World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Available online at: https://wjpsonline.com/
Research Article

PHYTOCHEMICAL AND PHARMACOLOGICAL EVALUATION OF ANTI ULCER ACTIVITY OF ANACYCLUS PYRETHRUM IN RATS

Sri Lasya Chatakonda, Dr. MD Sultan Ali Basha

Department of Pharmacology, SAFA College of Pharmacy, B.Thandrapadu, Kurnool, Andhra Pradesh- 518007, Mail: chatakondasrilasya1922@gmail.com.

Received: 31-05-2025 / Revised Accepted: 02-06-2025 / Published: 05-06-2025

ABSTRACT:
Objective:
To investigate the anti-ulcer potential of alcoholic extract of Anacyclus pyrethrum using various experimental ulcer models in rats.
Methods:
The study involved qualitative phytochemical screening and assessment of anti-ulcer activity using pylorus ligation and aspirin-induced ulcer models. Parameters measured included volume of gastric secretion, free and total acidity, and ulcer index.
Results:
The alcoholic extract of Anacyclus pyrethrum demonstrated significant reduction in gastric secretion volume, free and total acidity, and ulcer index compared to controls.
Conclusion:
Anacyclus pyrethrum exhibits promising anti-ulcer activity, supporting its traditional use in gastrointestinal disorders.
Keywords: Anacyclus pyrethrum, anti-ulcer, pylorus ligation, aspirin-induced ulcer, rats

INTRODUCTION

Peptic ulcers are defined as open sores that develop on the mucosal lining of the stomach, duodenum, or, less commonly, the esophagus. These lesions are collectively referred to as peptic ulcers and are a significant cause of morbidity worldwide. The most prevalent forms include gastric ulcers (located in the stomach), duodenal ulcers (in the proximal small intestine), and esophageal ulcers (in the esophagus).

The two principal causes of peptic ulcer disease are infection with Helicobacter pylori (H. pylori) and prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs). H. pylori disrupts the mucosal barrier, leading to increased susceptibility to acid-induced injury. NSAIDs, on the other hand, inhibit prostaglandin synthesis, compromising mucosal defense and repair mechanisms. Other contributing factors include excessive alcohol consumption, smoking, stress, and severesystemic illness, all of which can exacerbate mucosal vulnerability and delay healing. The hallmark symptom of peptic ulcer disease is a dull or burning epigastric pain, often described as hunger-like or gnawing. This discomfort may be accompanied by indigestion, heartburn, acid reflux, early satiety, nausea, vomiting, bloating, and belching. In some cases, ulcers may be asymptomatic until complications arise[1].

Untreated or severe ulcers can lead to serious complications:

- **Perforation:** Formation of a hole in the stomach or intestinal wall, leading to peritonitis and infection.
- **Bleeding:** Gastrointestinal bleeding can result in hematemesis or melena and may be life-threatening.
- **Obstruction:** Scar tissue from chronic ulcers can cause gastric outlet obstruction, impairing the passage of food[1].

Current Therapeutic Approaches

Management of peptic ulcers involves both pharmacological and non-pharmacological strategies:

Medications:

- Antacids neutralize gastric acid and provide symptomatic relief.
- H2-receptor antagonists (e.g., famotidine, cimetidine) reduce acid secretion by blocking histamine receptors on parietal cells.

Address for Correspondence: Sri Lasya Chatakonda, Department of Pharmacology, SAFA College of Pharmacy, B.Thandrapadu, Kurnool, Andhra Pradesh- 518007, Mail: chatakondasrilasya1922@gmail.com.

How to Cite this Article: Sri Lasya Chatakonda, PHYTOCHEMICAL AND PHARMACOLOGICAL EVALUATION OF ANTI ULCER ACTIVITY OF ANACYCLUS PYRETHRUM IN RATS, World J Pharm Sci 2025; 13(02): 144-147; https://doi.org/10.54037/WJPS.2022.100905

- Proton pump inhibitors (PPIs) such as pantoprazole and omeprazole are more potent acid suppressors, inhibiting the H+/K+ ATPase enzyme system.
- Mucosal protectants like sucralfate form a protective barrier over ulcers.
- Antibiotics are used to eradicate H. pylori infection when present1.
- **Lifestyle modifications:** Avoidance of NSAIDs, alcohol, and smoking, along with dietary adjustments, are recommended to support mucosal healing.
- **Surgical intervention:** Reserved for refractory cases or complications such as perforation or uncontrolled bleeding[1].

Experimental Models for Anti-Ulcer Research

To discover and evaluate new anti-ulcer agents, several animal models are employed:

- **NSAID-induced ulcer models:** Mimic the effect of drugs like aspirin on gastric mucosa.
- **Stress-induced models:** Use physical or psychological stress (e.g., cold water swim) to provoke ulceration.
- **Ethanol-induced models:** Assess the mucosal damage caused by alcohol.
- **Pylorus ligation model:** Involves surgical ligation of the pyloric end of the stomach, leading to accumulation of gastric secretions and subsequent ulceration.
- **Other models:** Include acetic acid-induced, histamine-induced, and reserpine-induced ulcers, each simulating different pathogenic mechanisms.

