IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Analysis of Anti Ulcer Activity using the Leaves of Celosia

Mr. Jankar Akash Rajebhau[1], Asst. Prof. Shubham L. Hange[2], Dr. Surwase K. P[3]

[1] Student, Department of Pharmacy, Kishori College of Pharmacy, Beed, Maharashtra, India
[2] Assistant Professor, Department of Pharmacy, Kishori College of Pharmacy, Beed, Maharashtra, India
[3] Professor, Department of Pharmacy, Kishori College of Pharmacy, Beed, Maharashtra, India

Abstract: *Peptic ulcer is one of the most common gastrointestinal disorders affecting a large population worldwide. It is mainly characterized by the formation of lesions in the gastric or duodenal mucosa due to an imbalance between aggressive factors such as hydrochloric acid, pepsin secretion, stress, alcohol consumption, Helicobacter pylori infection, and non-steroidal anti-inflammatory drugs, and defensive factors including mucus secretion, bicarbonate production, prostaglandins, and mucosal blood flow. Although several synthetic anti-ulcer drugs such as proton pump inhibitors, H2 receptor antagonists, and antacids are available for treatment, their prolonged use may produce adverse effects including headache, constipation, diarrhea, nutrient malabsorption, and relapse of ulcer conditions. Therefore, there is a growing interest in the development of safer and effective herbal remedies for the management of gastric ulcers.*

The present study focuses on the analysis of anti-ulcer activity using the leaves of Celosia cristata, a medicinal plant known for its various pharmacological properties such as antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, and wound healing activities. The leaves of Celosia cristata contain several bioactive phytoconstituents including flavonoids, alkaloids, tannins, saponins, glycosides, phenolic compounds, and steroids, which are believed to contribute to gastroprotective effects. The plant material was collected, authenticated, dried under shade, powdered, and subjected to extraction using suitable solvents by maceration or Soxhlet extraction method. Preliminary phytochemical screening was carried out to identify the presence of active chemical constituents responsible for anti-ulcer activity.

The prepared extract was evaluated for anti-ulcer potential using experimental animal models such as pylorus ligation induced ulcer model, ethanol induced ulcer model, or aspirin induced ulcer model in laboratory animals. Various ulcer parameters including ulcer index, gastric volume, pH, free acidity, total acidity, and percentage protection were determined. Histopathological examination of gastric mucosa was also performed to evaluate the protective effect of the plant extract against ulceration. The results obtained from the study were compared with standard anti-ulcer drugs to determine the effectiveness of the extract.

Keywords: Celosia cristata Anti-ulcer activity Peptic ulcer Gastric ulcer

I. INTRODUCTION

Peptic ulcer is one of the most common gastrointestinal disorders affecting millions of people throughout the world. It is characterized by the formation of ulcers or lesions in the mucosal lining of the stomach or the upper part of the small intestine due to the imbalance between aggressive factors and protective mechanisms of the gastric mucosa. Aggressive factors include hydrochloric acid secretion, pepsin activity, stress, alcohol consumption, smoking, Helicobacter pylori infection, and prolonged use of non-steroidal anti-inflammatory drugs, whereas protective factors include mucus secretion, bicarbonate production, prostaglandins, mucosal blood flow, and cellular regeneration. When the balance between these factors is disturbed, damage to the gastric mucosa occurs, resulting in ulcer formation.

DOI: 10.48175/IJARSCT-36437

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Peptic ulcer disease remains a major health problem because of its high prevalence, recurrence rate, and associated complications such as bleeding, perforation, and gastric obstruction. Common symptoms of ulcers include abdominal pain, heartburn, nausea, vomiting, bloating, indigestion, loss of appetite, and weight loss. In severe cases, ulcers may lead to gastrointestinal bleeding and life-threatening complications. The incidence of gastric ulcers has increased significantly due to modern lifestyle factors such as unhealthy dietary habits, stress, excessive use of painkillers, smoking, and alcohol intake.

Various synthetic drugs are available for the treatment of peptic ulcers, including proton pump inhibitors, H2 receptor antagonists, antacids, and mucosal protective agents. These drugs act by reducing gastric acid secretion or protecting the gastric mucosa. Although these medications are effective, prolonged use is associated with several adverse effects such as headache, diarrhea, constipation, nutrient malabsorption, hormonal imbalance, kidney disorders, and recurrence of ulcer after discontinuation of therapy. In addition, the high cost of treatment and increasing drug resistance have encouraged researchers to explore safer and more effective herbal alternatives for ulcer management.

Medicinal plants have been widely used in traditional systems of medicine since ancient times because of their therapeutic benefits and minimal side effects. Herbal medicines are considered safe, economical, and easily accessible sources of treatment for various diseases. Numerous plants possessing antioxidant, anti-inflammatory, cytoprotective, and antimicrobial properties have shown promising anti-ulcer activity. Natural products rich in flavonoids, tannins, alkaloids, phenolic compounds, and saponins are known to enhance gastric mucosal defense and promote ulcer healing.

Celosia cristata is an important medicinal plant belonging to the family Amaranthaceae. It is commonly known as Cockscomb due to its unique flower shape and is widely cultivated in tropical and subtropical regions. Apart from its ornamental value, the plant has significant medicinal importance in traditional medicine. Different parts of the plant, especially the leaves and flowers, have been used for the treatment of diarrhea, dysentery, wounds, inflammation, fever, skin diseases, liver disorders, and gastrointestinal problems. The plant contains various phytochemical constituents such as flavonoids, alkaloids, tannins, glycosides, phenolic compounds, steroids, and saponins which are responsible for its pharmacological activities.

