



## Development of Anti-Ulcer Drugs: Harnessing Herbal Ingredients

Tanu Maibam\*, Dr. Siva Shankar Prasad<sup>a</sup>, Bengia Sine<sup>b</sup>, Reema Rongpi<sup>c</sup>

\*4th Semester, M.Pharmacy, Department of Pharmacology, East point college of Pharmacy, Bangalore, India.

<sup>a</sup>Faculty of Department of Pharmacology, East point college of Pharmacy, Bangalore, India

<sup>b</sup>4th Semester, M.Pharmacy, Department of Pharmacology, East point college of Pharmacy, Bangalore, India. <sup>c</sup>4th Semester, M.Pharmacy, Department of Pharmacology, East point college of Pharmacy, Bangalore, India.

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### ABSTRACT

Many illnesses and diseases have been treated with plants and plant-derived items in folklore throughout history. With regard to the management or treatment of PU, herbal therapy is increasingly showing promise as a substitute for commercially available synthetic medications. Its cheaper cost, perceived efficacy, availability, and little to nonexistent negative effects serve as its foundation. In these study, herbal remedies that has gastroprotective activity and has been used in the treatment of PU, digestive disorders and other related ailments for several centuries are demonstrated.

**Keywords:** Peptic ulcer, Ayurvedic, herbal, treatment

### INTRODUCTION

A chronic illness, peptic ulcer arises from an imbalance between the stomach mucosa's endogenous protective factors (acid and pepsin secretions) and aggressive factors (mucus and bicarbonate secretion, adequate blood flow, prostaglandin E<sub>2</sub>, nitric oxide, sulfhydryl compounds and antioxidant enzymes, and others). The etiology of stomach ulcers has also been linked to behavioral and environmental factors, including smoking, eating poorly, consuming alcohol and non-steroidal anti-inflammatory medicines, and having an infection caused by *Helicobacter pylori*.<sup>(1,2)</sup> An ulcer is an open sore on the skin or mucous membrane that is characterized by the shedding of dead, inflammatory tissue. Lesions on surface of skin that shows a superficial tissue loss are called ulcers. Ulcers are often found mostly on the skin of lower limbs and in the gastrointestinal tract. There are numerous varieties of ulcers, including vaginal, peptic, esophageal, and oral ulcers.<sup>(3)</sup>

Every year, some 500,000 new cases are reported, affecting 5 million individuals in the United States alone. It is interesting to note that those born in the middle of the 20th century had the highest chance of developing peptic ulcer disease. With a peak occurrence between the ages of 55 and 65, ulcer disease is now mostly impacting the elderly population<sup>(4)</sup>. Severe stomach pain and blood in the stool are signs of a peptic ulcer. This results from an imbalance in the body's defensive and aggressive stomach lining elements<sup>(5)</sup>. The additional causes of ulcer formation include taking too many medications, especially non-steroidal anti-inflammatory drugs, producing too much acid, consuming too much alcohol, smoking or chewing tobacco, being seriously ill, receiving radiation therapy to the affected area, experiencing emotional stress, etc. Anticholinergics, H<sub>2</sub> antihistamines, proton pump inhibitors, prostaglandin analogs, antacids, ulcer preventive medications, and anti-H. Pylori pharmaceuticals are examples of common treatments used to treat peptic ulcers. These agents also reduce gastrointestinal acidity or enhance mucosal defense but some serious side effects are associated with these medicines<sup>(6)</sup>. Hence, herbal drugs are preferred when drugs are used for longer periods.

NSAIDs (non-steroidal anti-inflammatory pharmaceuticals), PPIs (proton pump inhibitors), H<sub>2</sub>RAs (histamine H<sub>2</sub> receptor antagonists), and cytoprotective agents are examples of conventional therapies with side effects that include mucosal damage, decreased stomach acid output, and medication interactions. As a result, in order to address this health issue, other treatment procedures are required. Since ancient times, people have used plants— whose bark, roots, leaves, fruits, and seeds are rich in active metabolites—for medical purposes. The ability of medicinal plants to have a broad variety of secondary metabolites, or phytochemicals, that are repeatedly generated in nature, accounts for their therapeutic benefits.<sup>(7)</sup> The following compilation of data revealed that several medicinal plants have been known to exhibit antiulcer properties.



