International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 2, February 2026 **ijppr.humanjournals.com** ISSN: 2349-7203

Omeprazole A Comprehensive Review on Its Role in The Management of Ulcer Disease

Karthick M*, Manivannan R, Abdul Jabbar M R, Bhuvan Kumar A, Chathriyan M, Syed Arfath S

Assistant professor, Department of Pharmaceutics,
Excel college of Pharmacy, Komarapalayam, Tamil Nadu, India- 637303.

Received: 27 December 2025 Revised: 10 January 2026 Accepted: 29 January 2026

ABSTRACT

Ulcer disease remains a major gastrointestinal disorder worldwide, resulting from an imbalance between aggressive factors such as gastric acid, Helicobacter pylori infection, NSAIDs, and weakened mucosal defense mechanisms. This review presents an integrated overview of ulcer pathophysiology, classification, etiology, diagnosis, and management strategies, with a special focus on omeprazole and emerging natural therapies. Omeprazole, a proton pump inhibitor, has demonstrated strong acid-suppressive activity, high specificity, and long-term clinical efficacy in the treatment of peptic ulcer disease, gastro- esophageal reflux disease, and NSAID-induced ulcers. However, prolonged use is associated with potential adverse effects, including nutrient malabsorption and altered hematological parameters. In parallel, traditional medicinal plants such as Aegle marmelos, Glycyrrhiza glabra, Azadirachta indica, Curcuma longa, Zingiber officinale, Aloe vera, and Psidium guajava have shown promising gastroprotective, antioxidant, and anti- inflammatory activities. Recent advances in drug delivery systems, particularly nanosuspension technology, have further enhanced the bioavailability and therapeutic efficacy of poorly soluble antiulcer drugs. This review highlights the potential of combining synthetic medications with herbal therapies and novel formulations to achieve safer, more effective, and sustainable ulcer management.

Keywords : Peptic ulcer, Omeprazole, Proton pump inhibitors, Herbal antiulcer agents, Nanosuspension, Gastroprotection

1. INTRODUCTION

One type of chronic inflammatory bowel disease (IBD) that is typified by dysregulation of the mucosal immune response is ulcerative colitis. Rectal bleeding, diarrhea, and weight loss are common symptoms of affected patients; some may need hospitalization or, in more extreme situations, a colectomy. A painful lesion in the duodenum (the first segment of the small bowel) or stomach lining is known as a gastric ulcer condition. In addition to causing discomfort in the abdomen, ulcers frequently result in bleeding or an abdominal hole. Sores are thick sores that penetrate the mucosal muscle and entire digestive tract. With the highest frequency happening between the ages of 55 and 65, ulcer disease has primarily affected the elderly population. Duodenal ulcers were shown to be more prevalent in men than gastric ulcers, while the opposite was true in women. Serious consequences are likely to occur in 35% of people with stomach ulcers.

2. TYPES OF ULCERS

Peptic sores come in two different varieties, which are as follows: The stomach lining can develop gastric ulcers. - Duodenal ulcers that form in the top portion of the small bowel. The most common causes of all types of peptic sores are either infections with the most frequent causes of both kinds of peptic ulcers are either Helicobacter pylori infection or long- term use of anti-inflammatory nonsteroidal drugs (NSAIDs).

International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 2, February 2026 ijppr.humanjournals.com ISSN: 2349-7203