Recent scientific studies have reported that Celosia cristata possesses antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, wound healing, and immunomodulatory activities. The antioxidant property of the plant plays an important role in preventing oxidative stress induced gastric mucosal damage. Free radicals and reactive oxygen species generated during stress and ulcer formation can damage the gastric lining through lipid peroxidation and inflammation. Phytoconstituents present in Celosia cristata help in scavenging these free radicals, protecting the gastric mucosa, and promoting tissue regeneration. Tannins and flavonoids present in the leaves may also increase mucus production and strengthen the mucosal barrier against ulcerogenic agents.

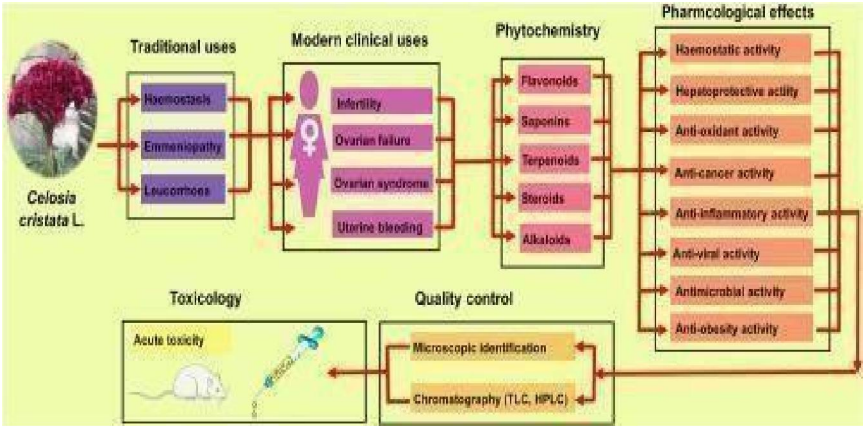
The present study is focused on the analysis of anti-ulcer activity using the leaves of Celosia cristata. The study aims to scientifically evaluate the gastroprotective potential of the plant extract using experimental animal models. The leaves are collected, authenticated, dried, powdered, and extracted using suitable solvents. Preliminary phytochemical screening is carried out to identify the bioactive compounds present in the extract. The anti-ulcer activity is evaluated by assessing parameters such as ulcer index, gastric pH, gastric juice volume, free acidity, total acidity, and percentage ulcer inhibition. Histopathological examination of gastric tissues is also performed to observe the protective effects of the extract on the gastric mucosa.

II. NEED OF STUDY

1. Peptic ulcer disease is one of the most common gastrointestinal disorders affecting a large population worldwide.
2. The incidence of gastric ulcers is increasing due to stress, unhealthy dietary habits, smoking, alcohol consumption, and excessive use of NSAIDs.
3. Synthetic anti-ulcer drugs such as proton pump inhibitors and H2 blockers produce several side effects on long-term use.
4. Recurrence of ulcers after discontinuation of conventional therapy is a major problem in ulcer treatment.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

5. Long-term use of synthetic drugs may lead to complications such as kidney disorders, nutrient deficiency, constipation, diarrhea, and drug interactions.
6. There is a growing demand for safer, economical, and effective herbal medicines for the treatment of gastric ulcers.
7. Medicinal plants are considered important sources of bioactive compounds with fewer adverse effects compared to synthetic drugs.
8. Celosia cristata contains important phytoconstituents such as flavonoids, tannins, alkaloids, saponins, and phenolic compounds which may possess anti-ulcer activity.



III. AIM

The aim of the present study is to analyze and evaluate the anti-ulcer activity using the leaves of Celosia cristata by assessing its gastroprotective potential through phytochemical and pharmacological studies in experimental models.

IV. OBJECTIVE

- To prepare the extract of Celosia cristata leaves using suitable extraction methods.
- To carry out preliminary phytochemical screening of the plant extract.
- To identify the presence of bioactive phytoconstituents responsible for anti-ulcer activity.
- To evaluate the anti-ulcer activity of Celosia cristata leaf extract using experimental animal models.
- To determine ulcer index, gastric pH, gastric juice volume, free acidity, and total acidity.
- To compare the anti-ulcer activity of the plant extract with standard anti-ulcer drugs.
- To study the gastroprotective effect of the extract on gastric mucosa.
- To assess the antioxidant and cytoprotective potential of Celosia cristata leaves.
- To perform histopathological examination of gastric tissues for evaluating mucosal protection.
- To scientifically validate the traditional medicinal use of Celosia cristata in gastric disorders.
- To explore the potential of Celosia cristata leaves for the development of herbal anti-ulcer formulations

V. REVIEW OF LITERATURE

Medicinal plants have been widely used since ancient times for the prevention and treatment of various diseases because of their therapeutic effectiveness and minimal side effects. Herbal medicines are rich sources of bioactive compounds such as flavonoids, alkaloids, tannins, glycosides, phenolic compounds, terpenoids, and saponins, which possess several pharmacological activities. In recent years, scientific interest in medicinal plants has increased significantly due to the growing need for safer and more economical alternatives to synthetic drugs. Among various herbal therapies, plant-based anti-ulcer agents have gained special importance because peptic ulcer disease remains one of the most common gastrointestinal disorders worldwide.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 3, June 2026 Impact Factor: 8.2

Peptic ulcer disease occurs due to an imbalance between aggressive factors like hydrochloric acid, pepsin, stress, alcohol, smoking, Helicobacter pylori infection, and NSAIDs, and defensive factors such as mucus secretion, prostaglandins, bicarbonate production, and mucosal blood flow. Oxidative stress and free radical generation play an important role in gastric mucosal injury. Therefore, medicinal plants possessing antioxidant and anti-inflammatory properties are considered effective in the prevention and treatment of ulcers.

