

# “Exploring the Therapeutic Potential of Herbal Candy in Alleviating Peptic Ulcers: A Review of Mechanisms, Efficacy, and Safety”

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## ABSTRACT-

Peptic ulcer disease is a chronic disorder that affects around 10% of the global population. The development of peptic ulcers requires the presence of gastric juice pH and the reduction of mucosal defenses. Peptic ulcer disease is a common condition treated by both gastroenterologists and primary care physicians (PUD). A number of symptoms, including weight loss, nausea, vomiting, bleeding, or perforation with a complex medical condition, can be indicative of peptic ulcer disease. Comprehending the mechanisms and susceptibility variables that lead to PUD formation is crucial to understanding the techniques employed in diagnostic and treatment methods.

**KEYWORDS-** Peptic ulcer disease, herbal treatment, Helicobacter pylori infection.

## I. INTRODUCTION-

The peptic ulcer disease (PUD) is one of the most dangerous diseases found in the stomach, called as a gastric ulcer. The second is duodenal ulcer, a type of peptic ulcer that develops in the first part of the small intestine (duodenum). And the third is esophageal ulcer, which occurs in the lower part of our esophagus. Mostly, the peptic ulcer is caused by infection with the bacterium *Helicobacter pylori* (*H. pylori*) and by the use of long-term (NSAIDs) nonsteroidal anti-inflammatory drugs such as – Ibuprofen and Naproxen sodium and less commonly causes include Zollinger-Elison syndrome, Crohn’s disease, tobacco, smoking and stress. Peptic ulcer disease is a condition in which the painful sores form or develop in the inner lining of the stomach or small intestine. Peptic ulcer occurs when the people who frequently take pain relievers are more likely to develop ulcers. It is estimated that the *H. pylori* infection is developing nation is likely to occur in children by age 10.

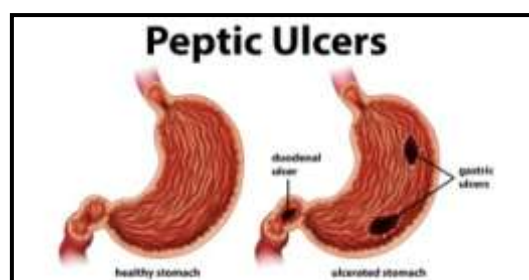


Fig.- 1. (Comparison between healthy stomach and ulcerated stomach)

## HISTORY OF PEPTIC ULCER –

The history of the research on peptic ulcer disease (PUD) is characterized by a premature abandonment of the bacterial hypothesis, which subsequently had its comeback, leading to the discovery of *Helicobacter pylori*, the major cause of the disease.<sup>[1]</sup>

The first perforated peptic ulcer was described in 1670, the first identified as causing peptic ulcers was *H. pylori* by Barry Marshall and Robin Warren in the late 20<sup>th</sup> century. They received the Nobel Prize for this discovery in 2005.

## ETIOLOGY-

After increasing steeply at the beginning of the twentieth century, ulcer perforation incidence during the last decades has declined in the young and in men, and it has risen among the elderly and in women.<sup>[2]</sup>

Nowadays the most important aim in peptic ulcer treatment is the *H. pylori* eradication. Therapy with two antibiotics and a proton pump inhibitor eradicates the bacteria, treats the ulceration and lowers the number of ulcer recurrences. In non-infected *H. pylori* ulcers or in a long-term treatment, proton pump inhibitors and H<sub>2</sub>-inhibitors are effective as well in gastroprotective therapy.<sup>[3]</sup>