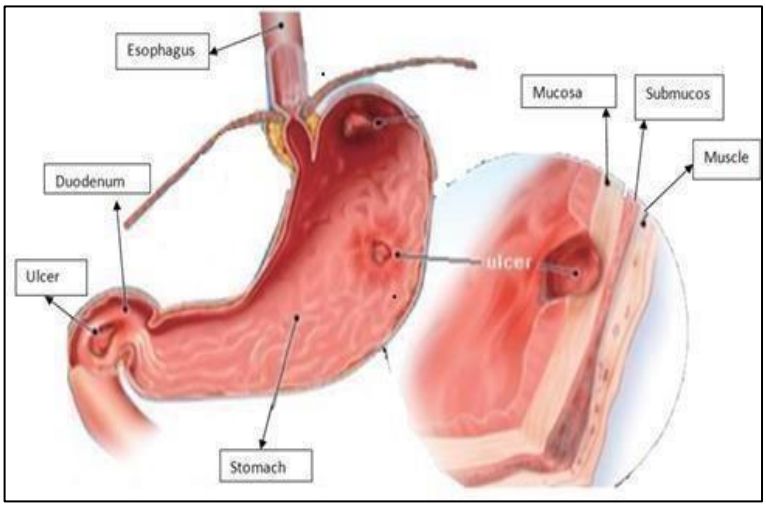

FIGURE 1: STOMACH ULCER

3. ANTI-ULCER DRUGS

Antiulcer medicines are pharmacological chemicals used to prevent or cure ulcers in the gastrointestinal system, notably the stomach and duodenum. These medicines work through a variety of methods, including decreasing stomach acid output, increasing mucosal defence, and facilitating gastric lining recovery. Based on how they work, antiulcer drugs are divided into a number of groups. Proton pump inhibitors (PPIs), such as pantoprazole and omeprazole, efficiently lower the production of stomach acid, resulting in comfort and healing. Ranitidine and famotidine are examples of H2 -receptor antagonists that also reduce acid secretion, but they do so via distinct mechanisms. In addition to mucosal protectants like sucralfate, which provide a barrier of defence over the ulcerated region, antacids alleviate symptoms by neutralising stomach acid.

4. OMEPRAZOLE:

One medication from the first generation of proton pump inhibitors is omeprazole. Due to its strong acid inhibitory effect, high specificity, and extended lifetime, it is frequently used to treat duodenal and stomach ulcers. Omeprazole is a member of the benzimidazole derivative family. With a pKa value of roughly 4, it is a white or off-white crystalline powder that is fat-soluble and weakly alkaline. Although it is stable in neutral or alkaline environments, it is poorly soluble in water and acid and easily breaks down in acid because of the sulfoyl group. Therefore, it is necessary to strictly control the technological conditions during the preparation process 14–16. Following This is an article from the Russian Journal of General Chemistry that has undergone post-peer review and pre- copyediting. Omeprazole is formed into vesicles and encased in the vesicle's bilayer, which enhances both its biology and water solubility. When compared to omeprazole alone, the use of such vesicles can improve the release characteristics and lower the dosage. The enteric-coated pellets in Omeprazole's (Omez) R 20 mg hard gelatin capsules were acquired from Pharaonia Pharmaceutical Industries in Egypt. According to Paget and Barnes, the dose was modified for rats to be 0.36mg/kgb.wt.(23) The recommended drugs for treating acid-related conditions such as peptic ulcer disease and gastro-oesophageal reflux disease are proton pump inhibitors. This is due to their effective suppression of gastric acid secretion.

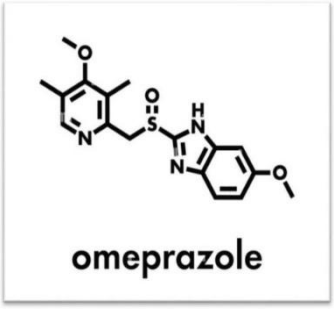

FIGURE 2: OMEPRAZOLE

5. Mechanism of Action

Omeprazole binds covalently to the proton pump in gastric parietal cells, blocking the final step of acid production.

Oral administration
↓
Absorbed in small intestine
↓
Enters systemic circulation
↓
Concentrates in acidic canaliculi of gastric parietal cells
↓
Converted to active sulfenamide form (in acidic pH)
↓
Irreversibly binds to H^+/K^+-ATPase (proton pump)
↓
Inhibition of final step of gastric acid secretion
↓
↓ Secretion of hydrochloric acid (basal & stimulated)
↓
↑ Gastric pH
↓
Healing of acid-related disorders (ulcers, GERD, etc.)

6. Guava seed

The flattened, kidney-shaped seeds are light yellow or cream in colour and measure 3 to 5 mm in length and 2 to 3 mm in width. There can be anywhere from 100 to 500 seeds per fruit, making up about 1.6 to 4% of the fruit's weight.

About 92% of guava seeds are dry matter, with 80% being fibre, 8–12.75% oil, 6–10% protein, and 0.5–6.62% ash [29, 61]. The fibre is composed of 25% lignin and 65% hemicellulose, and the ethereal extract has 79% linolenic, 8% palmitic, 7% oleic, and 5% stearic fatty acids, according to Vasco-Méndez et al. Sixty percent of triglycerides are triolein.

Pg-AMP1, an antimicrobial peptide that is part of a class of glycine-rich proteins present in guava seeds and is unique in its low molecular weight and three-dimensional structure, was identified and described by Pelegrini and Franco.

Other groups of antimicrobial peptides are comparable. Gram-negative bacterial growth may be inhibited, according to in vitro studies. In one study, they found that the development of Proteus and Klebsiella spp. was reduced by 30% and 90%, respectively, at a dose of 6.5 mm.

