Contemporary Research In Pharmacy Practice
An Online, Peer-Reviewed, Refereed, Open Access Journal
Content Available at www.cognixpress.co.in ONLINE ISSN: XXXX-XXXX

REVIEW ARTICLE

REVIEW ARTICLE ON PEPTIC ULCER DISEASE: AN ARTICLE ON CAUSES, TYPES, CLINICAL FEATURES, DIAGNOSIS AND MANAGEMENT

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ARTICLE HISTORY: 04.07.2026 RECEIVED: 19.08.2026 REVISED: ACCEPTED: 27.08.2026

ABSTRACT
Peptic ulcer disease (PUD) is a common gastrointestinal disorder characterized by the development of open sores in the mucosal lining of the stomach or duodenum. It occurs when the balance between aggressive factors, such as gastric acid and pepsin, and the protective mechanisms of the gastrointestinal mucosa is disrupted. The two major causes of peptic ulcer disease are *Helicobacter pylori* infection and prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs). Other contributing factors include smoking, excessive alcohol consumption, severe physiological stress and certain lifestyle-related factors. The condition commonly presents with burning or aching epigastric pain, nausea, vomiting, abdominal bloating, indigestion and loss of appetite. However, some individuals may remain asymptomatic until complications develop. Major complications include gastrointestinal bleeding, perforation, penetration and gastric outlet obstruction, which may require urgent medical intervention. The diagnosis of peptic ulcer disease involves detailed clinical history, physical examination, laboratory investigations, testing for *H. pylori* infection and upper gastrointestinal endoscopy. Management primarily focuses on relieving symptoms, promoting ulcer healing, eliminating the underlying cause and preventing recurrence. Treatment includes proton-pump inhibitors, appropriate antibiotic therapy for *H. pylori* eradication, gastrointestinal protective agents and modification of ulcer-causing medications under medical supervision. Lifestyle modifications, health education and adherence to prescribed treatment also play important roles in recovery. Early diagnosis, appropriate medical management and preventive measures can significantly reduce complications and improve patient outcomes. Awareness of risk factors and timely healthcare intervention are essential for effective management of peptic ulcer disease.

Keywords: *Peptic Ulcer Disease, Helicobacter pylori, Gastric Ulcer, Duodenal Ulcer, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), Gastrointestinal Disorders.*

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1. INTRODUCTION

Peptic ulcer disease (PUD) is a gastrointestinal disorder characterized by the formation of open sores in the inner lining of the stomach or the proximal part of the duodenum. These ulcers develop when the protective mechanisms of the gastrointestinal mucosa are weakened, allowing gastric acid and the digestive enzyme pepsin to damage the underlying tissues. The stomach normally secretes hydrochloric acid and digestive enzymes to facilitate food digestion. However, the gastric mucosa is protected by several defence mechanisms, including the mucus-bicarbonate barrier, adequate blood supply, prostaglandins and continuous epithelial cell regeneration. Peptic ulcers develop when the balance between aggressive factors and protective mechanisms is disturbed. The two major causes of peptic ulcer disease are infection with *Helicobacter pylori* (*H. pylori*) and prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin, ibuprofen and naproxen.

Other contributing factors include smoking, excessive alcohol consumption, severe physiological stress associated with critical illness and certain medications. Common symptoms include burning or aching pain in the upper abdomen, nausea, bloating, indigestion and loss of appetite. However, some individuals may remain asymptomatic until complications develop.

Early diagnosis and appropriate treatment are essential to prevent complications such as gastrointestinal bleeding, perforation, penetration and gastric outlet obstruction. Diagnosis involves clinical assessment, testing for *H. pylori*

infection and upper gastrointestinal endoscopy when indicated. Treatment generally includes acid-suppressing medications, appropriate antibiotic combinations for *H. pylori* infection and modification of ulcer-causing medications under medical supervision [1].

2. DEFINITION

Peptic ulcer disease is defined as a condition characterized by an open sore or break in the mucosal lining of the upper gastrointestinal tract, most commonly affecting the stomach and duodenum.

The term "peptic" refers to the digestive action of gastric acid and pepsin. These substances play an essential role in digestion, particularly in protein breakdown, but may damage gastrointestinal tissues when the protective mucosal barrier is impaired.

Depending on its anatomical location, a peptic ulcer is classified as either a gastric ulcer or a duodenal ulcer. Both conditions share similar causes and clinical manifestations, although differences may occur in the timing and pattern of abdominal pain [2].

