



A COMPERHENSIVE: REVIEW ON ANTI ULCER ACTIVITY OF HERBAL MEDICINAL PLANT

¹Kalyani Nirwan, ²Dr. Chakresh Patley, ³Dr.Rajesh Mujariya, ⁴Dr. Manjeet Singh, ⁵Punam Bihone

^{1,2,3,4} Institute of Pharmaceutical Science and Research (IPSR), Balaghat (MP), 481331, India

Abstract:

Ulcer is a common gastrointestinal disorder which is seen among many people in that bacterium *Helicobacter pylori* is regarded as the most common cause of infection. Long-term use of NSAIDs such as Paracetamol, Aspirin, Diclofenac, etc. Various herbal medicines have been used traditionally for the remedy of peptic ulcer disease (PUD), however scientific information with regards to their anti-peptic ulcer both in-vivo and in-vitro as well as clinical studies supporting their use is still inadequate. Preliminary phytochemical screening of these herbs has shown the presence of important secondary metabolites like flavonoids, alkaloids, terpenoids, tannins which are responsible for the anti-ulcer activity. The purpose of this study is to treat of peptic ulcer disease are to relieve pain, heal the ulcer, and delay ulcer recurrence using herbal medicinal plants.

Keywords: Helicobacter Pyroli, Peptic ulcer disease, Natural Pain Killer, Medicinal Plants, Abdominal Pain

Introduction

Peptic ulcer disease (PUD) comprises of esophageal, duodenal and gastric ulcers. The most frequently occurring symptom of PUD is epigastric pain. This pain may occur with dyspepsia, bloating, nausea and/or early satiety.¹ The causes of PUD are mainly two, the first being chronic infection with *Helicobacter pylori* and the second involves abuse of Non-Steroidal Anti-Inflammatory Drugs popularly known as NSAIDs.² Therapy is normally focused on the elimination of *H. pylori* from the gut of an infected patient. A standard orthodox triple therapy is normally indicated as first-line therapy which involves combination of Proton Pump Inhibitor, Amoxicillin and Clarithromycin; Omeprazole, Clarithromycin and Amoxicillin; Pantoprazole, Clarithromycin

and Amoxicillin among others. Increasing antibiotic resistance of certain Ulcers are most common on the skin of the lower extremities and in the gastrointestinal tract, although they may be encountered at almost any site.³ There are many types of ulcer such as mouth ulcer, esophagus ulcer, peptic ulcer, and genital ulcer these peptic ulcer is seen among many people. The peptic ulcers are erosion of lining of stomach or the duodenum.⁴ The two most common types of peptic ulcer are called “gastric ulcer” and “duodenal ulcer.” The name refers to the site of ulceration. A person may have both gastric and duodenal ulcers at the same time. Gastric ulcers are located in the stomach, characterized by pain; ulcers are common in older age group. Eating may increase pain rather than relieve pain.⁵ Other symptoms may include nausea, vomiting, and weight loss. Although patients with gastric ulcers have normal or diminished acid production, yet ulcers may occur even in complete absence of acid. Duodenal ulcers are found at the beginning of small intestine and are characterized by severe pain with burning sensation in upper abdomen that awakens patients from sleep.⁶ Generally, pain occurs when the stomach is empty and relieves after eating. A duodenal ulcer is more common in younger individuals and predominantly affects males.⁷ In the duodenum, ulcers may appear on both the anterior and posterior walls. In some cases, peptic ulcer can be life threatening with symptoms like bloody stool, severe abdominal pain, and cramps along with vomiting blood. Peptic ulcer is one of the world’s major gastrointestinal disorders and affecting 10% of the world population. About 19 out of 20 peptic ulcers are duodenal. An estimated 15000 deaths occur each year as a consequence of peptic ulcer. Annual incidence estimates of peptic ulcer hemorrhage and perforation were 19.4–57 and 3.8–14 per 100,000 individuals, respectively.⁸ The average 7-day recurrence of hemorrhage was 13.9% and the average long-term recurrence of perforation was 12.2% . In the Indian pharmaceutical industry, antacids and antiulcer drugs share 6.2 billion rupees and occupy 4.3% of the market.⁹ In order to achieve this aim, Indian ayurvedic book *Materia Medica* and electronic databases including science direct, pubmed, scopus, and google scholar were explored for each of the medicinal plants for peptic ulcers and all retrieved articles were evaluated to achieve any in vitro, in vivo, or clinical evidence for their efficacy and possible mechanisms.¹⁰ The retrieved studies either demonstrate obviously effectiveness of these herbs or indirectly their efficacy on the involved mechanisms in the treatment of peptic ulcers. *Materia Medica* provides lots of information about ethno medicinal herbs, which are valuable as antiulcer agents and their use experimentally was evaluated and proved by many researchers for its antiulcer activity. Following compiled data suggested that medicinal plant those are evidently reported for its antiulcer activity.¹¹