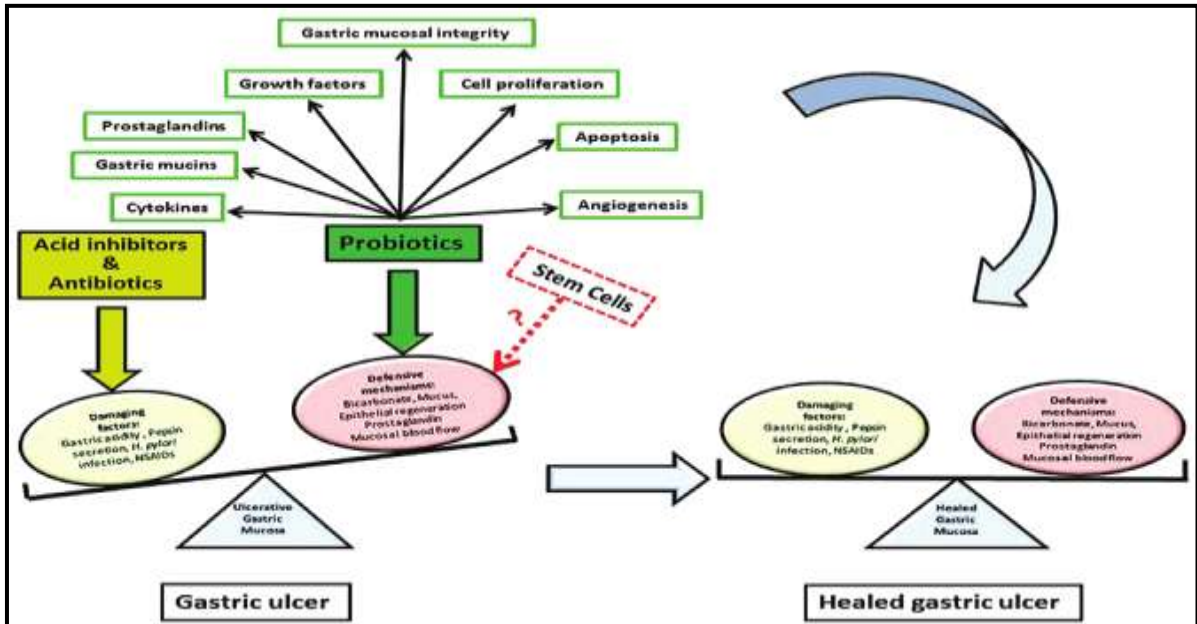


Fig.- 2. (Differences between the aggressive and defensive factor)

In children peptic ulcer disease (PUD) is relatively rare as compared with adults. This study aimed to assess the clinical and histological characteristics, etiology and treatment of PUD in children.<sup>[4]</sup>

The peptic ulcer disease (PUD) develops only in presence of acid environment. Excess of gastric acid not necessary for ulcer development.

Person with a gastric ulcer has normal gastric acidity compared with person with a duodenal ulcer.

Pepsinogen is activated to pepsin in presence of HCl.

Secretion of HCl by parietal cells has a pH of 0.8. pH reaches 2 to 3 after mixing with stomach contents.

**PATHOPHYSIOLOGY –**

Peptic ulcer disease (PUD) caused due to imbalance between the aggressive and the defensive factors.

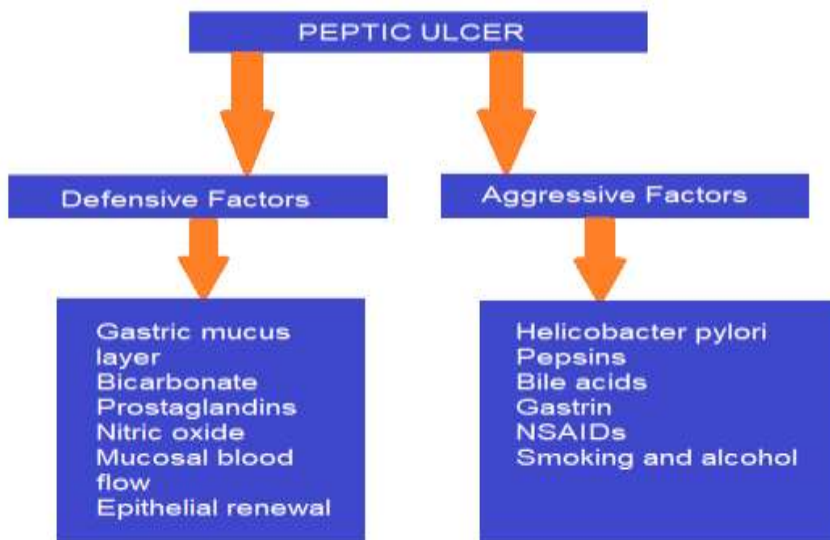


Fig.- 3. (Pathophysiology of peptic ulcer )

