

PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILING OF PLANTS FROM  
ASTERACEAE FAMILY: A COMPREHENSIVE REVIEWPunit Kumar Pandey<sup>1\*</sup>, Ravi Kant Kushwaha<sup>2</sup>, Amit Verma<sup>3</sup> and Saumya Tripathi<sup>4</sup>Nova College of Pharmacy<sup>1,4</sup>  
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**ABSTRACT**

The *Asteraceae* family, commonly known as the aster, daisy, or sunflower family, encompasses a vast array of plant species with diverse phytochemical compositions and pharmacological properties. This review aims to provide a comprehensive overview of the phytochemical constituents and pharmacological activities of plants belonging to the *Asteraceae* family. Through an extensive literature review, various databases were explored to gather relevant information on the phytochemical profiles and pharmacological potentials of *Asteraceae* plants. The review covers different classes of phytochemicals such as flavonoids, terpenoids, phenolic compounds, alkaloids, and essential oils, along with their distribution among *Asteraceae* species. Furthermore, the pharmacological activities including antioxidant, anti-inflammatory, antimicrobial, anticancer, analgesic, and immunomodulatory properties of these phytochemicals are discussed. Additionally, the review highlights the traditional uses of *Asteraceae* plants in different cultures and their potential applications in modern medicine. Overall, this review provides valuable insights into the phytochemical diversity and pharmacological significance of *Asteraceae* plants, which could serve as a foundation for further research and development of novel therapeutic agents.

**KEYWORDS:** *Asteraceae*, Phytochemicals, Pharmacological activities, Flavonoids, Terpenoids, Medicinal plants.**INTRODUCTION**

The *Asteraceae* family, also known as the aster, daisy, or sunflower family, represents one of the largest and most diverse plant families, comprising over 23,000 species distributed across various habitats worldwide.<sup>[1]</sup> This family includes a multitude of plants that have been esteemed for their medicinal properties, cultural significance, and ornamental value throughout history. The rich phytochemical diversity exhibited by plants from the *Asteraceae* family has garnered significant interest from researchers, pharmaceutical industries, and traditional healers alike.<sup>[2]</sup>

Phytochemicals, the bioactive compounds synthesized by plants, play a pivotal role in their defense mechanisms, environmental adaptation, and interactions with other organisms. The *Asteraceae* family is renowned for its abundant production of phytochemicals, including flavonoids, terpenoids, phenolic compounds, alkaloids, and essential oils, among others. These phytochemicals not only contribute to the distinctive characteristics of *Asteraceae* plants but also endow them with various pharmacological activities.<sup>[3]</sup>

The pharmacological properties of *Asteraceae* plants have been extensively studied and documented, revealing a wide spectrum of bioactivities, including antioxidant, anti-inflammatory, antimicrobial, anticancer, analgesic, and immunomodulatory effects. Such pharmacological activities have fueled the exploration of *Asteraceae* plants as potential sources of novel therapeutic agents for the treatment and management of various ailments.<sup>[4]</sup>



**Fig. 1: Some potential antiulcer agents from plant.**

#### **Antiulcer potential of plant from fabaceae family**

Plants from the *Asteraceae* family have been studied for their potential anti-ulcer properties due to their diverse phytochemical composition. One of the well-known genera in the *Asteraceae* family is *Artemisia*, which includes various species such as *Artemisia annua* (Sweet wormwood), *Artemisia absinthium* (Wormwood), and *Artemisia vulgaris* (Mugwort). These plants have been traditionally used in folk medicine for treating gastrointestinal ailments, including ulcers.<sup>[5]</sup>

Several studies have investigated the anti-ulcerogenic effects of plants from the *Asteraceae* family, attributing their efficacy to various bioactive compounds such as flavonoids, sesquiterpene lactones, phenolic acids, and essential oils.