## 1. *Acacia Arabica*

In dry sandy areas, *Acacia arabica* (family Mimosaceae) is widely distributed throughout India. Locally, it is referred to as "karuvelam" and is generally known as the "babul tree." This plant is claimed to include the following chemical components: gum that contains arabic acid mixed with calcium, magnesium, and potassium; it also contains a tiny amount of sugar, malic acid, moisture (14%), and ash (3-5%). Tannin is abundant in bark, and it makes up around 22.44% of the tannin in pods.

### Anti-ulcer Activity

In Ayurvedic: It is helpful as a gargle for wounds and hemorrhagic ulcers. Applying a poultice made of bruised, sensitive leaves to ulcers has stimulating and astringent properties.

In recent study: In rats, the stomach ulcer caused by cold restriction was prevented by *Acacia senegal* gum. <sup>(8)</sup> Active Constituents. Phenolic compounds, tannins, and flavonoids

## 2. *Allium sativum*

A member of the Liliaceae family, is referred to as "vellapundu" locally and as "garlic" generally. India is home to its cultivation. This plant contains starch, mucilage, albumen, sugar, and an acrid volatile oil that functions as the active ingredient. Edible oil is produced from seeds. Along with essential nutrients and complimentary components comprising vitamins, the juice, and especially its oil contents, are rich in combinations of salicylic acid, iodine, and sulfur bonded in an organic manner.

### Anti-ulcer activity

In Ayurvedic: Applying mustard or coconut oil to fried garlic is a great way to treat ulcers, ulcerated surfaces, and wounds infested with maggots. Garlic juice has been used as a lotion to cleanse wounds and bad ulcers by combining three or four parts of ordinary or distilled water with garlic juice. <sup>(9)</sup> Active Constituents. Volatile oil, alliin, and allicin

## 3. *Ocimum Sanctum*

The most well-known plant in the genus *Ocimum* is *Ocimum sanctum*, or Tulsi, which is revered as a sacred herb by Indian Hindus. Many pharmacological properties have been found in the entire plant, including the leaves, flowers, stem, root, and seeds. Traditional medical practitioners have used these properties as expectorants, analgesics, anticancer, antiasthmatic, antiemetic, diaphoretics, antidiabetic, antifertility, hepatoprotective, hypotensive, hypolipidmic, and stress relievers. Numerous components, including as saponins, flavonoids, triterpenoids, and tannins, are present in the stem and leaves (Shishoda et al., 2003). Moreover, it has phenolic chemicals that have anti-inflammatory and antioxidant properties.

**Anti-ulcer activity** In recent study. There have been claims that this plant has heart-healthy properties, anti-ulcer insecticidal properties, antiemetic properties, anti-stress properties, analgesic properties, and antioxidant properties, antitubercular, tonic, anti-diabetic properties. *O.sanctum* exhibits strong antiulcer properties against rats' ulcers induced by stress, as well as aspirin, imidaclopril, alcohol (ethanol 50%), histamine, reserpine, and serotonin.<sup>(10)</sup>

Active Constituents. Fixed oil eugenol

## 4. *Anogeissus latifolia*

*Anogeissus latifolia* which belongs to the family, Combretaceae also known as "Dhawa". Chemical components: Quinic and shikmic acids are produced by the leaves, bark, and heartwood; leaves also contain 90–95% of the tannins, gallotannin. 50% of the tannins in the young leaves and shoots are dry base tannins. There are 12–18% tannins in the bark. Heartwood includes myricetin, gallic acid, ellagic acid, and its derivatives. The primary component of gum is ghattic acid, a complex polysaccharic acid with a large molecular weight, as a calcium salt.

### Anti-ulcer activity

Wounds and ulcers, inflammations, diabetes, haemorrhages, haemoptysis, diarrhoea, dysentery, haemorrhoids, skin diseases, liver diseases, and general debility.<sup>(11)</sup> Active constituents: Tanins, ellagic acid, beta-sitosterol, glycoside and flavonoids.



## 5. Aloe Vera

Commonly known as "aloe gel," its family is Liliaceae. In India, it is referred to as "Kattalai" in local language. Aloin, saponins, and emodin are the phytochemicals.

### Anti-ulcer activity

In Ayurvedic :In America, aloe leaves are a successful therapy for persistent ulcers. After a few weeks, the discomfort first subsides and the ulcers heal.

In recent study: Gum acacia was mixed with powdered aloe vera. A 200 mg/kg dose of leaf extract was administered orally to experimental rats to treat indomethacin-induced stomach ulcers. Its concentrate has undergone exposure to regulate a particular antiulcer effect. Saponins, barbaline, and isobarboline are considered functional components.<sup>(12)</sup>

## 6. Carica Papaya

It is a member of the Caricaceae family, commonly known as papaya and known as papali- pazham in the country, and it grows in certain regions. Chemically speaking, the plant mentioned above contains chymopapain, papain, caposide, pectin, carpaine, and carotenoids. Usually, it is used in natural medicine.