**CAUSES-AGGRESSIVE MECHANISM –**

- 1. Helicobacter pylori (H.pylori)** - It is a gram negative bacteria which is found in gastric and duodenal mucosa.
  - Now H. pylori have high urea activity which produce ammonia which further elevates the local pH.
  - Due to this local region of mucosa is damaged by high alkalinity.
  - Which helps in the development of peptic ulcer.
- 2. NSAIDs** – Non steroidal drugs like- Aspirin, Naproxen, Ibuprofen etc. can irritate or inflame the lining of small intestine. Which can cause ulcer so that's why we can avoid long term use of NSAIDs.
 

the common side effects of NSAIDs can induce stomach upset, gastrointestinal bleeding, ulcer, especially with high dose and long term use. They can also affect the blood pressure and kidney function.
- 3. Genetics** – It may also be involved. (eg- Zollinger-Elison syndrome) it is a genetic disorder responsible for some ulcer.
  - **Zollinger-Elison syndrome** – It is a rare condition in which one or more tumors form in pancreas or in the upper part of small intestine.
  - These tumors known as gastrinomas which secrete gastric hormone in large amounts which produce HCl and cause ulcer.
- 4. Smoking and Alcohol** – These are not directly involved but they can increase the chances of

ulcer development. Calcium, Alcohol, Coffee and fat food can also influence HCl secretion.

**DEFENSIVE MECHANISM –**

- 1. Gastric mucus layer:** - A thick, sticky layer of gastric mucus covers the GIT, shielding it from pepsin and HCl.
- 2. Bicarbonate** - Bicarbonate ions released by the stomach's pyloric region's mucosal cells, where 6 to 7 is the pH. Bicarbonate, an alkaline chemical that balances stomach acid, is secreted by the inner lining of the duodenum and stomach. This neutralization helps keep the stomach's pH steady and stops it from becoming too acidic.
- 3. Prostaglandins** - The body naturally produces prostaglandins, which are involved in the regulation of multiple processes, one of which is the protection of the stomach lining. They aid in promoting blood flow to the stomach lining, mucus and bicarbonate generation.
- 4. Blood flow** - The health and repair of the stomach lining depend on adequate blood flow to it. Blood supports the duodenum and stomach's cells' capacity to repair and maintain their integrity by supplying them with nutrition and oxygen.

These protective elements aid in the lining of the stomach and duodenum when they are working correctly. But when this equilibrium is upset by things like H. pylori infection or taking NSAIDs, the protective mechanism gets weakened and peptic ulcers can occur.

**SIGN & SYMPTOMS OF PEPTIC ULCER–**



**Fig.- 4. (Sign & symptoms of peptic ulcer)**

- Pain
- Heart burn
- Upset Stomach
- Bloating
- Anemia
- Severe pain in the mid of upper abdomen
- Loss of appetite
- Vomiting blood (that can look like “coffee-grounds”)
- Dark blood in the stools
- Nausea
- Vomiting
- Weight loss

#### COMPLICATION OF (PUD) –

There are four major complications of peptic ulcer disease (PUD) : bleeding, perforation, penetration and obstruction. Complication can occur in patients with peptic ulcer of any etiology. The dramatic decline in the prevalence of *Helicobacter pylori* ; an increase use of nonsteroidal anti-inflammatory drugs, and an increase rate of ulcer complication related to such drug use, especially in the elderly.<sup>[5]</sup>

- **Hemorrhage**
  - Blood vessels damaged as ulcer erodes into the muscles of stomach or duodenal wall.
  - Coffee ground vomitus or occult blood in tarry stools.
- **Perforation**
  - An ulcer can erode through the entire wall.
  - Bacteria and partially digested food spill into peritoneum = peritonitis.
- **Narrowing & obstruction ( pyloric)**
  - Swelling and scarring can cause obstruction of food leaving stomach = repeated vomiting.