Here are some examples of *Asteraceae* plants and their potential anti-ulcer properties:

**Artemisia annua:** This plant contains artemisinin, a compound known for its anti-inflammatory and anti-ulcer properties. Studies have shown that extracts of *Artemisia annua* possess gastroprotective effects against ulcers induced by ethanol, NSAIDs (Non-steroidal anti-inflammatory drugs), and stress.<sup>[6]</sup>

**Artemisia absinthium:** The essential oil and extracts of *Artemisia absinthium* have been reported to exhibit significant anti-ulcer activity in experimental models. The presence of sesquiterpene lactones, flavonoids, and phenolic compounds contributes to its gastroprotective effects.<sup>[7]</sup>

**Matricaria chamomilla (Chamomile):** Although not exclusive to the *Asteraceae* family, chamomile belongs to this plant family and has been extensively studied for its anti-ulcer properties. Chamomile extracts contain flavonoids such as apigenin and quercetin, which possess anti-inflammatory and cytoprotective effects on the gastric mucosa, making it effective in preventing and treating ulcers.<sup>[8]</sup>

**Tanacetum parthenium (Feverfew):** Feverfew contains parthenolide, a sesquiterpene lactone known for its anti-inflammatory and anti-ulcerogenic properties. Studies

have shown that feverfew extracts can inhibit gastric mucosal damage induced by various ulcerogenic agents.<sup>[9]</sup>

**Helianthus annuus (Sunflower):** Sunflower seeds and oil contain phytochemicals such as polyphenols and flavonoids, which exhibit antioxidant and anti-inflammatory properties. These compounds contribute to the gastroprotective effects of sunflower extracts against ulcer formation.<sup>[10]</sup>

While these plants show promise as potential anti-ulcer agents, further research, including clinical trials, is necessary to validate their efficacy and safety for human use. Additionally, it's essential to consult healthcare professionals before using herbal remedies for treating ulcers or any other medical condition.

#### **Phytochemistry of antiulcer plants of asteraceae family**

The phytochemistry of *Asteraceae* antiulcer plants is diverse and complex, encompassing various classes of bioactive compounds that contribute to their gastroprotective effects. Here are some key phytochemicals commonly found in *Asteraceae* plants known for their antiulcer properties:

**Sesquiterpene lactones:** Many *Asteraceae* plants contain sesquiterpene lactones, which are known for their anti-inflammatory and anti-ulcerogenic activities. Compounds like parthenolide, artemisinin, and absinthin are examples of sesquiterpene lactones found in plants like *Tanacetum parthenium* (Feverfew), *Artemisia annua* (Sweet wormwood), and *Artemisia absinthium* (Wormwood), respectively.<sup>[7]</sup>

**Flavonoids:** Flavonoids are a class of polyphenolic compounds with antioxidant and anti-inflammatory properties. Plants from the *Asteraceae* family often contain flavonoids such as apigenin, luteolin, quercetin, and kaempferol, which contribute to their anti-ulcer effects. Examples include *Matricaria chamomilla* (Chamomile) and *Helianthus annuus* (Sunflower).<sup>[8]</sup>

**Phenolic Acids:** Phenolic acids, including caffeic acid, chlorogenic acid, and rosmarinic acid, are abundant in

many *Asteraceae* plants and have been associated with gastroprotective effects due to their antioxidant and anti-inflammatory properties. These compounds are found in plants like *Tanacetum parthenium* (Feverfew) and *Artemisia absinthium* (Wormwood).<sup>[9]</sup>