Several researchers have reported the anti-ulcer activity of medicinal plants rich in flavonoids and phenolic compounds. Flavonoids are known to reduce gastric acid secretion, increase mucus production, improve mucosal blood circulation, and scavenge free radicals responsible for gastric damage. Tannins help in protecting the gastric mucosa by forming a protective layer over ulcerated tissues and promoting healing. Saponins and alkaloids also contribute to cytoprotective and anti-inflammatory activities.

Celosia cristata, commonly known as Cockscomb, belongs to the family Amaranthaceae and is widely distributed in tropical and subtropical regions. The plant is mainly cultivated as an ornamental plant because of its attractive flowers; however, it also possesses significant medicinal importance. Traditionally, different parts of the plant have been used in folk medicine for the treatment of diarrhea, dysentery, inflammation, bleeding disorders, wounds, fever, skin diseases, liver disorders, and gastrointestinal ailments. The leaves of Celosia cristata are reported to contain several phytochemical constituents such as flavonoids, alkaloids, tannins, steroids, glycosides, saponins, and phenolic compounds which may contribute to its medicinal properties.

According to various phytochemical studies, Celosia cristata contains compounds with strong antioxidant potential. Antioxidants play an important role in protecting gastric mucosa from oxidative stress induced by ulcerogenic agents. Free radicals generated during stress or exposure to alcohol and NSAIDs can damage gastric tissues by lipid peroxidation and cellular necrosis. Antioxidant compounds present in medicinal plants help in neutralizing these free radicals and reducing gastric injury.

Research studies on Celosia species have demonstrated various pharmacological activities including antioxidant, anti-inflammatory, antimicrobial, hepatoprotective, wound healing, immunomodulatory, antidiabetic, and analgesic effects. These pharmacological properties suggest that the plant may also possess significant gastroprotective activity. The anti-inflammatory activity of the plant may reduce inflammation of gastric tissues, while its antioxidant effect may prevent oxidative damage to the gastric mucosa.

Previous studies on medicinal plants rich in flavonoids have shown significant reduction in ulcer index, gastric acidity, and gastric lesion formation in experimental ulcer models. These studies suggest that phytoconstituents present in medicinal plants can enhance gastric defense mechanisms and accelerate healing of ulcers. Flavonoids and phenolic compounds have also been reported to increase prostaglandin synthesis, stimulate mucus secretion, and improve regeneration of gastric epithelial cells.

Experimental models such as pylorus ligation induced ulcer model, ethanol induced ulcer model, and aspirin induced ulcer model are commonly used to evaluate anti-ulcer activity of medicinal plants. In pylorus ligation models, accumulation of gastric acid and pepsin causes ulceration, whereas ethanol induced ulcers occur due to oxidative stress and damage to gastric mucosa. Aspirin induced ulcers mainly result from inhibition of prostaglandin synthesis. These models are useful in evaluating the gastroprotective and antisecretory properties of plant extracts.

VI. ROLE AND CLASSIFICATION

•Role of Ulcer

Peptic ulcer plays an important role in gastrointestinal disorders because it affects the normal functioning of the digestive system and significantly reduces the quality of life of patients. Ulcers develop when the protective mucosal lining of the stomach or duodenum is damaged by gastric acid, pepsin, infections, drugs, or other harmful factors. The disease is associated with pain, discomfort, indigestion, and complications that may become severe if left untreated.

The gastric mucosa normally acts as a protective barrier against the corrosive action of hydrochloric acid and digestive enzymes. When this protective mechanism becomes weak, acid and pepsin begin to damage the epithelial lining, resulting in inflammation and ulceration. Peptic ulcers are therefore considered an indication of imbalance between aggressive factors and mucosal defense mechanisms.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Stress plays an important role in the development of ulcers by increasing gastric acid secretion and reducing blood supply to gastric tissues. Psychological stress, anxiety, and depression may aggravate ulcer formation. Excessive consumption of alcohol and smoking also contribute to gastric irritation and weaken the protective mucosal layer. Long-term use of non-steroidal anti-inflammatory drugs such as aspirin and ibuprofen inhibits prostaglandin synthesis, thereby reducing mucus and bicarbonate secretion and increasing the risk of ulcers.

Helicobacter pylori infection is another important factor involved in ulcer formation. The bacteria damage the gastric mucosa by producing toxins and inflammatory mediators, leading to chronic gastritis and ulcer development. Oxidative stress generated during inflammation further damages gastric tissues through lipid peroxidation and free radical formation.

Ulcers may lead to several complications such as bleeding, perforation, gastric obstruction, anemia, and severe abdominal pain. Chronic ulcers may also increase the risk of gastric cancer in some patients. Therefore, prevention and treatment of ulcers are important for maintaining gastrointestinal health and reducing complications.

Medicinal plants with antioxidant, anti-inflammatory, cytoprotective, and healing properties play a significant role in ulcer management. Herbal drugs help in reducing gastric acidity, increasing mucus secretion, neutralizing free radicals, and promoting healing of gastric tissues. Celosia cristata may help in ulcer treatment because of its phytochemical constituents such as flavonoids, tannins, phenolic compounds, and saponins which possess gastroprotective activity.

VII. CLASSIFICATION OF ULCER

Peptic ulcers can be classified into different types based on their location, cause, and severity.

1.Gastric Ulcer

Gastric ulcers occur in the inner lining of the stomach. These ulcers are commonly associated with reduced mucosal protection, excessive acid secretion, stress, smoking, alcohol consumption, and prolonged use of NSAIDs. Symptoms include burning stomach pain, nausea, vomiting, and loss of appetite.

2.Duodenal Ulcer

Duodenal ulcers occur in the upper part of the small intestine known as the duodenum. These ulcers are mainly caused by excessive acid secretion and Helicobacter pylori infection. Pain usually occurs when the stomach is empty and may decrease after food intake.