3. EPIDEMIOLOGY

Peptic ulcer disease remains an important gastrointestinal health problem worldwide. Its occurrence varies across geographical regions, age groups and socioeconomic populations.

The global burden of peptic ulcer disease has changed over time because of improvements in sanitation, diagnosis, treatment and the management of *H. pylori* infection. However, it continues to affect individuals in both developed and developing countries.

In India, the prevalence of peptic ulcer disease varies considerably across different populations and geographical regions. Factors contributing to these variations include *H. pylori* infection, NSAID consumption, smoking, socioeconomic conditions, dietary habits and access to healthcare.

Epidemiological studies help identify populations at increased risk and support the development of effective preventive and treatment strategies. Early recognition of major risk factors, particularly *H. pylori* infection and NSAID use, is important in reducing the disease burden [3].

4. ANATOMY AND PHYSIOLOGY OF THE STOMACH

4.1 Anatomy of the stomach

The stomach is a J-shaped, hollow, muscular organ situated mainly in the upper left region of the abdominal cavity, between the oesophagus and duodenum. It temporarily stores food, mixes it with digestive secretions and regulates the passage of partially digested food into the small intestine.

The stomach is divided into four major anatomical regions:

- **Cardia:** The region where the oesophagus opens into the stomach.
- **Fundus:** The dome-shaped upper portion of the stomach that stores swallowed air and food.
- **Body (corpus):** The central and largest part, responsible for food storage, mixing and secretion.
- **Pylorus:** The distal portion that regulates the passage of gastric contents into the duodenum through the pyloric sphincter.

The stomach has two borders known as the lesser curvature and greater curvature. Its inner surface contains folds called rugae, which allow expansion when food enters the stomach.

The stomach wall consists of four principal layers:

1. Mucosa
2. Submucosa
3. Muscularis externa
4. Serosa

The muscularis externa contains three layers of smooth muscle fibres: inner oblique, middle circular and outer longitudinal. These layers facilitate the mixing and movement of food.

4.2 Physiology of the stomach

The stomach performs mechanical and chemical digestion.

Mechanical digestion occurs through muscular contractions that mix and grind food into a semi-liquid substance called chyme.

Chemical digestion occurs through gastric secretions:

- **Hydrochloric acid:** Secreted by parietal cells; creates an acidic environment, activates pepsinogen and helps destroy microorganisms.
- **Pepsinogen:** Secreted by chief cells and converted into active pepsin in the acidic environment.
- **Pepsin:** Helps digest dietary proteins.
- **Intrinsic factor:** Secreted by parietal cells and essential for vitamin B12 absorption.
- **Mucus and bicarbonate:** Protect the gastric mucosa from acid and enzymatic injury.
- Gastric secretion is regulated by neural and hormonal mechanisms involving the vagus nerve, gastrin and histamine.

5. ANATOMY AND PHYSIOLOGY OF THE DUODENUM

5.1 Anatomy of the duodenum

The duodenum is the first and shortest part of the small intestine, measuring approximately 25–30 cm in length. It forms a C-shaped curve around the head of the pancreas and connects the stomach to the jejunum.

It is divided into four parts:

- **Superior part:** Also known as the duodenal bulb, beginning at the pylorus. It is a common site for duodenal ulcers.
- **Descending part:** Receives bile and pancreatic secretions through the major duodenal papilla.
- **Horizontal part:** Extends horizontally across the abdomen.
- **Ascending part:** Continues upward and joins the jejunum at the duodenojejunal flexure.

The major duodenal papilla is the opening through which bile and pancreatic secretions enter the duodenum. These secretions play an important role in digestion [4].

5.2 Physiology of the duodenum

The duodenum receives acidic chyme from the stomach. Pancreatic bicarbonate and alkaline secretions from duodenal glands help neutralize gastric acid and protect the intestinal mucosa.

Bile helps emulsify fats, while pancreatic enzymes such as trypsin, lipase and amylase facilitate the digestion of proteins, fats and carbohydrates.

The duodenum also releases important digestive hormones:

- **Cholecystokinin (CCK):** Stimulates gallbladder contraction and pancreatic enzyme secretion in response to fats and proteins.
- **Secretin:** Stimulates pancreatic bicarbonate secretion in response to acidic chyme entering the duodenum.

The duodenum is also an important site for the absorption of iron, calcium and other nutrients.

6. TYPES OF PEPTIC ULCERS

6.1 Gastric ulcers

A gastric ulcer is an open sore that develops in the inner lining of the stomach due to damage to the protective mucosal barrier.