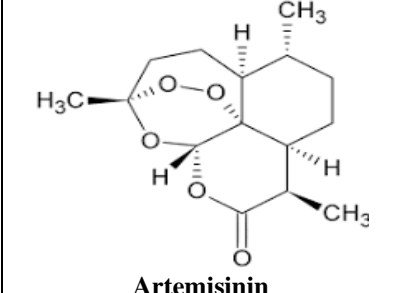
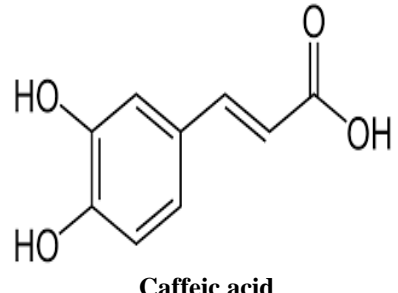
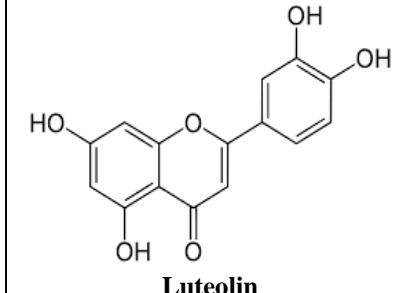
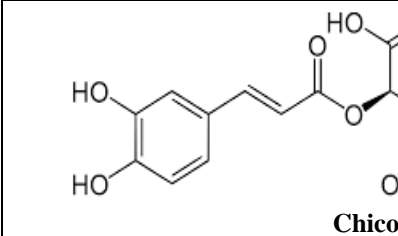
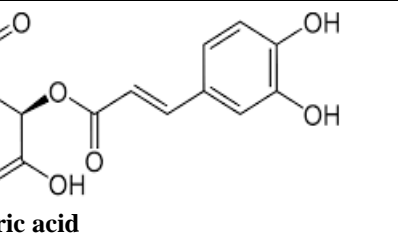
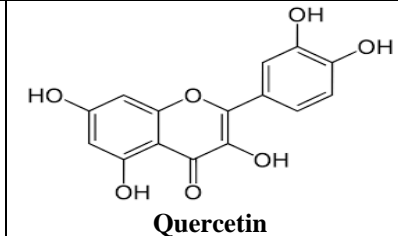
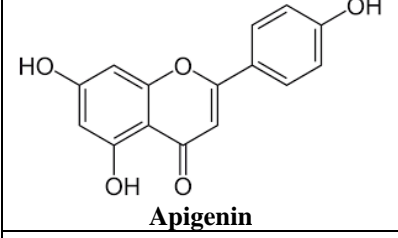
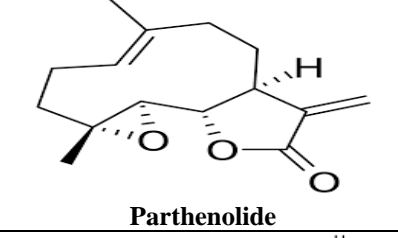
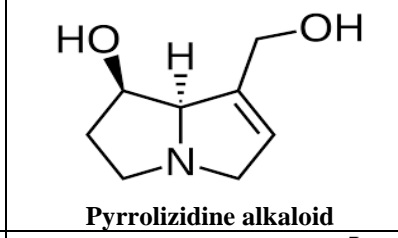
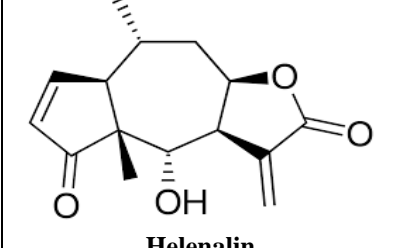
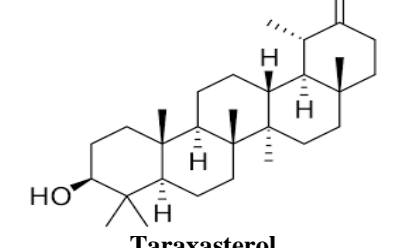
**Essential oils:** Some *Asteraceae* plants, including those in the *Artemisia* genus, produce essential oils containing various volatile compounds such as monoterpenes and sesquiterpenes. These essential oils possess anti-ulcerogenic properties and contribute to the overall gastroprotective effects of the plants.<sup>[10]</sup>

**Alkaloids:** While less common in *Asteraceae* plants compared to other plant families, certain species may contain alkaloids with anti-ulcer activity. However, alkaloids are not as extensively studied in *Asteraceae* antiulcer plants compared to other classes of phytochemicals.