Figure 3: Guava seed

International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 2, February 2026 ijppr.humanjournals.com ISSN: 2349-7203

Scientific Classification of Guava (Psidium guajava L.)

Category	Scientific Classification
Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Myrtales
Family	Myrtaceae
Genus	Psidium
Species	Psidium guajava L.

NANOSUSPENSION

One potential technique for increasing the bioavailability of hydrophobic medications is the use of nanosuspensions (NS). NS are defined as unique liquid submicron colloidal dispersions containing pure medicine particles at the nanoscale, stabilised by surfactants or polymers, and range in size from 1 to 1000 nm. Because of their tiny size and huge surface area, these nanosystems increase the solubility of medications that are poorly soluble in water. Additionally, by increasing drug loading, improving dose-bioavailability correlation, lowering toxicity and side effects, and encouraging patient adherence by lowering the number of oral units needed for administration, they can alter the pharmacokinetics of the medication, improving its efficacy and safety. When drug particles are reduced to the nanometre range, their surface area increases, and their saturation solubility results in a higher rate of dissolution.

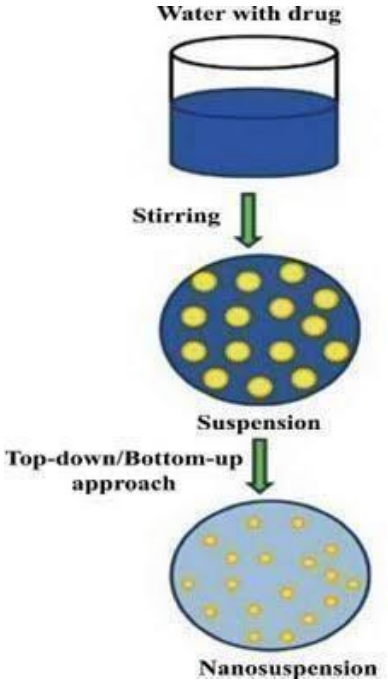

Figure 4: Nanosuspension

7. Advantages of Nanosuspension:

Increase the medicines' solubility and bioavailability Ideal for medications that are hydrophilic.

It is possible to attain greater drug loading. It is feasible to reduce the dosage.

Improve the medications' chemical and physical stability and offer passive drug targeting.

8. Preparation of Nanosuspension:

The most widely used method for creating nanosuspensions is jet milling or colloid micronisation. This technique enhances the drug's rate of dissolution but has no effect on saturation solubility, making it unable to increase the drug's bioavailability. Sucker and co- workers used a precipitation technique to produce nanoparticles by dissolving the drug in a solvent and adding the solvent to a non-solvent that causes precipitation of the fine drug particle. The benefit of this is that it makes use of inexpensive, basic equipment. However, when used for large-scale production, this caused issues with mixing and stirring.

The primary approaches for creating nanosuspensions that have been employed recently may be divided into four categories.

(a) Homogenisation (b)Wetmilling

(c) Emulsification-solvent evaporation and

(d) Precipitation or microprecipitation method.