3.Esophageal Ulcer

Esophageal ulcers develop in the lower part of the esophagus due to acid reflux disease. Continuous exposure of esophageal mucosa to stomach acid leads to inflammation and ulcer formation. Symptoms include chest pain, difficulty swallowing, and heartburn.

4.Stress Ulcer

Stress ulcers develop due to severe physiological or psychological stress. They are commonly observed in critically ill patients, burn victims, trauma patients, or individuals undergoing major surgery. Stress increases acid secretion and decreases mucosal blood flow resulting in ulcer formation.

5.Drug-Induced Ulcer

These ulcers are caused by prolonged use of medications such as aspirin, ibuprofen, corticosteroids, and other non-steroidal anti-inflammatory drugs. These drugs inhibit prostaglandin synthesis and weaken gastric mucosal protection.

6.Helicobacter pylori Induced Ulcer

These ulcers are caused by infection with Helicobacter pylori bacteria. The bacteria damage the mucosal lining of the stomach and duodenum leading to inflammation and ulceration.

7.Acute Ulcer

Acute ulcers develop suddenly and remain for a short duration. They are usually associated with stress, medications, infections, or severe illness. Acute ulcers may heal rapidly with proper treatment.

8. Chronic Ulcer

Chronic ulcers persist for a long period and heal slowly. These ulcers may recur frequently and are often associated with Helicobacter pylori infection, chronic NSAID use, smoking, and excessive acid secretion.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

VIII. MATERIALS AND METHODS

The present study was carried out to evaluate the anti-ulcer activity using the leaves of Celosia cristata. The experimental work included collection and authentication of plant material, preparation of extract, phytochemical screening, induction of ulcer in experimental animals, and evaluation of anti-ulcer activity using various parameters.

Collection of Plant Material

Fresh leaves of Celosia cristata were collected from local areas and gardens during the flowering season. The collected plant material was washed thoroughly with distilled water to remove dust, dirt, and other foreign particles. The leaves were shade dried at room temperature for several days to preserve the active phytoconstituents. After complete drying, the leaves were powdered using a mechanical grinder and stored in airtight containers for further study.

Authentication of Plant Material

The collected plant material was authenticated by a qualified botanist or plant taxonomist. The authenticated sample was preserved for future reference.

Preparation of Plant Extract

The dried powdered leaves of Celosia cristata were subjected to extraction using suitable solvents such as ethanol or hydroalcoholic solvent. The extraction was carried out by Soxhlet extraction method or maceration process.

In Soxhlet extraction, the powdered material was packed in a thimble and extracted continuously with solvent for several hours until complete extraction was achieved. The obtained extract was filtered and concentrated using a rotary evaporator or water bath at controlled temperature. The concentrated extract was dried and stored in desiccators for further pharmacological studies.

Preliminary Phytochemical Screening

Preliminary phytochemical tests were carried out to identify the presence of various phytoconstituents in the extract such as:

- Flavonoids
- Alkaloids
- Tannins
- Saponins
- Glycosides
- Phenolic compounds
- Steroids
- Terpenoids

Standard chemical tests were performed for qualitative identification of these constituents.

Experimental Animals

Healthy adult Wistar albino rats weighing approximately 150–200 g were used for the study. The animals were housed in clean polypropylene cages under standard laboratory conditions of temperature, humidity, and light-dark cycle. Animals were provided with standard pellet diet and water ad libitum. The study was carried out according to institutional ethical guidelines.

Acute Toxicity Study

Acute toxicity studies of Celosia cristata leaf extract were performed to determine the safe dose range. Different doses of the extract were administered orally to experimental animals and observed for signs of toxicity, behavioral changes, and mortality for 24 hours and further observation period.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Experimental Design

The animals were divided into different groups containing equal number of animals.

- Normal control group
- Ulcer control group
- Standard drug treated group
- Test extract low dose group
- Test extract high dose group

The standard anti-ulcer drug such as omeprazole or ranitidine was used for comparison.

Induction of Ulcer

Ethanol Induced Ulcer Model

Gastric ulcers were induced by administration of absolute ethanol to experimental animals. Ethanol causes direct damage to gastric mucosa through oxidative stress and necrosis. The plant extract and standard drug were administered before ethanol treatment. After the experimental period, animals were sacrificed and stomachs were examined for ulceration.

Pylorus Ligation Induced Ulcer Model

In this method, pyloric end of the stomach was ligated under anesthesia to allow accumulation of gastric acid and pepsin. Increased acid secretion results in ulcer formation. After the specified period, gastric juice was collected and analyzed for ulcer parameters.

Induction of Gastric Ulcer Ethanol Induced Ulcer Model

Animals were fasted for 24 hours before the experiment. The plant extract and standard drug were administered orally. After one hour, gastric ulcer was induced by administration of absolute ethanol. Ethanol produces gastric mucosal damage through oxidative stress, necrosis, and vascular injury.

After the experimental period, animals were sacrificed and stomachs were removed carefully. The stomach was opened along the greater curvature and washed with saline solution to observe ulcer lesions.

Pylorus Ligation Induced Ulcer Model

Animals were fasted for 24 hours before pylorus ligation. Under light anesthesia, a small incision was made in the abdomen and pyloric end of the stomach was ligated carefully without damaging blood vessels. The abdomen was sutured and animals were allowed to recover.

Pylorus ligation causes accumulation of gastric acid and pepsin leading to ulcer formation. After four hours, animals were sacrificed and gastric juice was collected for analysis.

Aspirin Induced Ulcer Model

Aspirin was administered orally to induce gastric ulcer by inhibiting prostaglandin synthesis. Reduced prostaglandin level weakens gastric mucosal defense resulting in ulcer formation. The protective effect of Celosia cristata extract against aspirin induced ulcers was evaluated.