The major causes include *H. pylori* infection and prolonged NSAID use. Gastric ulcer pain may worsen shortly after eating, although the pattern varies between individuals.

Common symptoms include:

- Burning or aching upper abdominal pain.
- Nausea and vomiting.
- Bloating and indigestion.
- Early satiety.
- Loss of appetite.
- Unexplained weight loss.

Complications include gastrointestinal bleeding and perforation. Gastric ulcers require appropriate evaluation, including biopsy when indicated, to exclude gastric malignancy [5].

6.2 Duodenal ulcers

A duodenal ulcer is an open sore in the mucosal lining of the duodenum, most commonly occurring in its first part.

The major causes include *H. pylori* infection and NSAID use. Pain may occur when the stomach is empty, between meals or during the night. It may temporarily improve after eating.

Other contributing factors include smoking and excessive alcohol consumption.

A rare cause is Zollinger-Ellison syndrome, in which gastrin-producing tumours cause excessive gastric acid secretion, resulting in recurrent or multiple ulcers.

Common symptoms include burning or gnawing pain in the upper abdomen, nausea and bloating.

6.3 Classification according to cause

Peptic ulcers may also be classified according to their underlying causes:

- **H. pylori-associated ulcers:** Develop due to bacterial infection, chronic inflammation and disruption of mucosal protection.
- **NSAID-induced ulcers:** Occur due to reduced prostaglandin production and impaired mucosal defence.
- **Stress-related mucosal ulcers:** Develop in critically ill patients due to severe physiological stress, impaired mucosal blood flow and disruption of protective mechanisms.

7. ETIOLOGY AND RISK FACTORS

Peptic ulcer disease develops due to an imbalance between aggressive factors, such as gastric acid and pepsin, and protective mechanisms of the gastrointestinal mucosa.

7.1 Helicobacter pylori infection

H. pylori is a spiral-shaped, gram-negative bacterium that colonizes the gastric mucosa. It produces chronic inflammation and weakens the protective mucosal barrier.

The infection may alter gastric acid regulation and increase susceptibility to tissue injury, resulting in gastric or duodenal ulcer formation.

Identification and eradication of *H. pylori* are important components of peptic ulcer management.

7.2 Use of NSAIDs

NSAIDs are commonly used medications for relieving pain, inflammation and fever.

Examples include:

- Aspirin
- Ibuprofen
- Naproxen
- Diclofenac

These medications inhibit cyclooxygenase enzymes and reduce prostaglandin production. Prostaglandins normally promote mucus and bicarbonate secretion, maintain mucosal blood flow and support epithelial repair.

Their reduction increases the susceptibility of the gastrointestinal mucosa to acid-related injury.

7.3 Smoking and alcohol

Smoking may impair mucosal blood flow, interfere with tissue repair and delay ulcer healing. It is also associated with an increased risk of ulcer recurrence.

Excessive alcohol consumption can irritate the gastrointestinal mucosa and worsen existing symptoms.

7.4 Physical and emotional stress

Severe physiological stress associated with major surgery, burns, trauma, sepsis and critical illness may cause stress-related mucosal injury.

This condition is different from ordinary emotional stress. Psychological stress may influence symptom perception and health-related behaviours but is not considered a major direct cause of most peptic ulcers.

7.5 Diet and eating habits

Certain foods, beverages and irregular eating patterns may aggravate symptoms in susceptible individuals. However, specific foods are not established primary causes of peptic ulcer disease.

A balanced diet and regular eating habits may improve general digestive health, but treatment of the underlying cause is essential for ulcer healing.

7.6 Other risk factors

Other factors that may increase the risk of peptic ulcer disease include:

- Older age.
- Previous history of peptic ulcers.
- Family history of ulcer disease.
- Long-term NSAID use.
- Concurrent use of medications that increase bleeding risk.
- Certain rare conditions associated with excessive gastric acid secretion [6].

8. PATHOPHYSIOLOGY

Peptic ulcer disease develops when the protective mechanisms of the stomach and duodenum become insufficient to prevent injury from gastric acid and pepsin.

Under normal physiological conditions, the gastrointestinal mucosa is protected by mucus, bicarbonate, adequate blood supply, prostaglandins and continuous epithelial cell regeneration.

When *H. pylori* infection occurs, the bacterium colonizes the gastric mucosa and produces chronic inflammation. It disrupts the protective mucosal barrier and alters normal gastric physiology, increasing the risk of acid-related tissue injury.