Herbal medicinal plants and its anti-ulcer activity

Aegle marmelos. *Aegle marmelos* which is commonly known as a “bael tree” belonging to the family *Rutaceae* is the plant that chiefly grows on throughout India. It is locally called as “vilvam.” Chemical constituents in this plant are flavonoids, tannins, and saponins.¹²



Figure no.1: Bel Plant

Antiulcer Activity

In Folk Medicine. The fruit of *A. marmelos* is traditionally used for the treatment of ulcer among the kani tribes in Kanyakumari district, Tamil Nadu, India. *In Recent Studies*. Ulcers are induced by aspirin plus pylorus ligated gastric ulceration in rats and aqueous extract of leaves is to be administered orally for 21 days, daily dose of 1gm/kg.¹³ The result indicated a significant reduction in the ulcer lesion count compared to control. *Active Constituents*. Luvangetin, a pyranocoumarin isolated from the seeds, is considered.¹⁴

Azadirachta indica. *Azadirachta indica* (family *Meliaceae*) is indigenous to and cultivated nearly all over India and in Bengal. It is commonly known as “neem” and locally called “vembu.” Chemical constituents reported in this plant are nimbidin, phenolic compounds, saponin, and flavonoids.¹⁵ It contains a bitter alkaloid named Margosine. Seeds contain about 10–31% of a yellow bitter fixed oil. The oil contains free and volatile fatty acids. The volatile fatty acids probably consist of a mixture of stearic and oleic acids with a small amount of lauric acid.¹⁶



Figure no. 2: Neem Plant

Antiulcer Activity

In Ayurvedic. A poultice of leaves mixed with sesamum seeds is very useful in unhealthy ulcerations.¹⁷ *In Recent Studies.* *Azadirachta indica* leaf extract protected against pylorus ligation and cold restraint stress induced gastric ulcer in rats. *Active Constituents.* Stearic and palmitic acid isolated from the nimbodin fraction of neem seeds oil is considered.¹⁸

Aloe vera. *Aloe vera* belonging to the family *Liliaceae* is commonly known as “aloe gel.” It is locally called “kattalai” which is found all over India. Chemical constituents in this plant are aloin, isobarbaloin, and emodin.¹⁹



Figure no.3: Aloe vera Plant

Antiulcer Activity

In Ayurvedic. Leaves are being used successfully in America in the local treatment of chronic ulcers. First the pain diminishes and after a few weeks the ulcers heal. *In Recent Studies.* *Aloe vera* powder was mixed with gum acacia; the solution was administered orally in rats at dose of 200mg/kg against indomethacin induced gastric ulcer.²⁰ The extract showed significant antiulcer activity comparable to control. *Active Constituents.* Barbaloin, isobarbaloin, and saponins are considered.²¹

Annona squamosa. (*Annonaceae*) is commonly known as “custard apple.” It is cultivated in gardens all over India which is locally called as “sitapalam.” Chemical constituents in this plant are alkaloids, flavonoids, saponins, and tannins. Seeds yield oil and resin; seeds, leaves, and immature fruit contain an acrid principle.²²



Figure no. 4: Sitapalam Plant

Antiulcer Activity

In Ayurvedic. Leaves made into a paste without adding water are applied to unhealthy ulcers. *In Recent Studies.*²³ The aqueous leaf extract protected against pylorus ligation and ethanol induced gastric ulcer in rats. *Active Constituents.* Tannic acid is considered.²⁴