Evaluation Parameters

Ulcer Index

Ulcer lesions present in the stomach were examined using a magnifying lens and ulcer index was calculated based on severity of ulcers.

The ulcer index was calculated using standard scoring method.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Gastric Juice Volume

Thecollected gastric juice was centrifuged and total volume was measured in milliliters.

Determination of Gastric pH

The pH of gastric juice was measured using a calibrated digital pH meter.

Statistical Analysis

The obtained experimental data were expressed as mean ± standard deviation. Statistical analysis was performed using one-way analysis of variance followed by suitable post hoc test. Differences between groups were considered significant at $p < 0.05$.

Evaluation of Anti-Ulcer Activity

The anti-ulcer activity of Celosia cristata leaf extract was assessed by comparing the treated groups with ulcer control group and standard drug treated group. Significant reduction in ulcer index, gastric acidity, and mucosal damage along with increased gastric pH and mucus protection indicated effective anti-ulcer activity of the plant extract. Histopathological observations further confirmed the gastroprotective potential of Celosia cristata leaves.

Fig.No.3PlantofcelosiaCristata

9. Collection and Authentication of Materials :

Fresh and healthy leaves of Celosia cristata were collected from local cultivated gardens and nearby natural areas during the appropriate growing season. Care was taken to select mature, disease-free, and uncontaminated leaves to ensure the quality and purity of the plant material used in the study. The collected plant material was placed in clean polyethylene bags and transported carefully to the laboratory for further processing.

The leaves were thoroughly washed first with tap water and then with distilled water to remove dust particles, soil, insects, and other foreign impurities. Proper cleaning of plant material was necessary to avoid contamination during extraction and pharmacological evaluation. After washing, the leaves were spread evenly on clean blotting paper and allowed to dry under shade at room temperature for approximately 10 to 15 days. Shade drying was preferred over direct sunlight drying because exposure to high temperature and sunlight may degrade important phytoconstituents such as flavonoids, phenolic compounds, and volatile components present in the plant.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

After complete drying, the leaves became crisp and moisture free. The dried leaves were then pulverized into coarse powder using a mechanical grinder. The powdered material was sieved to obtain uniform particle size, which helps in effective extraction of phytoconstituents. The prepared powder was stored in clean, dry, airtight amber-colored containers to protect it from moisture, light, and environmental contamination until further use.

The collected plant material was authenticated by a qualified botanist or plant taxonomist from a recognized institution or botanical department. Authentication was carried out based on morphological and taxonomical characteristics such as shape, size, color, arrangement of leaves, stem characteristics, and floral features of the plant. Proper identification and authentication of medicinal plants are important steps in herbal research to ensure the accuracy, reproducibility, and reliability of experimental results.

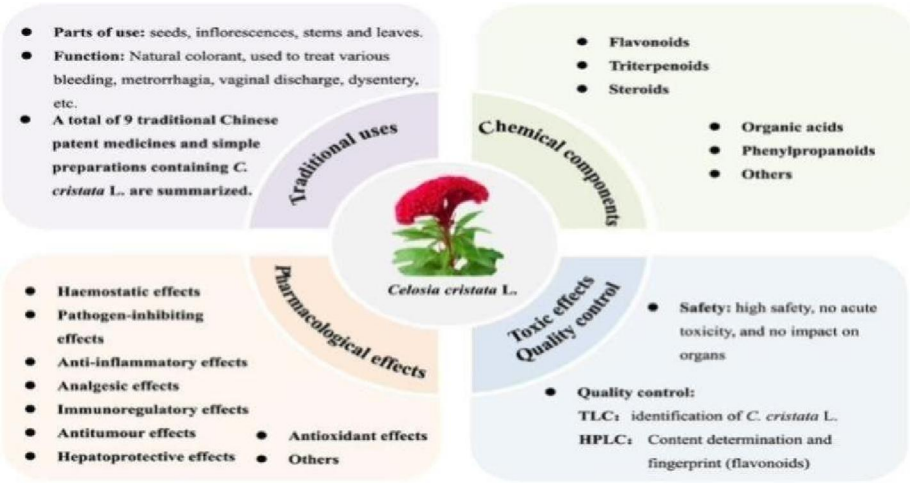
A voucher specimen of Celosia cristata was prepared and preserved for future reference and documentation. The authenticated specimen was labeled with necessary details including botanical name, family name, date of collection, and place of collection. The authenticated plant material was then used for extraction, phytochemical screening, and pharmacological evaluation of anti-ulcer activity.

Proper collection and authentication of plant material play a significant role in maintaining the quality and therapeutic efficacy of herbal medicines. The use of correctly identified plant material ensures that the pharmacological activities observed during the study are genuinely associated with Celosia cristata and its phytochemical constituents.

The medicinal plant selected for the present investigation was Celosia cristata, belonging to the family Amaranthaceae. Fresh leaves of the plant were collected from local cultivated fields, herbal gardens, and surrounding natural areas during the flowering season when the plant contained a maximum concentration of active phytoconstituents. Selection of suitable plant material is an important step in herbal research because the quality, purity, and therapeutic

Collection and authentication of plant materials are among the most critical steps in pharmacognostic and phytopharmacological investigations. The therapeutic activity of herbal medicines largely depends upon the correct identification and purity of plant material. Use of adulterated, contaminated, or incorrectly identified plants may produce unreliable results and affect the safety and efficacy of herbal formulations. Therefore, proper authentication ensures scientific validity, standardization, and quality control of the research work.

The authenticated leaves of Celosia cristata obtained through the above procedures were used for extraction, phytochemical screening, and evaluation of anti-ulcer activity in experimental animal models. Proper handling and preservation of the plant material ensured stability of active phytoconstituents and contributed to the reliability of pharmacological results obtained during the study.