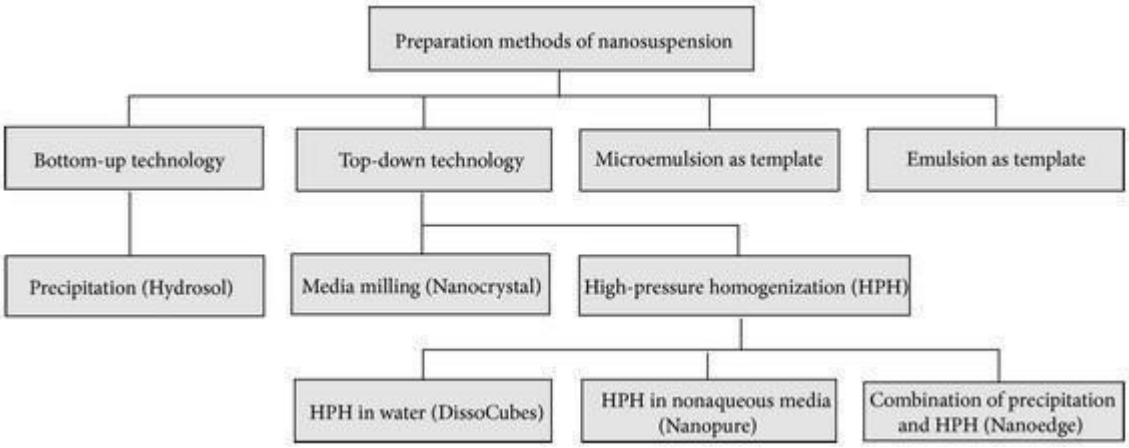

Figure 5:Preparation methods of nanosuspension

9. Evaluation of Nanosuspensions:

A) In-Vitro Evaluations

1. Particle size and size distribution

2. Particle charge (Zeta Potential

3. Crystalline state and morphology

4. Saturation solubility and dissolution velocity

B) In-Vivo Evaluation

C) Evaluation for surface-modified Nanosuspensions

1. Surface hydrophilicity

2. Adhesion properties

3. Interaction with body proteins

10. CONCLUSION

Ulcers remain a significant gastrointestinal disorder caused by an imbalance between protective and aggressive factors in the stomach and duodenum. Common causes include Helicobacter pylori infection, prolonged NSAID use, excess gastric acid secretion, and lifestyle factors such as smoking, alcohol, and poor diet. Diagnosis relies on patient history, endoscopy, and laboratory tests.

Management strategies include synthetic drugs like proton pump inhibitors (e.g., omeprazole), H2- receptor antagonists, antacids, and antibiotics, which provide effective symptom relief and healing. However, long-term use may lead to side effects and resistance. Hence, natural remedies such as Aegle marmelos, Glycyrrhiza glabra, Azadirachta indica, turmeric, ginger, Aloe vera, and Psidium guajava (guava seeds) have gained attention for their proven gastroprotective, antioxidant, and anti-inflammatory properties.

Advanced formulations like nanosuspensions have further improved drug solubility, bioavailability, and therapeutic efficacy, offering new opportunities in ulcer treatment.

Overall, an integrative approach that combines synthetic medications with natural therapies and modern drug delivery systems holds the greatest promise for effective, safe, and sustainable ulcer management.

11. REFERENCES

1. Paik J. Ozanimod: a review in ulcerative colitis. Drugs. 2022 Aug;82(12):1303-13.
2. RaviKKumar VR, Rathi S, Singh S, Patel B, Singh S, Chaturvedi K, Sharma B. A comprehensive review on ulcer and their treatment. Zhongguo Ying Yong Sheng Li Xue ZaZhi. 2023 Dec 21;39:e20230006.
3. Jaswanth K, Kumar K, Venkatesh P. A review on peptic ulcer. UPI Journal of Pharmaceutical, Medical and Health Sciences. 2022 Jan 29:19-26.
4. Jawale DD. Review Article on Anti-ulcer Agent. International Journal of Sciences and Innovation Engineering. 2025 May 30;2(5):1024-31.
5. Kumar M, Kapoor S, Dhumal S, Tkaczewska J, Changan S, Saurabh V, Mekhemar M, Rais N, Satankar V, Pandiselvam R, Sayed AA. Guava (Psidium guajava L.) seed: A low- volume, high-value byproduct for human health and the food industry. Food Chemistry. 2022 Aug 30;386:132694
6. Mohamed ME, Kamel MA. Anti-ulcer and gastro protective effects of dexlansoprazole in experimentally induced gastric ulcer in rats. Zagazig Veterinary Journal. 2023 Jun 1;51(2):208-23.
7. Rang HP, Dale MM, Ritter JM, Flower RJ, Henderson G. Rang & Dale's pharmacology. 9th ed. London: Elsevier; 2019.
8. Angulo-López JE, Flores-Gallegos AC, Torres-León C, Ramírez-Guzmán KN, Martínez GA, Aguilar CN. Guava (Psidium guajava L.) fruit and valorization of industrialization by- products. Processes. 2021 Jun 20;9(6):1075..
9. Lakshmi P, Kumar GA. Nanosuspension technology: A review. Int J Pharm Pharm Sci. 2010 Aug;2(4):35-40.
10. Patel VR, Agrawal YK. Nanosuspension: An approach to enhance solubility of drugs. Journal of advanced pharmaceutical technology & research. 2011 Apr 1;2(2):81-7.
11. Krishna KB, Prabhakar C. A review on nanosuspensions in drug delivery. Int J Phama and Bio Sci. 2011;2(1):549-8.
12. Bhowmik D, Harish G, Duraivel S, Kumar BP, Raghuvanshi V, Kumar KS. Nanosuspension-A novel approaches in drug delivery system. The Pharma Innovation. 2013 Feb 1;1(12, Part A):50.

How to cite this article:
Karthick M et al. Ijppr.Human, 2026; Vol. 32 (2): 209-214.
Conflict of Interest Statement: All authors have nothing else to disclose.