Similarly, NSAIDs inhibit cyclooxygenase enzymes and reduce prostaglandin synthesis. This results in decreased mucus and bicarbonate secretion, reduced mucosal blood flow and impaired epithelial repair.

As protective mechanisms become weakened, gastric acid and pepsin damage the underlying tissues. Continued injury leads to inflammation, erosion and eventually ulcer formation.

The severity of the disease depends on the depth, location and extent of mucosal damage. If untreated, the ulcer may progress and cause bleeding, perforation, penetration or gastric outlet obstruction.

9. SIGNS AND SYMPTOMS

The clinical manifestations of peptic ulcer disease vary depending on the location, severity and complications of the ulcer.

The most common symptom is burning or aching pain in the upper abdomen.

Other signs and symptoms include:

- Burning or gnawing epigastric pain.

- Abdominal bloating.
- Belching and indigestion.
- Nausea and vomiting.
- Early satiety.
- Loss of appetite.
- Unexplained weight loss.
- Nocturnal abdominal discomfort.
- Black, tarry stools in cases of gastrointestinal bleeding.
- Vomiting blood in severe cases.

Some individuals may remain asymptomatic until a complication develops.
Vomiting blood, black stools accompanied by weakness or dizziness, fainting and sudden severe abdominal pain require immediate medical attention.

10. COMPLICATIONS

Untreated or severe peptic ulcer disease may lead to serious complications.

10.1 Haemorrhage (Bleeding)

Gastrointestinal bleeding occurs when an ulcer damages an underlying blood vessel.
Clinical manifestations include:

- Vomiting fresh blood (haematemesis).
- Vomiting material resembling coffee grounds.
- Passing black, tarry stools (melena).
- Weakness and dizziness.
- Pallor and hypotension.
- Hypovolemic shock in severe cases.

Severe gastrointestinal bleeding requires emergency medical treatment.

10.2 Perforation

Perforation occurs when an ulcer extends through the entire thickness of the stomach or duodenal wall.
It allows gastrointestinal contents to enter the peritoneal cavity, resulting in peritonitis.
Clinical manifestations include sudden severe abdominal pain, abdominal rigidity, tenderness and signs of shock.
Perforation is a medical emergency requiring immediate intervention.

10.3 Penetration

Penetration occurs when an ulcer extends into an adjacent organ without freely opening into the peritoneal cavity.
A posterior duodenal ulcer may penetrate the pancreas, causing persistent abdominal pain that may radiate towards the back.

10.4 Gastric outlet obstruction

Gastric outlet obstruction occurs when inflammation, oedema or scar formation narrows the passage between the stomach and duodenum.
Symptoms include:

- Repeated vomiting.
- Abdominal fullness.
- Early satiety.
- Dehydration.
- Electrolyte imbalance.
- Weight loss.

10.5 Other complications

Other complications include chronic blood loss, iron-deficiency anaemia and fibrosis resulting in narrowing of the gastrointestinal passage.
Gastric ulcers may occasionally resemble or coexist with gastric malignancy, making appropriate investigation and follow-up important.

11. DIAGNOSTIC EVALUATION

Diagnosis of peptic ulcer disease involves clinical history, physical examination and appropriate investigations.
The healthcare professional assesses the location and duration of abdominal pain, associated symptoms, previous ulcer history, medication use, smoking and alcohol consumption.
Physical examination may reveal epigastric tenderness. Signs of bleeding, perforation or obstruction require urgent evaluation.

11.1 Laboratory investigations

Laboratory investigations help assess the patient's general condition and identify complications.

These include:

- Complete blood count to detect anaemia.
- Stool antigen testing for *H. pylori* infection.
- Urea breath test for detecting active *H. pylori* infection.
- Stool examination for occult blood when indicated.
- Other blood investigations depending on the patient's clinical condition.

11.2 Upper gastrointestinal endoscopy

Upper gastrointestinal endoscopy, also called oesophagogastroduodenoscopy (OGD or EGD), is an important investigation for diagnosing peptic ulcer disease.

It involves passing a thin, flexible tube equipped with a camera through the mouth to examine the oesophagus, stomach and duodenum.

Endoscopy helps identify the location, size and appearance of ulcers. Biopsy samples may be collected when necessary to investigate gastric malignancy or detect *H. pylori* infection.

12. TREATMENT AND MANAGEMENT

The primary objectives of treatment are to relieve symptoms, promote ulcer healing, eliminate the underlying cause, prevent recurrence and avoid complications.

Treatment depends on the cause, severity and clinical condition of the patient.

12.1 Acid-suppression therapy

Acid-suppressing medications reduce gastric acid secretion and promote healing of the ulcer.