IX. EVALUAITION AND FORMULATION

The formulation for the present study was prepared using the ethanolic extract of Celosia cristata leaves. The dried powdered leaves were subjected to Soxhlet extraction using ethanol as the solvent. The obtained extract was

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

concentrated and dried to obtain a semisolid mass. The prepared extract was stored in airtight containers for further pharmacological evaluation.

For administration to experimental animals, the extract was suspended in distilled water or suitable vehicle such as 1% carboxymethyl cellulose to prepare different concentrations according to the required dose. The formulation was prepared freshly before administration to ensure stability and effectiveness of phytoconstituents.

The doses of the extract were selected based on acute toxicity studies and previous literature reports. Standard anti-ulcer drugs such as omeprazole or ranitidine were used for comparison with the test formulation.

Evaluation of Formulation

The prepared formulation containing Celosia cristata leaf extract was evaluated for various physical, chemical, and pharmacological parameters to determine its quality, stability, and anti-ulcer activity.

Physical Evaluation

1.Color

The color of the prepared extract formulation was observed visually. The extract showed dark green to brownish green appearance depending on solvent concentration and drying conditions.

2.Odor

The odor of the formulation was evaluated by sensory observation. The extract possessed characteristic herbal odor.

3.Consistency

The consistency of the extract was examined visually and manually. The concentrated extract showed semisolid consistency.

4.Solubility

The solubility of the extract was tested in water, ethanol, methanol, and other suitable solvents. The extract showed good solubility in ethanol and moderate solubility in water.

5.pH Determination

The pH of the prepared formulation was measured using a digital pH meter. The pH was found within acceptable range suitable for oral administration.

X. PHARMACOLOGICAL EVALUATION :

The pharmacological evaluation of Celosia cristata leaf extract was carried out to determine its anti-ulcer activity and gastroprotective potential using experimental animal models. The study was designed to evaluate the effectiveness of the plant extract in reducing gastric ulceration, gastric acidity, and mucosal damage caused by various ulcerogenic agents. The pharmacological investigation also helped in assessing the safety and therapeutic significance of the plant extract.

Healthy adult Wistar albino rats weighing about 150–200 g were selected for the study. The animals were maintained under standard laboratory conditions with proper temperature, humidity, and light-dark cycle. They were provided with standard pellet diet and water ad libitum. Before the experiment, the animals were fasted for 24 hours while water was allowed freely. Ethical guidelines for the care and use of laboratory animals were strictly followed during the study.

The animals were divided into different experimental groups including normal control group, ulcer control group, standard drug treated group, and test extract treated groups. Omeprazole or ranitidine was used as the standard anti-ulcer drug for comparison. Different doses of Celosia cristata leaf extract were administered orally to evaluate dose dependent anti-ulcer activity.

The anti-ulcer activity was evaluated using different experimental ulcer models such as ethanol induced ulcer model, pylorus ligation induced ulcer model, and aspirin induced ulcer model.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

Ethanol Induced Ulcer Model

In this model, gastric ulcer was induced by administration of absolute ethanol. Ethanol causes severe damage to the gastric mucosa through oxidative stress, increased vascular permeability, necrosis, and free radical generation. The plant extract and standard drug were administered orally before ethanol treatment.

After the experimental period, the animals were sacrificed and the stomachs were removed carefully. The stomach was opened along the greater curvature and washed with saline solution to examine ulcer lesions. The ulcer index and percentage inhibition of ulcers were calculated.

The Celosia cristata extract treated groups showed significant reduction in ulcer formation compared to ulcer control group. The gastroprotective effect may be due to antioxidant and cytoprotective properties of flavonoids and phenolic compounds present in the plant extract.

Pylorus Ligation Induced Ulcer Model

In pylorus ligation method, the pyloric end of the stomach was ligated under light anesthesia to allow accumulation of gastric acid and pepsin. Increased gastric secretion leads to digestion of gastric mucosa and ulcer formation.

After four hours of pylorus ligation, the animals were sacrificed and gastric juice was collected for analysis. Various parameters such as gastric volume, pH, free acidity, total acidity, and ulcer index were determined.

XI. RESULTS AND DISCUSSION

•The present study was carried out to evaluate the anti-ulcer activity using the leaves of Celosia cristata in experimental animal models. The ethanolic leaf extract was subjected to phytochemical screening and pharmacological evaluation using ethanol induced ulcer model, pylorus ligation induced ulcer model, and aspirin induced ulcer model. Various parameters such as ulcer index, gastric pH, gastric juice volume, free acidity, total acidity, percentage ulcer inhibition, and histopathological changes were studied to determine the gastroprotective effect of the plant extract.

•The extraction of dried powdered leaves of Celosia cristata yielded a dark green semisolid extract with characteristic odor. The percentage yield of extract was found satisfactory, indicating efficient extraction of phytoconstituents using ethanol solvent. Preliminary phytochemical screening of the extract revealed the presence of flavonoids, alkaloids, tannins, saponins, glycosides, phenolic compounds, steroids, and terpenoids. These phytoconstituents are known for antioxidant, anti-inflammatory, and cytoprotective activities which may contribute to anti-ulcer effects.

•Acute toxicity studies showed that the extract was safe at the administered doses and no mortality or severe toxic symptoms were observed during the study period. The absence of toxicity indicated that the extract could be safely used for pharmacological evaluation.

•In ethanol induced ulcer model, the ulcer control group showed severe gastric mucosal damage characterized by hemorrhage, necrosis, edema, and multiple ulcer lesions. Ethanol administration produced extensive gastric injury due to oxidative stress and free radical generation. Animals treated with Celosia cristata extract showed significant reduction in gastric lesions compared to ulcer control group. The extract treated groups demonstrated lower ulcer index and improved gastric mucosal protection. The high dose extract group exhibited better protection than low dose group and its effect was comparable to the standard drug treated group.