Carica papaya. (*Caricaceae*) is commonly known as “papaya.” It is locally called “papali-pazham.” It grows in all tropical countries and many subtropical regions of the world. Chemical constituents in this plant are Papain, chymopapain, pectin, carposide, carpaine, carotenoids, and antheraxanthin.²⁵



Figure no. 4: Papaya Plant

Antiulcer Activity

In Folk Medicine. It is largely used in tropical folk medicines. The ripe fruit is edible and unripe can be eaten cooked for indolent ulcer.²⁶ The unripe fruit can be cooked as parts of salads, jellies, and stews while the ripe fruits are usually eaten raw without the skin or seed. Intake of the unripe fruit of the plant has been linked with an antiulcer effect. *In Recent Studies.* The aqueous seed extract of *C. papaya* was administered at the doses of 50 and 100mg/kg orally, in rats against ethanol induced gastric ulcer.²⁷ The extract protected the gastric mucosa against ethanol effect. *C. papaya* extract significantly reduced the gastric juice volume and gastric acidity. *Active Constituents.* Chymopapain and papain are widely known as being useful for digestive disorders and disturbances of the gastrointestinal tract.²⁸

Ficus religiosa. (*Urticaceae*) is commonly known as “sacred fig.” It is locally called “arasha-maram.” This sacred peepul is a large tree round wild and cultivated all over India by the Hindus. Chemical constituents in this plant are bark containing tannin, caoutchouc (cochtone), and wax.²⁹



Figure no. 5: peepul Plant

Antiulcer Activity

In Ayurvedic. Bark is useful in ulcers in infusion or decoction (simple kashayam) with a little honey. *In Recent Studies.* The hydro alcoholic extract leaves of *F. religiosa* were studied at two dose levels (250 and 500 mg/kg, oral) in rats against absolute ethanol, aspirin, and pylorusligation induced gastric ulcer. The extract significantly decreases the ulcer index value when compared to control. *Active Constituents.* Bioactive compounds like flavonoids, saponins, and tannins are considered.³⁰

Moringa oleifera. (*Moringaceae*) is commonly known as “drum-stick, horse radish tree.” It is locally called “murungai.” It is native to the Western and sub-Himalayan region, India, Pakistan, Asia minor, Africa, and Arabia. Chemical constituents in this plant are alkaloids, flavonoids, saponin, tannins, zeatin, quercetin, kaempferom, and terpenoids³²



Figure no. 6: murunga Plant

Antiulcer Activity

In Folk Medicine. The medicinal value of the different parts of the plant has long been recognized in folklore medicine.³³ The leaf tea treats gastric ulcers by Kani tribals of Pechiparai Hills, Tamil Nadu, India. Flower buds of *M. oleifera* are widely consumed in Pakistan and have been reported to possess antiulcer activity. The alcoholic leaves extract of *M. oleifera* was administered in the doses of 125, 250, and 500mg/kg orally, in rats against pylorus ligation, ethanol, cold restraint stress, and aspirin induced gastric ulcer. The extract showed decreases in ulcer and acid pepsin secretion. *Active Constituents.* Quercetin, beta sitosterol, and beta carotene are considered.³⁴

Tamarindus indica. (*Caesalpiniaceae*) is commonly known as “tamarind tree.” It is locally called “puli; puliyam-pazham.” This evergreen tree which is indigenous to South India is cultivated throughout India and Burma. Chemical constituents in this plant are pulp that contains tartaric acid 5%, citric acid 4%, malic and acetic acids, tartaric of potassium 8%, invert sugar 25–40%, gum, and pectin.



Figure no. 7: Imli Plant

Seeds contain albuminoids, fat, carbohydrates 63.22%, fiber, and ash containing phosphorus and nitrogen. Fruit contains traces of oxalic acid.³⁵

Antiulcer Activity

In Ayurvedic. Decoction of the leaves is used as a wash for indolent ulcers and promotes healthy action. The methanolic extract of the seed coat of *T. indica* at doses of 100 and 200mg/kg significantly reduces the total volume of gastric juice and free and total acidity of gastric secretion in pylorus ligation induced ulcer model as compared to control. *Active Constituents.* Tannins are considered.