### Anti-ulcer activity

In Ayurvedic: . Fruits that have been sun-dried can be made into jellies, stews, and salads, whereas ripe fruit is often eaten raw and without a shell or core. The plant's unripe fruit consumption and its antiulcer properties were associated.<sup>(13)</sup>

In recent study: When rats with stomach ulcers were given papaya with ethanol orally at levels of 50 and 100 mg/kg, the ulcers significantly decreased. The stomach mucosa was protected against the effects of ethanol by the extract. Gastric acid and stomach juice were significantly reduced by carica papaya extract. Chymopapain and papain are two active ingredients that are well-known for their ability to aid in G.I.T. issues.

Active Constituents. Chymopapain and papain

## 7. Mimosa pudica

Thottal Sinungee is the common name for this Fabaceae family plant, which is often referred to as "touch me not." It is spreading over numerous subtropical regions and tropical nations worldwide. The entire plant is packed with flavonoids, gums, tannins, naringin, quercetin, saponins, and mucilage.

### Anti-ulcer activity

In Ayurvedic: A decoction of crisp leaves and seeds is used to treat intestinal ulcers. In recent study: Mimosa pudica leaf extracts have been shown to exhibit dose-dependent antiulcer action, and being a natural antioxidant, these leaf extracts can be useful in the treatment of ulcers.<sup>(14,15)</sup> Active Constituents. Alkaloid mimosine

## 8. Solanum nigrum L

Solanum nigrum L., is a medicinal plant that is a member of the Solanaceae family. Glycoproteins, glycoalkaloids, gallic acid, catechin, protocatechuic acid, caffeic acid, epicatechin, rutin, and naringenin are among the chemical components that have been described.

### Anti-ulcer activity

In ayurvedic study: Traditionally Solanum nigrum L is used to heal sores, ulcer and even diarrhea In recent study: According to reports, the methanolic extract of plant berries has an antiulcer effect on aspirin-induced ulceration in rats by protecting the stomach mucosa from free radical scavenging and promoting an antioxidant state. It has been observed that plant leaf, seed, and root extracts containing ethanol, methanol, and ethyl acetate have antifungal efficacy against a variety of fungus strains. Additionally, the plant is said to have pharmacological properties that include antiviral, antipyretic, antidiabetic, immunostimulant, cytotoxic,



hepatoprotective, cardioprotective, analgesic, larvicidal, anti-inflammatory, anti-cancer, and anti-seizure properties.<sup>(16)</sup> Active Constituents: Flavonoids.

### 9. *Azadirachta indica*

Native to India, *Azadirachta indica* (family Meliaceae) is grown in Bengal and almost everywhere else in the country. It is referred to locally as "vembu" and internationally as "neem." Nimbidin, phenolic compounds, saponin, and flavonoids are the chemical components of this plant that have been documented. Margosine, a bitter alkaloid, is present in it. About 10–31% of a yellow, bitter fixed oil is present in seeds. There are volatile and free fatty acids in the oil. The volatile fatty acids are most likely a blend of oleic and stearic acids with a trace of lauric acid.<sup>(17)</sup>

#### Anti-ulcer activity

In Ayurvedic: With unhealthy ulcerations, a poultice made of leaves and sesame seeds is quite useful.<sup>(18)</sup>

In recent study: Rats exposed to cold restraint stress and pylorus ligation were protected from developing stomach ulcers by *azadirachta indica* leaf extract.<sup>(19)</sup> Active Constituents. Stearic and palmitic acid.

### 10. *Ficus religiosa*

Urticaceae is frequently referred to as the "sacred fig." Locals refer to it as "arasha-maram." The Hindus nurture this sacred peepul tree, which grows to a considerable size in the wild, across India. This plant's chemical components include tannin-containing bark, wax and caoutchouc (cochtone).<sup>(20)</sup>

#### Anti-ulcer activity

In Ayurvedic: Bark infusion or decoction (simple kashayam) with a small amount of honey is beneficial for ulcers.

In recent study: In rats, the hydroalcoholic extract leaves of *F. religiosa* were tested against aspirin, absolute ethanol, and pylorus ligation-induced stomach ulcers at two oral dosage levels (250 and 500 mg/kg). In comparison to the control, the extract dramatically lowers the ulcer index value.<sup>(21)</sup> Active Constituents. Bioactive compounds like flavonoids, saponins, and tannins.