These phytochemicals exert their anti-ulcer effects through various mechanisms, including reducing gastric acid secretion, enhancing gastric mucosal defense mechanisms, scavenging free radicals, and inhibiting pro-inflammatory pathways. The synergistic action of multiple bioactive compounds in *Asteraceae* plants contributes to their efficacy in preventing and treating ulcers.<sup>[10]</sup>

*Asteraceae* antiulcer plants exhibit various pharmacological activities that contribute to their effectiveness in preventing and treating ulcers. These pharmacological actions are often mediated by the diverse array of bioactive compounds present in these plants. Here are some key pharmacological activities associated with *Asteraceae* antiulcer plants:

**Table 1: Important Chemical Structures Reported Of Some Antiulcer Components From Plants.**

 <b>Artemisinin</b>	 <b>Caffeic acid</b>	 <b>Luteolin</b>
 <b>Chicoric acid</b>	 <b>Quercetin</b>	 <b>Apigenin</b>
 <b>Parthenolide</b>	 <b>Pyrrrolizidine alkaloid</b>	 <b>Helenalin</b>
 <b>Taraxasterol</b>	 <b>Amyrin</b>	

#### Pharmacology of antiulcer plants of *asteraceae* family

**Anti-inflammatory activity:** Many *Asteraceae* plants possess potent anti-inflammatory properties, which can

help alleviate inflammation associated with ulcer formation. Compounds such as sesquiterpene lactones, flavonoids, and phenolic acids inhibit the production of

pro-inflammatory mediators, such as cytokines and prostaglandins, thereby reducing gastric inflammation.<sup>[11-14]</sup>

**Antioxidant activity:** Oxidative stress plays a crucial role in ulcer development by causing damage to the gastric mucosa. *Asteraceae* antiulcer plants are rich in antioxidants, including flavonoids, phenolic acids, and essential oils, which scavenge free radicals and protect against oxidative damage, thereby promoting mucosal healing.<sup>[14]</sup>

**Cytoprotective activity:** Some compounds found in *Asteraceae* plants exert cytoprotective effects on the gastric mucosa by enhancing mucin secretion, stimulating bicarbonate production, and strengthening the mucosal barrier. This helps to protect the stomach lining from injury caused by aggressive factors such as gastric acid and pepsin.<sup>[14]</sup>

**Anti-secretory activity:** Certain *Asteraceae* antiulcer plants possess anti-secretory properties, which reduce gastric acid secretion and inhibit the activity of proton pump enzymes. This helps to maintain the pH balance in the stomach and prevent excessive acidity, which can exacerbate ulcer formation.<sup>[14]</sup>

**Anti-Helicobacter pylori activity:** *Helicobacter pylori* is a bacterium implicated in the pathogenesis of peptic ulcers. Some *Asteraceae* plants exhibit antibacterial activity against *H. pylori*, either directly through the action of bioactive compounds or indirectly by modulating the host immune response.<sup>[14]</sup>

**Enhancement of gastric mucosal blood flow:** Adequate blood flow to the gastric mucosa is essential for tissue repair and healing. Certain compounds present in *Asteraceae* antiulcer plants have been shown to improve gastric microcirculation, thereby facilitating the delivery of oxygen and nutrients to injured tissues.<sup>[14]</sup>

**Analgesic activity:** Ulcers can cause significant pain and discomfort. Some *Asteraceae* plants possess analgesic properties, which help to alleviate ulcer-related pain by modulating pain perception pathways in the central nervous system.<sup>[14]</sup>

Overall, the pharmacological activities of *Asteraceae* antiulcer plants work synergistically to promote gastric mucosal integrity, reduce inflammation, and accelerate ulcer healing. These plants offer a promising natural alternative for the prevention and management of peptic ulcers, either alone or in combination with conventional therapies. However, further research, including clinical trials, is needed to fully elucidate their therapeutic potential and ensure their safety and efficacy in clinical settings.<sup>[15-56]</sup>

## CONCLUSION

In conclusion, the phytochemical and pharmacological profiling of plants from the *Asteraceae* family underscores their importance as valuable sources of bioactive compounds with diverse therapeutic properties. Continued investigation into the potential health benefits of *Asteraceae* plants holds promise for the development of novel therapeutics and nutraceuticals for various health conditions, including ulcers and beyond.

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## Conflicts of interest

Declared None.

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