•The reduction in ulcer formation may be attributed to antioxidant activity of flavonoids and phenolic compounds present in the extract. These phytoconstituents may help in scavenging free radicals generated by ethanol and prevent lipid peroxidation of gastric mucosal cells. Tannins present in the extract may also contribute by forming a protective layer over gastric tissues and reducing irritation caused by gastric acid.

•In pylorus ligation induced ulcer model, the ulcer control group showed increased gastric juice volume, high acidity, and severe ulceration due to accumulation of gastric acid and pepsin. Treatment with Celosia cristata extract significantly reduced gastric juice volume, free acidity, and total acidity while increasing gastric pH. Reduction in acidity indicates antisecretory activity of the plant extract. The treated groups also showed marked decrease in ulcer index compared to ulcer control group.

•The increase in gastric pH observed in extract treated animals suggests that the plant extract may reduce excessive acid secretion and provide a favorable environment for ulcer healing. The decrease in gastric juice volume may be due to

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

inhibition of gastric secretory mechanisms. Flavonoids and saponins present in the extract may stimulate mucus production and strengthen gastric mucosal defense against acid and pepsin.

•In aspirin induced ulcer model, the ulcer control group developed severe gastric lesions due to inhibition of prostaglandin synthesis by aspirin. Prostaglandins normally protect gastric mucosa by increasing mucus and bicarbonate secretion and maintaining blood flow.

XII.CONCLUSION

The present study was successfully carried out to evaluate the anti-ulcer activity of ethanolic extract of Celosia cristata leaves using various experimental animal models. Based on the observations obtained from ethanol induced ulcer model, pylorus ligation induced ulcer model, and aspirin induced ulcer model, it can be concluded that Celosia cristata leaf extract possesses significant gastroprotective and anti-ulcer potential.

The preliminary phytochemical screening of the extract revealed the presence of important bioactive constituents such as flavonoids, tannins, alkaloids, saponins, phenolic compounds, glycosides, steroids, and terpenoids. These phytoconstituents are well known for their antioxidant, anti-inflammatory, cytoprotective, and free radical scavenging properties, which play a major role in protecting gastric mucosa from ulcer formation. The presence of these compounds strongly supports the observed pharmacological activity of the plant extract.

In ethanol induced ulcer model, the extract showed a significant reduction in gastric lesions and ulcer index. The high dose of Celosia cristata extract exhibited better protective activity when compared to the low dose group and showed results closer to the standard drug omeprazole. This indicates that the extract is effective in preventing oxidative stress induced gastric mucosal damage. The reduction in ulcer formation may be attributed to the antioxidant potential of flavonoids and phenolic compounds present in the plant.

In pylorus ligation induced ulcer model, the extract significantly reduced gastric juice volume, free acidity, and total acidity while increasing gastric pH. These findings suggest that the extract possesses antisecretory activity and helps in regulating gastric acid secretion. The ability of the extract to maintain gastric pH and reduce acid levels indicates its potential in protecting the gastric mucosa from acid-induced damage.

In aspirin induced ulcer model, Celosia cristata extract showed marked protection against gastric mucosal damage. Aspirin-induced ulcers occur due to inhibition of prostaglandin synthesis, which weakens the protective lining of the stomach. The extract helped in reducing ulcer formation, suggesting that it may enhance gastric mucosal defense mechanisms such as mucus secretion and epithelial protection.

Histopathological studies further confirmed the gastroprotective effect of the extract. Gastric tissues from ulcer control group showed severe mucosal erosion, hemorrhage, edema, and inflammatory infiltration. However, treatment with Celosia cristata extract showed significant healing of gastric mucosa, reduced inflammation, and improved tissue architecture. The high dose group showed nearly normal gastric structure, indicating strong protective and healing activity.

The overall results of the study demonstrate that Celosia cristata leaf extract exhibits dose-dependent anti-ulcer activity. The higher dose showed more significant protection compared to the lower dose, and its effect was comparable to that of the standard anti-ulcer drug. This confirms the effectiveness of the plant extract in reducing gastric damage and promoting healing.

REFERENCES

1. Harborne, J.B. (1998). Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. Chapman & Hall, London.
2. Kokate, C.K., Purohit, A.P., & Gokhale, S.B. (2018). Pharmacognosy. Nirali Prakashan, Pune.
3. Khandelwal, K.R. (2016). Practical Pharmacognosy Techniques and Experiments. Nirali Prakashan.
4. Rang, H.P., Dale, M.M., Ritter, J.M., Flower, R.J. (2012). Rang and Dale's Pharmacology. Elsevier.
5. Gupta, A.K. et al. (2010). "Anti-ulcer activity of medicinal plants: A review." Journal of Ethnopharmacology, 128(2), 233–245.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