### 11. *Tamarindus indica*

A common name for *Tamarindus indica* (Caesalpiniaceae) is "tamarind tree." Locals refer to it as "puli; puliyam-pazham." Native to South India, this evergreen tree is grown all across India and Burma. This plant's chemical components include pulp that includes 5% tartaric acid, 4% citric acid, acetic and malic acids contains gum, pectin, 25–40% invert sugar, and 8% potassium.

#### Anti-ulcer activity

In Ayurvedic: Decoction of the leaves encourages healthy activity and is used as a wash for indolent ulcers. In recent study: In a pylorus ligation-induced ulcer model, the total volume of gastric juice and the free and total acidity of gastric output are considerably reduced when the methanolic extract of *T. indica*'s seed coat is administered at dosages of 100 and 200 mg/kg in comparison to the control group.<sup>(22)</sup> Active Constituents. Tannins are considered.

### 12. *Moringa oleifera*

The *Moringa oleifera*, or horse radish tree, belongs to the family Moringaceae. Locals refer to it as "murungai." It is indigenous to Africa, Arabia, Asia Minor, Pakistan, India, and the Western and Sub-Himalayan regions. Alkaloids, flavonoids, saponin, tannins, zeatin, quercetin, kaempferol, and terpenoids are some of the chemical components of this plant.<sup>(23)</sup>

#### Anti-ulcer activity

In Ayurvedic: The various plant components have long been known to have therapeutic benefits in traditional medicine. Native Kani people of Tamil Nadu, India's Pechiparai Hills, use the leaf tea to heal stomach ulcers. In Pakistan, *M. oleifera* flower buds are commonly ingested and have been shown to have antiulcer properties.<sup>(23)</sup>



In recent study: Rats were given oral dosages of 125, 250, and 500 mg/kg of *M. oleifera*'s alcoholic leaf extract to prevent stomach ulcers caused by aspirin, ethanol, pylorus ligation, and cold restraint stress. Reduces in ulcer and acid pepsin secretion were seen in the extract.<sup>(24)</sup> Active Constituents: Quercetin, beta carotene and beta sitosterol.

## CONCLUSION:

In conclusion, herbal medicine offers a wide range of benefits and has been used for centuries in many cultures. Recent research is helping to confirm the effectiveness and safety of various herbal remedies for treating health issues. However, we still face challenges, such as the need for consistent quality and more clinical studies to understand how these herbs work and how they might interact with conventional medicines. As more people look for natural health solutions, it's important for herbalists, researchers, and healthcare providers to work together. By valuing traditional knowledge and continuing to study herbal remedies, we can create a more complete and patient-friendly approach to healthcare.