#### RISK FACTORS OF (PUD) –

It is very important to identify the high risk group for PUD with respect to bacterial and host factors. We all know very well that the main risk factors of PUD is *Helicobacter pylori*. The *Helicobacter pylori* plays an important role in the pathogenesis of peptic ulcer disease (PUD). Several factors have been proposed as possible *H.pylori* virulence determinants; for example, bacterial adhesins and gastric inflammation factors are associated with an increased risk of PUD. However, differences in bacterial virulence factors alone cannot explain the opposite ends of the PUD disease spectrum, that is duodenal and gastric ulcers; presumably, both bacterial and host factors contribute to the differential response. Carriers of

the high-producer alleles of the pro-inflammatory cytokines IL-1B, IL-6, IL-8, IL-10, and TNF- $\alpha$  who also carry low-producer allele of anti-inflammatory cytokines have severe gastric mucosal inflammation, whereas carriers of the alternative alleles have mild inflammation. Recent reports have suggested that the PSCA and CYP2C19 ultra-rapid metabolizer genotypes are also associated with PUD.<sup>[6]</sup>

#### DIAGNOSIS OF (PUD) –

Diagnosis is the main source for the prevention of any disease and disorders. It plays an important role. If we have any ulcer and we use or taking any NSAIDs it may have greater chances to develop the ulcer, so we can use one of these tests for diagnosis:

- H.Pylori tests
  - Upper Endoscopy tests
  - Biopsy
  - Stool antigen tests
  - Urea Breath test
1. **H.Pylori test** -The H. Pylori test is now widely used, and your doctor will tailor your treatment to get rid of the bacteria and minimize your symptoms. The most commonly utilized test is the breathalyzer test. It's the simplest way to identify H. pylori, but your doctor could also use an upper endoscopy sample collection procedure, a stool or blood test, or another method.
  2. **Endoscopy** –The most crucial test for the diagnosis of PUD is endoscopy. The physician may advise an upper endoscopy test to identify the ulcer if the patient exhibits any serious symptoms. In order to check for anomalies, the doctor will introduce an endoscope—which resembles a tiny, illuminated tube with a tiny camera—through your throat and into your stomach during this procedure.
  3. **Biopsy** –Autopsy A stomach biopsy, also known as a gastric biopsy test, is a diagnostic technique for stomach ulcers. During this process, a sample of stomach tissue is taken. It is then sent to a testing lab where scientists examine it to look for potentially hazardous bacteria and other organisms.
  4. **Stool antigen test** – The most used test for finding H. pylori is this one. This test looks for proteins, or antigens, linked to an H. pylori infection in the feces.

5. **Stool PCR test** –The stool polymerase chain reaction (PCR) test is another name for this laboratory test. It is frequently employed to identify *H. pylori* infection in stool. In addition, this test looks for mutations that can make an individual resistant to the medications we use to treat *H. pylori*. In comparison to the stool antigen test, this test is more expensive and not always available at medical centers.

#### TREATMENT OF (PUD) –

For the treatment of PUD we usually includes medication to decrease the production of acid in stomach . If it is caused by bacteria, antibiotics may be required.

#### ALOE VERA –



( Fig. – 5. Aloe vera barbadensis )

Synonyms : Aloe, Musabber, Kumara.  
Botanical name : Aloe barbadensis miller.  
Family : Liliaceae

The main enzymes found in Aloe vera include Amylase (breaks down sugars and starches), Bradykinase (stimulates immune system, analgesic, anti-inflammatory), Catalase (prevents accumulation of water in the body), Cellulase (aids digestion - cellulose), Lipase (aids digestion - fats), Oxidase, Alkaline Phosphatase, Proteolytiase (hydrolyses proteins into their constituent elements), Creatine Phosphokinase (aids metabolism), and Carboxypeptidase. The body receives what it needs to function properly thanks to the healing powers of aloe vera and its synergistic action. The antioxidant-rich plant aloe vera has zinc and selenium as well as vitamins A, C, and E. Antioxidants support a stronger immune system and fight against free radicals in the body.

