHODS

2.1 Plant Material

Roots of Celosia argentea were collected from North Karnataka, authenticated and shade dried. The dried material was powdered and successively extracted with petroleum ether, chloroform and methanol using Soxhlet extraction.

2.2 Phytochemical Screening

Preliminary phytochemical analysis was carried out for alkaloids, flavonoids, carbohydrates, saponins, triterpenes, steroids, tannins and glycosides. The methanolic extract showed the presence of alkaloids, flavonoids, carbohydrates, saponins, triterpenes and glycosides.

2.3 Experimental Animals

Albino rats weighing 150–200 g were used for the study. Animals were maintained under standard laboratory conditions with free access to food and water.

2.4 Acute Toxicity Study

Acute toxicity studies were performed according to OECD guideline 423. No mortality was observed up to 1000 mg/kg indicating the safety of the extract.

2.5 Anti-Ulcer Activity

The methanolic extract was evaluated against:

• Aspirin-induced gastric ulcer

• Alcohol-induced gastric ulcer

• Stress-induced gastric ulcer

• Pylorus ligation-induced gastric ulcer

Animals were divided into four groups

Group I – Control

Group II – Lansoprazole (8 mg/kg)

Group III – Methanolic Extract (100 mg/kg)

Group IV – Methanolic Extract (200 mg/kg)

2.6 Antioxidant Activity

The antioxidant activity of the extract was evaluated using:

• Lipid peroxidation assay

• Reducing power assay

• Superoxide anion scavenging assay

• Hydroxyl radical scavenging assay

3. RESULTS

3.1 Phytochemical Screening

The methanolic extract showed positive results for alkaloids, flavonoids, carbohydrates, saponins, triterpenes and glycosides.

3.2 Anti-Ulcer Activity

Table 1: Percentage Protection against Gastric Ulcer.

Models	**Aspirin**	**Alcohol**	**Stress**	**Pylorus ligation**
Treatment(dose)				
Control	**0**	**0**	**0**	**0**
Lansoprazole (8mg/kg)	95.211	94.641	94.931	94.641
	88.297	87.501	90.548	85.843
Methanolic extract I	82.942	67.082	32.653	69.532

(100mg/kg)	64.963	41.088	21.9	46.877
Methanolic extract II	94.854	91.837	81.876	93.686
(200mg/kg)	86.139	76.568	65.081	82.343

The methanolic extract significantly reduced ulcer formation in all experimental models.

The extract exhibited dose-dependent protection, with 200 mg/kg showing activity comparable to the standard drug.

3.3 Effect on Gastric Secretion Parameters.

In pylorus ligated rats, methanolic extract significantly reduced gastric juice volume, free acidity and total acidity while increasing gastric pH.

Models	**Aspirin**	**Alcohol**	**Stress**	**Pylorus ligation**
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4. DISCUSSION

The methanolic extract of Celosia argentea root demonstrated significant anti-ulcer activity in all experimental models. Aspirin-induced ulcers are associated with inhibition of prostaglandin synthesis and disruption of gastric mucosal defense. The extract significantly reduced ulcer index in this model, indicating mucosal protective activity.

Alcohol-induced gastric lesions are mainly mediated through oxidative stress and free radical generation. The significant reduction in lesion index suggests strong cytoprotective and antioxidant properties of the extract.

In pylorus ligation-induced ulceration, the extract significantly reduced gastric secretion parameters including gastric volume, free acidity and total acidity while increasing gastric pH. These findings indicate an antisecretory mechanism of action.

The antioxidant activity observed in lipid peroxidation, superoxide scavenging and hydroxyl radical scavenging assays further supports the gastroprotective activity of the extract. Flavonoids and other phenolic constituents present in the extract may contribute to the

observed effects through free radical scavenging and enhancement of mucosal defense mechanisms.

5. CONCLUSION

The present investigation demonstrated that the methanolic extract of Celosia argentea root possesses significant anti-ulcer and antioxidant activities. The extract effectively protected against aspirin-induced, alcohol-induced, stress-induced and pylorus ligation-induced gastric ulcers. The gastroprotective effect may be attributed to a combination of antisecretory, cytoprotective and antioxidant mechanisms. These findings scientifically validate the traditional use of Celosia argentea in the treatment of gastric ulcers and warrant further studies for isolation and characterization of active phytoconstituents.

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