Rationale for Herbal Anti-Ulcer Agents

Despite advances in pharmacotherapy, side effects, drug resistance, and recurrence remain challenges in ulcer management. This has prompted interest in herbal medicines, which are often perceived as safer and may offer multi-targeted effects. Anacyclus pyrethrum, a medicinal plant traditionally used for gastrointestinal ailments, contains bioactive compounds such as flavonoids, alkaloids, tannins, and saponins, which are thought to possess cytoprotective, antioxidant, and anti-inflammatory properties. However, scientific validation of its anti-ulcer efficacy remains limited, necessitating systematic evaluation in experimental models.

This study aims to assess the anti-ulcer activity of the alcoholic extract of Anacyclus pyrethrum in established rat models of gastric ulceration, providing evidence for its potential therapeutic use and supporting its traditional claims.

Materials and Methods

Plant Material and Extraction

Anacyclus pyrethrum roots were collected, authenticated, and shade-dried. The dried material was coarsely powdered and subjected to Soxhlet extraction using alcohol as the solvent. The extraction process was carried out for several cycles until the solvent in the siphon tube became colorless, indicating complete extraction. The extract was concentrated under reduced pressure to yield a semi-solid mass, which was stored in a desiccator until use.

Phytochemical Screening

Qualitative phytochemical screening of the alcoholic extract was performed to identify the presence of major phytoconstituents such as alkaloids, flavonoids, tannins, saponins, steroids, and glycosides. Standard chemical tests were used for each class of compounds, and results were recorded.

Experimental Animals

Wistar rats of either sex, weighing between 150–250 g, were procured and acclimatized under standard laboratory conditions (12-hour light/dark cycle, temperature 22 ± 2°C, relative humidity 55–65%). Animals were provided with standard pellet diet and water ad libitum, except during fasting periods required for experimental protocols. All experimental procedures were carried out in accordance with institutional ethical guidelines.

Ulcer Models

Pylorus Ligation-Induced Ulcer Model:

Rats were fasted for 48 hours with free access to water. Under light ether anesthesia, a midline abdominal incision was made, and the pyloric end of the stomach was ligated carefully without causing damage to the blood supply. The alcoholic extract of Anacyclus pyrethrum was administered orally at the predetermined dose prior to ligation. After 10–19 hours, the animals were sacrificed. The stomach was excised, and gastric contents were collected for analysis. The stomachs were opened along the greater curvature, rinsed with saline, and examined for ulcers. The volume of gastric secretion was measured, and free and total acidity were determined by titration with 0.01 N NaOH using Topfer's reagent and phenolphthalein as indicators. Ulcer index was calculated based on the number and severity of lesions observed.

Aspirin-Induced Ulcer Model:

Rats were fasted for 24–36 hours before the experiment. Aspirin was administered orally at a dose known to induce gastric ulcers, followed by the test extract. After 3 hours, the animals were sacrificed, and the stomachs were removed, opened, and examined for ulcers. The ulcer index was calculated, and gastric juice was analyzed for free acidity.

Assessment Parameters
Volume of Gastric Secretion: Collected and measured post-sacrifice.
Free and Total Acidity: Determined by titration.
Ulcer Index: Calculated using a standard scoring system based on the number and severity of ulcers.
Statistical Analysis: Data were expressed as mean ± SEM. Statistical significance was assessed using ANOVA, with $p < 0.05$ considered significant.

RESULTS:
Phytochemical Screening:
The alcoholic extract of Anacyclus pyrethrum tested positive for flavonoids, alkaloids, tannins, and saponins .
Effect on Gastric Secretion and Acidity:
The extract significantly reduced the volume of gastric secretion, free acid, and total acidity in the pylorus ligation model.
Effect on Ulcer Index:
A marked reduction in ulcer index was observed in both pylorus ligation and aspirin-induced ulcer models compared to controls.

Table 1. Qualitative Phytochemical Screening of Alcoholic Extract of *Anacyclus pyrethrum*

Phytochemical	Result (+/-)
Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+
Steroids	-
Glycosides	+
Phenols	+

'+' indicates presence; '-' indicates absence.

Table 2. Effect of Alcoholic Extract of *Anacyclus pyrethrum* on Volume of Gastric Secretion in Pylorus Ligation Model (Rats)

Group	Dose (mg/kg)	Volume of Gastric Secretion (ml) (Mean ± SEM)
Control	—	3.85 ± 0.15
Standard (Omeprazole)	20	1.92 ± 0.11*
Extract Low Dose	100	2.95 ± 0.12*
Extract High Dose	200	2.14 ± 0.09*

Significant difference vs. control, p < 0.05.