#### MENTHOL –



( Fig. – 6. Peppermint )

Synonyms – Camphor, Peppermint.  
Botanical name : *Mentha piperita* L.  
Family – Lamiaceae.

By increasing the activities of the antioxidant GSH and the enzymes GSH-Px and GR in the menthol-treated group compared to the vehicle-treated group, menthol revealed an antioxidant activity. Menthol showed immunomodulatory effects; it decreased cytokine levels in the stomach tissue, decreased pro-inflammatory cytokines TNF- and IL-6, and boosted anti-inflammatory cytokine IL-1 levels.<sup>[7]</sup>

#### GINGER-



( Fig. – 7. Zingiber officinale )

Synonyms – Zing.  
Botanical name : *Zingiber officinale*.  
Family – Zingiberaceae.

Ginger (*Zingiber officinale*) is a herbaceous perennial plant in the Zingiberaceae family. It is extensively accessible and utilized in Asian countries as a traditional remedy for a range of conditions, including fever, rheumatic disorders,

nausea, vomiting, and colds. The antibacterial, antioxidant, and anti-inflammatory properties of ginger and its active components have been demonstrated by several studies. Ginger extract showed its protective effects in HepG2 cell lines exposed to mycotoxin by increasing the activities of antioxidant enzymes and reducing lipid peroxidation. Peripheral blood mononuclear cells from patients with type 2 diabetes who took supplements containing ginger powder for ten weeks showed a decrease in the expression of nuclear factor kappa light chain enhancer of activated B cells (NF- $\kappa$ B). In many animals suffering from acute or chronic.<sup>[8]</sup>

#### LIQUORICE –



( Fig. – 8. *Glycyrrhiza glabra* )

Synonyms – Licorice, Glycyrrhiza.  
Botanical name : *Glycyrrhiza glabra*.  
Family – Leguminaceae.

Numerous flavonoids, alkaloids, and other chemical components are present in *G. glabra*. Uncertainty surrounds the components that provide *G. glabra* its antiulcer action. Different plants include flavonoids that are proven to lessen the development of stomach ulcers. As a result, it is believed that flavonoids may help explain at least some of the plants' antiulcer properties. In addition to flavonoids, licorice also contains steroids such beta-sitosterol, which is believed to lessen the occurrence of gastric ulcers, and glycyrrhizic acid, which has antiulcer benefits for the stomach.<sup>[9]</sup>

#### CINNAMON –



( Fig.- 9. *Cinnamomum verum* )

Synonyms – Dalchini, Henna.  
Botanical name : *Cinnamomum verum*.  
Family – Luarels.

Due to its numerous health advantages, delicious flavor, and ability to preserve food, cinnamon (*Cinnamomum cassia*), of the Lauraceae family, is a popular spice all over the world. According to Jayaprakasha et al. (2002), the most popular chemical components of cinnamon include the volatile oil (cinnamaldehyde, eugenol, cinnamic acid, and weitherhin), mucilage, diterpenes, and proanthocyanidins. Cinnamon has properties that may be helpful adjuncts in lowering the risk of cardiovascular disease, including chemoprevention, antispasmodic, sedative, hypothermic, choleric, antibacterial, antifungal, antipyretic, antiviral, antiplatelet, antiseptic, lipolytic, anesthetic, cytotoxic, anodyne, and immune system stimulation.<sup>[10]</sup>

#### FENNAL –



( Fig. – 10. *Foeniculum vulgare* )

Synonyms – Shauf.

Botanical name : *Foeniculum vulgare*.

Family –Umbellifers.