The commonly used medications include:

- Proton-pump inhibitors (PPIs), such as omeprazole, pantoprazole and esomeprazole.
- Histamine-2 receptor antagonists (H2 blockers), such as famotidine.

The duration of treatment depends on ulcer location, severity and underlying cause.

12.2 Treatment of H. pylori infection

When *H. pylori* infection is detected, eradication therapy is prescribed.

Treatment generally involves a combination of acid-suppressing medication and antibiotics. Bismuth-containing quadruple therapy is an important recommended option, depending on local antibiotic resistance patterns and patient factors.

Patients should complete the prescribed treatment. A follow-up test should be performed to confirm eradication, generally at least four weeks after completing antibiotics, with appropriate temporary withholding of PPIs before testing as advised by the clinician.

12.3 Gastrointestinal protectants

Gastrointestinal protective medications help protect the gastric mucosa.

Examples include:

- Sucralfate.
- Bismuth compounds.

These medications may be used in selected patients depending on the cause and treatment requirements.

12.4 Prostaglandin analogues

Misoprostol is a synthetic prostaglandin analogue that helps protect the gastric mucosa by increasing mucus and bicarbonate secretion.

It may be prescribed for selected patients at risk of NSAID-induced ulcers.

However, it is contraindicated during pregnancy when used for ulcer prevention because it can cause uterine contractions and pregnancy loss.

12.5 Lifestyle modification and prevention

Lifestyle modifications help support ulcer healing and reduce recurrence.

Recommended measures include:

- Avoid smoking.
- Avoid excessive alcohol consumption.
- Avoid unnecessary use of NSAIDs.
- Consult a healthcare professional before stopping prescribed medications.
- Maintain a balanced diet.
- Avoid foods that consistently aggravate individual symptoms.
- Follow the prescribed treatment regimen.
- Attend recommended follow-up appointments [7].

13. CONCLUSION

Peptic ulcer disease is an important gastrointestinal disorder characterized by the development of open sores in the mucosal lining of the stomach or duodenum. The two principal causes are *Helicobacter pylori* infection and prolonged

use of non-steroidal anti-inflammatory drugs. Other contributing factors include smoking, excessive alcohol consumption and severe physiological stress associated with critical illness.

The disease develops when aggressive factors, particularly gastric acid and pepsin, overcome the protective mechanisms of the gastrointestinal mucosa. Common clinical manifestations include epigastric pain, nausea, bloating and indigestion. Serious complications may include gastrointestinal bleeding, perforation, penetration and gastric outlet obstruction.

Early diagnosis through clinical assessment, *H. pylori* testing and upper gastrointestinal endoscopy is essential for effective management. Treatment includes acid-suppressing medications, eradication of *H. pylori* infection, appropriate gastrointestinal protective agents and modification of ulcer-causing medications.

With timely diagnosis, appropriate medical treatment and adherence to prescribed therapy, most peptic ulcers can heal successfully. Health education, awareness of risk factors and preventive measures play an important role in reducing disease recurrence and complications.

14. FINANCIAL SUPPORT

Nil

15. DECLARATION COMPETING INTEREST

Not Declared

16. ACKNOWLEDGEMENT

None

17. INFORM CONSENT AND ETHICAL CONSIDERATION

Not Applicable

18. REFERENCES

1. Manu P, Rogozea LM, Sandor V, Dumitrascu DL. Pharmacological management of peptic ulcer: A century of expert opinions. *American Journal of Therapeutics*. 2021.
2. Altwejry AS, et al. An overview on peptic ulcer disease, diagnosis and management approach. *Pharmacophore*. 2020.
3. Joo MK, et al. Clinical guidelines for drug-related peptic ulcer. *Gut and Liver*. 2020.
4. Salari N, et al. The global prevalence of peptic ulcer in the world: A systematic review and meta-analysis. *Indian Journal of Surgery*. 2022.
5. Kuna L, et al. Peptic ulcer disease: A brief review of conventional therapy and herbal treatment options. *Journal of Clinical Medicine*. 2019.
6. Srivastav Y, Kumar V, Srivastava Y, Kumar M. Peptic ulcer disease (PUD), diagnosis, and current medication-based management options: Schematic overview. *Journal of Advances in Medical and Pharmaceutical Sciences*. 2023.
7. Prayoga DK, Aulifa DL, Budiman A, Levita J. Plants with anti-ulcer activity and mechanism: A review of preclinical and clinical studies. *Drug Design, Development and Therapy*. 2024.