Table 3. Effect of *Anacyclus pyrethrum* Extract on Free Acidity in Aspirin-Induced Ulcer Model

Group	Dose (mg/kg)	Free Acidity (mEq/L) (Mean ± SEM)
Control	—	54.2 ± 2.1
Standard (Omeprazole)	20	23.5 ± 1.3*
Extract Low Dose	100	39.8 ± 1.7*
Extract High Dose	200	27.6 ± 1.2*

Significant difference vs. control, p < 0.05.

Table 4. Effect of Alcoholic Extract of *Anacyclus pyrethrum* on Ulcer Score in Pylorus Ligation Model

Group	Dose (mg/kg)	Ulcer Score (Mean ± SEM)
Control	—	3.8 ± 0.2
Standard (Omeprazole)	20	1.1 ± 0.1*
Extract Low Dose	100	2.5 ± 0.1*
Extract High Dose	200	1.3 ± 0.2*

Significant difference vs. control, $p < 0.05$.

Discussion

The anti-ulcer effect of Anacyclus pyrethrum may be attributed to its phytochemical constituents, particularly flavonoids and tannins, known for their cytoprotective and antioxidant properties. The extract reduced gastric secretion and acidity, suggesting both antisecretory and mucosal protective mechanisms. These findings are consistent with traditional claims and support further investigation into its active principles and clinical relevance.

CONCLUSION

The alcoholic extract of Anacyclus pyrethrum exhibits significant anti-ulcer activity in rat models, likely due to its phytochemical content. This supports its ethnomedicinal use and warrants further research for potential therapeutic application.

Acknowledgements

I would like thank our principal sir and management of SAFA College of Pharmacy for providing this opportunity.

REFERENCES

1. Shay H, Komarov SA, Fels SS, Meranze D, Gruenstein H, Siplet H. A simple method for the uniform production of gastric ulceration in the rat. Gastroenterology. 1945;5:43-61.
2. Goa KL, Campoli-Richards DM. Cimetidine. A review of its pharmacodynamic and pharmacokinetic properties, and therapeutic use in peptic ulcer disease and other allied diseases. Drugs. 1987;34(6):520-570.
3. Wallace JL. Nonsteroidal anti-inflammatory drugs and gastroenteropathy: the second hundred years. Gastroenterology. 1997;112(3):1000-1016.
4. Borrelli F, Izzo AA. The plant kingdom as a source of anti-ulcer remedies. Phytotherapy Research. 2000;14(8):581-591.
5. Suleyman H, Albayrak A, Bilici M, Cadirci E, Halici Z. Different mechanisms in formation and prevention of indomethacin-induced gastric ulcers. Inflammation. 2010;33(4):224-234.
6. Gupta M, Mazumder UK, Gomathi P, Selvan VT. Anti-ulcer activity of Methanolic extract of Cassia fistula Linn. seed in rats. Journal of Ethnopharmacology. 2006;109(2):323-328.
7. Klein LC Jr, Gandolfi RB, Santin JR, Lemos M, Filho VC, de Andrade SF. Antiulcerogenic activity of Plinia glomerata (Myrtaceae) in different experimental ulcer models. Molecules. 2011;16(7):5434-5444.
8. Kumar S, Dewan S, Sangraula H, Kumar V. Antiulcer and anti-inflammatory activities of Curcuma longa Linn. Indian Journal of Experimental Biology. 2001;39(1):41-47.
9. Kumar A, Ilavarasan R, Jayachandran T, et al. Anti-ulcer activity of Syzygium cumini bark on different experimental ulcer models in rats. Journal of Ethnopharmacology. 2008;112(1):200-204.
10. Dharmani P, Palit G. Exploring Indian medicinal plants for antiulcer activity. Indian Journal of Pharmacology. 2006;38(2):95-99.
11. Khalil R, El-Sheikh NM. Protective effect of Nigella sativa seeds against gastric mucosal injury induced by indomethacin in rats. Saudi Medical Journal. 2010;31(3):284-289.
12. Alqasoumi SI, Abdel-Kader MS, Abdallah HM, et al. Anti-ulcer activity of Radix Paeoniae Rubra in different experimental models. Pharmaceutical Biology. 2009;47(9):894-899.
13. Kaur G, Jaggi RK, Singh N. Anti-stress and anti-ulcer effects of Withania somnifera Dunal. Indian Journal of Experimental Biology. 2003;41(10):1161-1165.
14. Bandyopadhyay U, Biswas K, Chattopadhyay I, Banerjee RK. Gastroprotective effect of neem (Azadirachta indica) bark extract: Further studies on the mechanism involved. Life Sciences. 2002;71(24):2845-2865.
15. Rafatullah S, Tariq M, Mossa JS, Al-Yahya MA, Al-Said MS, Ageel AM. Evaluation of turmeric (Curcuma longa) for gastric and duodenal anti-ulcer activity in rats. Journal of Ethnopharmacology. 1990;29(1):25-34.