6. Sakat, S.S. et al. (2009). "Evaluation of anti-ulcer activity of herbal extracts." Indian Journal of Pharmaceutical Sciences, 71(6), 722–727.
7. Dharmani, P. & Palit, G. (2006). "Exploring Indian medicinal plants for antiulcer activity." Indian Journal of Experimental Biology, 44, 415–420.
8. Nwafor, P.A., &Okwuasaba, F.K. (2001). "Anti-ulcer activity of methanolic extracts of some medicinal plants." Journal of Ethnopharmacology, 72(1–2), 79–82.
9. Kumar, V., Abbas, A.K., & Aster, J.C. (2015). Robbins and Cotran Pathologic Basis of Disease. Elsevier.
10. Trease, G.E., & Evans, W.C. (2009). Pharmacognosy. Saunders Elsevier.
11. Oliver-Bever, B. (1986). Medicinal Plants in Tropical West Africa. Cambridge University Press.
12. "Celosia cristata Linn.: A pharmacological and phytochemical review." International Journal of Pharmaceutical Sciences Review and Research.
13. "Gastroprotective activity of medicinal plants: Mechanisms and evaluation models." Phytotherapy Research.
14. Malairajan, P. et al. (2008). "Anti-ulcer activity of plant extracts in experimental models." Journal of Pharmacy Research, 1(2), 1–5.
15. OECD Guidelines for Testing of Chemicals (Acute Oral Toxicity and Gastroprotective Studies), OECD Publishing.
16. Evans, W.C. (2002). Trease and Evans Pharmacognosy. Saunders Elsevier.
17. Rang, H.P., Dale, M.M., Ritter, J.M., Flower, R.J., & Henderson, G. (2016). Rang and Dale's Pharmacology, 8th Edition. Elsevier.
18. Kokate, C.K. (2019). Practical Pharmacognosy. Nirali Prakashan.
19. Wallis, T.E. (2005). Textbook of Pharmacognosy. CBS Publishers.
20. Brunton, L.L., Hilal-Dandan, R., &Knollmann, B.C. (2018). Goodman & Gilman's The Pharmacological Basis of Therapeutics. McGraw Hill.
21. Shukla, S., Mehta, A., & Bajpai, V.K. (2010). "Evaluation of gastroprotective activity of plant extracts." Asian Pacific Journal of Tropical Biomedicine, 2(1), 1–7.
22. Rang HP, Dale MM, Ritter JM, Flower RJ. Rang and Dale's Pharmacology. 8th ed. London: Elsevier; 2016.
23. Tripathi KD. Essentials of Medical Pharmacology. 8th ed. New Delhi: Jaypee Brothers Medical Publishers; 2019.
24. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 56th ed. Pune: Nirali
25. Prakashan; 2019.
26. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. 3rd ed. London: Chapman and Hall; 2005.
27. Trease GE, Evans WC. Trease and Evans Pharmacognosy. 16th ed. London: Saunders Elsevier; 2009.
28. Brunton LL, Hilal-Dandan R, Knollmann BC. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 13th ed. New York: McGraw Hill; 2018.
29. Khandelwal KR. Practical Pharmacognosy Techniques and Experiments. 25th ed. Pune: Nirali Prakashan; 2018.
30. Sharma PV. Dravyaguna Vijnana. Vol. 2. Varanasi: Chaukhamba Bharati Academy; 2013.
31. Evans WC. Pharmacognosy. 15th ed. London: WB Saunders; 2002.
32. Wallis TE. Textbook of Pharmacognosy. 5th ed. New Delhi: CBS Publishers; 2005.
33. Satoskar RS, Rege NN, Bhandarkar SD. Pharmacology and Pharmacotherapeutics. 24th ed. Mumbai: Popular Prakashan; 2015.
34. Ghule BV, Ghante MH, Saoji AN, Yeole PG. Anti-ulcer activity of herbal plants: A review. International Journal of Pharmaceutical Sciences Review and Research. 2010;5(1):136-146.
35. Borrelli F, Izzo AA. The plant kingdom as a source of anti-ulcer remedies. Phytotherapy Research. 2000;14(8):581-591.
36. Kumar V, Abbas AK, Aster JC. Robbins and Cotran Pathologic Basis of Disease. 10th ed. Philadelphia: Elsevier; 2020.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, June 2026
Impact Factor: 8.2

37. Katzung BG. Basic and Clinical Pharmacology. 14th ed. New York: McGraw Hill; 2018.
38. Panda VS, Sonkamble MA. Anti-ulcer activity of medicinal plants. Pharmacognosy Reviews. 2012;6(12):102-110.
39. Singh A, Malhotra S, Subban R. Anti-ulcer activity of herbal drugs: A review. International Journal of Research in Ayurveda and Pharmacy. 2011;2(2):524-531.
40. Dhuley JN. Protective effect of herbal extracts against gastric ulceration. Journal of Ethnopharmacology. 1999;65(1):37-40.
41. Ghosh MN. Fundamentals of Experimental Pharmacology. 6th ed. Kolkata: Hilton and Company; 2015.
42. Wagner H, Bladt S. Plant Drug Analysis: A Thin Layer Chromatography Atlas. 2nd ed. Berlin: Springer; 2009.
43. Sofowora A. Medicinal Plants and Traditional Medicine in Africa. 3rd ed. Ibadan: Spectrum Books; 2008.
44. Kirtikar KR, Basu BD. Indian Medicinal Plants. Vol. 3. Dehradun: International Book Distributors; 2005.
45. Anonymous. The Wealth of India: Raw Materials. Vol. 2. New Delhi: CSIR Publications; 2003.
46. Deore SL, Khadabadi SS, Baviskar BA. Experimental models for anti-ulcer activity. Pharmacologyonline. 2009;1:151-160.
47. Jain NK. Textbook of Forensic Pharmacy. 7th ed. Delhi: Vallabh Prakashan; 2016.
48. Goel RK, Bhattacharya SK. Gastroduodenal mucosal defense and mucosal protective agents. Indian Journal of Experimental Biology. 1991;29(8):701-714.
49. Al Mofleh IA. Spices, herbal xenobiotics and the stomach: Friends or foes? World Journal of Gastroenterology. 2010;16(22):2710-2719.
50. Hiruma-Lima CA, Calvo TR, Rodriguez JA, Andrade FD, Vilegas W, Brito AR. Antiulcerogenic activity of natural products. Journal of Ethnopharmacology. 2006;104(1-2):1-14