Conclusion

According to pervious hypothesis, acid secretion is a major sole cause of ulcer formation and reduction in acid secretion was thought to be the major approach towards therapy. Now a day's treatment of ulcer mainly targets the potentiation of the defensive system along with lowering of acid secretion. Ayurveda, the oldest medicinal system in the world, provides leads to find therapeutically useful compounds from plants. Therefore, Ayurveda knowledge supported by modern science is necessary to isolate, characterize, and standardize the active constituents from herbal sources for antiulcer activity. The combination of traditional and modern knowledge can produce better drugs for the treatment of peptic ulcer with fewer side effects. It is apparent that experimental evaluation of herbal drugs for the treatment of gastric ulcer is rather impressive but very few have reached clinical trials and still few have been marketed. This shows that the benefits of research are not

reaching the people to whom medical research is directed and hence the time, manpower, and resources are not efficiently utilized. Hence, pharmacologists need to take more active interest in evaluation of herbal drugs for potential antiulcer activity and standardization of such herbal drugs to be clinically effective and globally competitive.

Reference

1. Ha, Therapeutic potentials of *Cnestis ferruginea*: a review, *J. Pharmacogn. Phytochem.* 6 (6) (2017) 1397–1401.
2. Akter S, Begum T and Begum R: Phytochemical analysis and investigation of anti-inflammatory and anti-ulcer activity of *Terminalia bellirica* leaves extract. *International Journal of Pharmacognosy* 2019; 6: 54-65.
3. Bhajoni PS, Meshram GG and Lahkar M: Evaluation of the antiulcer activity of the leaves of *Azadirachta indica*: An experimental study. *Integrative Medicine International* 2016; 3(1-2): 10-16.
4. C.C. Chan, N.H. Chien, C.L. Lee, et al., Comparison of 10-day sequential therapy with 7-day standard triple therapy for *Helicobacter pylori* eradication in inactive peptic ulcer disease and the efficiency of sequential therapy in inactive peptic ulcer disease and non-ulcer dyspepsia, *BMC Gastroenterol.* 2015 (2015) 15–170.
5. D. Kaur, N. Kaur, A. Chopra, A comprehensive review on phyto chemistry and pharmacological activities of *Vernonia amygdalina*, *J. Pharmacogn. Phytochem.* 8 (3) (2019) 2629–2636.
6. E. Kawakami, S.K. Ogata, C.M.P. _Aurea, M.M. Ana, et al., Patrício, triple therapy with Clarithromycin, Amoxicillin and omeprazole for *Helicobacter pylori* eradication in children and adolescents, *Arq. Gastroenterol.* 38 (3) (2001).
7. E.O. Farombi, O. Owoeye, Antioxidative and chemo preventive properties of *Vernonia amygdalina* and *Garcinia bi flavonoid*, *Int. J. Environ. Res. Publ. Health* 8 (2011) 2533–2555.
8. G.O. Avwioro, F.A. Awoyemi, T. Odoula, A novel natural collagen and muscle stain from *Morinda lucida* extracts 4 (2) (2005) 44–48.
9. H.D. Neuwinger, *African ethno botany: poisons & drugs: chemistry pharmacology, Toxicology* (1996).
10. J. R. Ilavarasan, S.Monideen, and M. Vijayalakshmi, “Antiulcer activity of *Aegle marmelos*,” *Ancient Science of Life*, vol. 21, no. 4, pp. 23–26, 2002.
11. K. M. Nadkarni’s, *Indian Materia Medica, Volume 1*, pp. 116-117, Popular Prakashan, Mumbai, India, 1976.
12. K. M. Nadkarni’s, *Indian Materia Medica, Volume 1*, pp. 65–71, Popular Prakashan, Mumbai, India, 1976.
13. K. M. Nadkarni’s, *Indian Materia Medica, Volume 1*, pp. 76-77, popular Prakashan, Mumbai, India, 1976.