## REFERENCES

1. Lemos LMS, Martins T, Tanajura GH. Evaluation of antiulcer activity of chromanone fraction from *Calophyllum brasiliense* Camb, *Journal of Ethnopharmacology*. 2012; 432–439.
2. Falguni Jaiswal\*, Dr. A. K. Rai, Dr. Parnay Wal, Ankita Wal and Shashi Pratap Singh. PEPTIC ULCER: A REVIEW ON ETIOLOGY, PATHOGENESIS AND TREATMENT. *Asian Journal of Pharmaceutical Education and Research* Vol -10, Issue-4, October- December 2021 ISSN:2278 7496
3. Shoba FG, A Review on Antiulcer Activity of Few Indian Medicinal Plants, *International Journal of Microbiology*. 2014; 1-14.
4. K, J., K. K. C, and V. P. "A Review on Peptic Ulcer". *UPI Journal of Pharmaceutical, Medical and Health Sciences*, vol. 5, no. 1, Jan. 2022, pp. 19-26, doi:10.37022/jpmhs.v5i1.73.
5. N. S. Vyawahare, V. V. Deshmukh, M. R. Gadhari, V. G. Kagathara. Plants with Antiulcer Activity. *Phcog Rev.* Vol, 3, Issue 5, 118-125, 2009
6. Manisha Bhatti, Divya Dhawal Bhandari, Jitender Singh. Review on Peptic ulcer and its effective Management and Treatment with Herbals. *Research Journal of Pharmacy and Technology*. 2022; 15(8):3580-8. doi: 10.52711/0974- 360X.2022.00600
7. Prayoga DK, Aulifa DL, Budiman A, Levita J. Plants with Anti-Ulcer Activity and Mechanism: A Review of Preclinical and Clinical Studies. *Drug Des Devel Ther.* 2024;18:193-213 <https://doi.org/10.2147/DDDT.S446949>
8. G. Vimala, F. Gricilda Shoba A Review on Antiulcer Activity of Few Indian Medicinal Plants. *International journal of microbiology*. 25 May 2014 <https://doi.org/10.1155/2014/519590>
9. Nadkarni's K. M., *Indian Materia Medica*, Volume 1, 1976, Popular Prakashan, Mumbai, India, pp. 65–71.
10. Dilpreet Kaur, A.C. Rana, Nidhi Sharma, Sunil Kumar. Herbal drugs with anti ulcer activity. *Journal of applied pharmaceutical sciences* DOI: 10.7324/JAPS.2012.2326
11. Pradip Kumar Maury\*, S.K. Jain, Nand Lal and Shashi Alok. A REVIEW ON ANTIULCER ACTIVITY. *International journal of Pharmaceutical sciences and research*. IJPSR, 2012; Vol. 3(8): 2487-2493 ISSN: 0975-8232
12. Sai Krishna Borra, . 2011. Anti-ulcer effect of Aloe vera in non-steroidal anti- inflammatory drug induced peptic ulcers in rats. *African Journal of Pharmacy and Pharmacology* 5(16):1867–71.
13. Indran, M & Mahmood, A A . 2008. Protective effect of *Carica papaya* L leaf extract against alcohol induced acute gastric damage and blood oxidative stress in rats. *West Indian Med J* 57(4):323–326.
14. Vinohapooshan, G & Sundar, K . 2010. Anti-ulcer activity of *Mimosa pudica* leaves against gastric ulcer in rats. *Research Journal of Pharmaceutical, Biological and Chemical Sciences* 1(4):606–614.
15. Azmi, Lubna, Singh, M K & Akhtar, A K . 2011. Pharmacological and biological overview on *Mimosa pudica* Linn. *International Journal Of Pharmacy & Life Sciences* 2(11).
16. T Lakshmi Srinivas, S Mohana Lakshmi, S Neelufar Shama, G Koteswara Reddy, K R Prasanna. Medicinal Plants as Anti-Ulcer Agents. *Journal of pharmacognosy and phytochemistry*. ISSN 2278-4136 ISSN 2349-8234 JPP 2013; 2 (4): 91-97
17. L. Muhammad, D. Sani, W. Sumayya, S.M. Abdallah, Phytochemical screening and antibacterial activity of bitter leaf (*vernonia amygdalina*) 2 (2020) 1-7. 17.
18. M. Azamthulla, M. Asad, and V. S. Prasad, "Antiulcer activity of *Allium sativum* bulb juice in rats," *Saudi Pharmaceutical Journal*, vol. 17, no. 1, pp. 70–77, 2009.
19. M. C. Divakar, S. B. Rao, G. R. N. Nair, and A. Hisham, "The role of fatty acids on the ulcer healing property of the nimbidin fraction of the neem oil," *Journal of Medicinal and Aromatic Plants Science*, vol. 23, no. 3, pp. 404–408, 2001
20. Sahoo SK, Sahoo HB and Priyadarshini D: Antiulcer activity of ethanolic extract of *Salvadora indica* (W.) leaves on albino rats. *Journal of Clinical and Diagnostic Research* 2016; 10(9): 07-10.
21. Sapkota B, Prakash CK and Jain V: Evaluation of Anti-ulcer Activity of *Citrus maxima* (Brum.) Leaves Extract in Experimental Animals. *Journal of Clinical and Experimental Pharmacology* 2021; 11: 1-6.



22. V.C. Mbatchou, K.O. Nabayire, Y. Akuoko, Vernonia Amygdalina Leaf: Unveiling its Antacid and Carminative Properties in Vitro, Current Science, 2017.
23. Kumari Subitha T., Ayyanar M., Udayakumar M., and Sekar T., Ethnomedicinal plants used by Kani tribals in Pechiparai forests of Southern Western Ghats, Tamilnadu, India, International Research Journal Plant Science. (2011) 2, no. 12, 349–354.
24. Verma V. K., Singh N., Saxena P., and Singh R., Anti-ulcer and anti-oxidant activity of Moringa oleifera (Lam) leaves against aspirin and ethanol induced gastric ulcer in rats, International Research Journal of Pharmacy. (2002) 2, 46–57.

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