*Foeniculum vulgare* seeds have been discovered to contain a variety of phytochemicals, including quercetin, coumaric acid, ferulic acid, and chlorogenic acid, as well as minerals and vitamins like iron, potassium, phosphorus, sodium, calcium, riboflavin, niacin, and ascorbic acid. Fennel's distinctive essential oil endows the plants with a range of medicinal potentials. Hydrocarbon molecules make up essential oils, like all organic chemicals, and they are further classified into distinct classes based on structural differences like as oxygenated molecules known as terpene hydrocarbons, Aldehydes, ketones, and other compounds . It discovered that fennel essential oil contains among the more than 30 different types of chemicals, most Anethole (50-80% prevalence), fenchone (8-10%), limonene (5%).<sup>[11]</sup>

FENUGREEK-



( Fig. – 11. *Trigonella foenum-graecum* )

Synonyms – Methi.

Botanical name : *Trigonella foenum-graecum*.

Family – Fabaceae.

Fenugreek's gel fraction could protect against stomach lesions. The presence of flavonoids and polysaccharides in the gel component of fenugreek may be the cause of the herb's usefulness for protecting the stomach. Fenugreek's anti-secretory properties may also work as a barrier against ulcers.

CARDAMOMS –



(Fig. – 12. *Elettaria cardamomum* )

Synonyms – Elaichi.

Botanical name : *Elettaria cardamomum*.

Family – Ginger family (Zingiberaceae).

*Helicobacter pylori*, a pathogen associated with the formation of the majority of stomach ulcer problems, may be defended against by cardamom. Cardamom is an all-natural remedy for acid because it is alkaline as well. Cardamom, like its cousin ginger, may aid in digestive issues. Possibly Beneficial for Digestive Issues, Including Ulcers

It is frequently combined with other therapeutic spices to treat discomfort, motion sickness, and vomiting. Cardamom's potential capacity to treat ulcers has garnered the greatest attention in terms of its potential to ease stomach discomfort.<sup>[12]</sup>

TULSI –



( Fig. – 13. *Ocimum sanctum* )

Synonyms – Tulsi.

Botanical name : Ocimum sanctum.

Family – Lamiaceae.

Holy basil, sometimes referred to as tulsi, has health-improving qualities. It is regarded as a tonic for greater fitness and health. Due to its abundance in essential oils, phytonutrients, vitamin C, and vitamin A, tulsi is a powerful antioxidant that helps to prevent the body from being harmed by free radicals. There are countless health advantages, such as curing respiratory issues, lowering blood pressure, managing high glucose levels, and enhancing heart and cholesterol health. Bronchitis, asthma, influenza, coughing, and colds can all be treated using a decoction made from tulsi leaves, honey, and ginger. Tulsi leaves can also assist you in fighting ulcers organically.

## II. CONCLUSION –

For the adult or old age patient who are taking drugs like – Aspirin and NSAIDs, and regularly use of PPIs or H2 receptors antagonists should be considered for the protection and to reduce the development of PUD. H. pylori eradication has been confirmed.

Clarithromycin act at 50S ribosomal unit of H. pylori to block the protein synthesis in bacteria.<sup>[13]</sup> clarithromycin is cause resistant to penetrates in high concentration into gastric tissue and show higher antimicrobial effect against H. pylori.

Clarithromycin has a stronger antibacterial impact against H. pylori and is less likely to pierce stomach tissue at high concentrations. Not only in underdeveloped countries, but all throughout the world, herbal medicine is utilized. Over time, there has been an increase in interest in the use of herbal treatments worldwide. The market for plant-based products has increased significantly as a result of the advantages that herbal medicine has over synthetic medications, including being more expensive and having more severe side effects. The growing field of herbal medicine has attracted pharmaceutical companies, which has spurred studies on clinical trials and scientific validation of herbal medicines. Numerous programs have previously been established to investigate the effectiveness and safety of herbal medications, as initially recommended by WHO guidelines for evaluating herbal medicines. These suggestions have shown to be helpful.

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