14. Kayande N, Mahajan T and Sisodiya R: *In-vitro* evaluation of antiulcer activity of *Melia azedarach* linn leaves on wistar albino rats. *World Journal of Pharmaceutical Research* 2018; 7(6): 514-523.
15. Khatri S, Goswami RB and Jain S: Phytochemical screening and evaluation of antiulcer activity of ethanolic extract of *Spathodea campanulata* leaves. *Journal of Drug Delivery and Therapeutics* 2019; 9(4): 1012-5.
16. L. Muhammad, D. Sani, W. Sumayya, S.M. Abdallah, Phytochemical screening and antibacterial activity of bitter leaf (*vernonia amygdalina*) 2 (2020) 1-7.
17. 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.
18. 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.
19. N. R. Pillai and G. Santhakumari, "Toxicity studies on nimbidin, a potential anti-ulcer drug," *Planta Medica*, vol. 50, no. 2, pp. 146–148, 1984.
20. O.A. Olajide, S.O. Awe, J.M. Makinde, The effect of *Morinda lucida* Benth (Rubiaceae) extract on the gastrointestinal tract of rodents, *Phytotherapy : Int. J. Pharmacol. Toxicol Eval. Nat. Product* 12 (6) (1998) 439-441.
21. Pal A and Chinnaiyan SK: Anti-ulcer activity of leaves of *Averrhoa carambola* Linn. *International Journal of Pharmacology Research* 2019; 9(05): 1-6.
22. Panchawat S and Pradhan J: Comparative Evaluation of Antiulcer Activity of *Ficus religiosa* (Stem Bark) Extracts Prepared by Different Methods of Extraction. *Current Traditional Medicine* 2020; 6(4): 351-9.
23. Patel VK and Lariya NK: Evaluation of anti-ulcer activity of extract of *Moringa oleifera* Lam. using Acetic acid induced ulcer model. *Journal of Drug Delivery and Therapeutics* 2019; 9(3): 23-8.
24. R. K. Goel, R. N. Maiti, M. Manickam, and A. B. Ray, "Antiulcer activity of naturally occurring pyrano-coumarin and iso-coumarins and their effect on prostanoid synthesis using human colonic mucosa," *Indian Journal of Experimental Biology*, vol. 35, no. 10, pp. 1080–1083, 1997.
25. R.T. Kavitt, A.M. Lipowska, A. Anyane-Yeboah, I.M. Gralnek, Diagnosis and treatment of peptic ulcer disease, *Am. J. Med.* 32 (4) (2019) 447–456.
26. R.U.B. Eban, U.O. Edet, D.E. Atang, L.A. Iyere, Antimicrobial Studies and Phytochemical Analysis of the Fruits and Leaves of *Cnestis ferruginea*, 25, *World News of Natural Sciences*, 2019, pp. 188-198.
27. S. K. Borra, R. K. Lagisetty, and G. R. Mallela, "Anti-ulcer effect of *Aloe vera* in non-steroidal anti-inflammatory drug induced peptic ulcers in rats," *African Journal of Pharmacy and Pharmacology*, vol. 5, no. 16, pp. 1867–1871, 2011.

28. S.F. Yuso, F.F. Haron, M.T.M. Mohamed, et al., Antifungal activity and phytochemical screening of *vernonia amygdalina* extract against *botrytis cinerea* causing gray mold disease on tomato fruits, *Biology* 9 (286) (2020) 1-14.
29. 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.
30. 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.
31. T. Kumari Subitha, M. Ayyanar, M. Udayakumar, and T. Sekar, "Ethnomedicinal plants used by Kani tribals in Pechiparai forests of Southern Western Ghats, Tamilnadu, India," *International Research Journal Plant Science*, vol. 2, no. 12, pp. 349–354, 2011.
32. T. S. Mohamed Saleem, R. Pradeep Kumar, N. Priyanka, M. Madhuri, V. Sravanti, and K. Sarala, "Anti-ulcerogenic effect of aqueous extract of *Annona squamosa* (Linn)," *International Journal of Research in Phytochemistry and Pharmacology*, vol. 2, no. 3, pp. 157–159, 2012.
33. T. Surendra, A. Rafat, Herbal treatment alternatives for peptic ulcer disease, *J. Drug Deliv. Therapeut.* 6 (3) (2016).
34. Ugwah MO, Ugwah-Oguejiofor CJ and Etuk EU: Evaluation of the antiulcer activity of the aqueous stem bark extract of *Balanites aegyptiaca* L Delile in Wistar rats. *Journal of Ethnopharmacology* 2019; 239: 1-27.
35. V.C. Mbatchou, K.O. Nabayire, Y. Akuoko, *Vernonia Amygdalina* Leaf: Unveiling its Antacid and Carminative Properties in Vitro, *Current Science*, 2017.