Peptic Ulcer Disease; Stomach And Gastric Ulcers, A Concise Review

Abstract:

The most prevalent condition affecting the stomach and duodenum is peptic ulcer disease (PUD), which is linked to Helicobacter pylori (H. pylori) infection. Esophageal, duodenal, and stomach ulcers are all parts of peptic ulcer disease (PUD). Epigastric discomfort is the PUD symptom that commonly occurs. Proton Pump Inhibitors (PPI), Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), and antibiotics are widely used to treat PUD, which is caused by an imbalance between offensive and defensive forces. Abdominal discomfort, nausea, vomiting, weight loss, and bleeding or perforation with the complicated disease areonly a few of the symptoms of peptic ulcer disease. Understanding the methodology behind diagnosis and treatment options requires identifying the risk factors and mechanisms that result in PUD. The purpose of this review is to provide a concise summary of key ideas and recent findings in the field of peptic ulcer disease management, etiology, pathophysiology, and epidemiology.

1. Introduction:

A peptic ulcer or stomach ulcer is defined as deep damage of the mucosa or lining of the stomach and/or duodenum that extends past the muscular mucosa, specifically to the muscle layer, as a result of the production of gastric acid in the environment. The use of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), which naturally include the Acetylsalicylic acid (ASA) , and chronic Helicobacter-pylori (H. pylori) infection are the two most common etiological antecedents. There are specific, less common, and thought out combined antecedents that can result in a peptic ulcer PU, accounting for less than 5% of occurrences. One of these is Zollinger-Ellison syndrome (ZES), also known as gastronomy. ZES is a neuroendocrine tumor that is hyperactive and gastrinsecretory and is frequently seen near the head of the pancreas or in the duodenal wall [1]. Acid-induced lesions called peptic ulcers affect the stomach and duodenum

and are distinguished by denuded mucosa with the defect extending into the submucosa or muscular is propria. Erosion is the term for lesions that do not extend to this depth [2].Erosions are larger than 5 mm in diameter and represent a breach in the mucosal barrier of the stomach lining that penetrates the muscularis mucosa. An important fact to consider is that this illness process can be both prevented and treated. Depending on the cause of the patient's stomach ulcer, numerous treatment options may be available. The stomach mucosa is naturally shielded by the body from the potentially dangerous gastric lumen's acidic environment. When these defenses are compromised, the stomach mucosa may undergo changes that finally result in erosion and ulceration. Prostaglandins, mucus, growth factors, and proper blood flow all work to protect the gastric mucosa. Smoking, hydrochloric acid, ischemia, NSAIDs, hypoxia, alcohol, and Helicobacter pylori (H. pylori) are known to harm this barrier [3].

The risk of numerous gastroduodenal illnesses, including gastric atrophy with intestinal metaplasia, peptic ulcer disease (PUD), ulcer bleeding, and gastric cancer, is said to increase with age [4]. Unknown antecedents or painful sores that appear to develop spontaneously are used to define the unknown origin of peptic ulcer illnesses. Acid-induced lesions known as peptic ulcers cause denuded mucosa in the stomach and duodenum, with the defect extending into the submucosa or muscularis propria. Erosion is the term for lesions that do not extend to this depth [5]. One of the most common diseases in the globe, PUD has contributed significantly to both morbidity and mortality through some of its consequences. The prevalence of duodenal and gastric ulcers varies across the global population, and the average age of those who have the condition is between 30 and 60 years old, while it can strike at any age. Among Africa, duodenal ulcers are uncommon in black individuals, but in the United States, all individuals experience the same prevalence of duodenal ulcers. Additionally, males are more likely than females to get duodenal ulcers [6-8].

The causes of peptic ulcers might be complicated. Alcohol and nicotine, for example, can prevent or lessen the release of mucus and bicarbonate, which increases the discharge of acid. Children of parents with duodenal ulcers are three times more likely to develop ulcers than the general population [9], suggesting that genetic factors can have an impact. The discovery of H. pylori and ulcers linked to long-term anti-inflammatory drug usage has improved our understanding of the circumstances surrounding the development of peptic ulcers [10].

2. Epidemiology:

In 1990, 10% of Americans reported having peptic ulcer disease, and there are over 500,000 new cases identified each year in the United States [4]. However, globally, the risk of mortality and the requirement for hospitalization as a result of PUD has been declining. Due to treatment and better hygiene, H. pylori infections have certainly decreased, which is the most likely secondary cause of PUD. . This trend may also be partially explained by rising prescription and over-the-counter use of acid-suppressing pharmaceuticals as well as increased caution when using non-steroidal anti-inflammatory drugs (NSAIDs)[3, 11, 12]. Peptic ulcer disease, which includes gastric ulcers, has a lifetime prevalence of 5–10% of individuals, which is probably an underestimate of the condition because some people may experience no symptoms. According to studies, the likelihood of developing stomach ulcers rises with age and NSAID use frequency. According to research, smoking increases the relative risk of developing stomach ulcers by two times compared to non-smokers. The prevalence of stomach ulcers is the same for both men and women. In the United States of America's population, the frequency of H. pylori infection at age 60 is close to 50%. According to estimates, 25% of long-term NSAID users will get stomach ulcers [13].

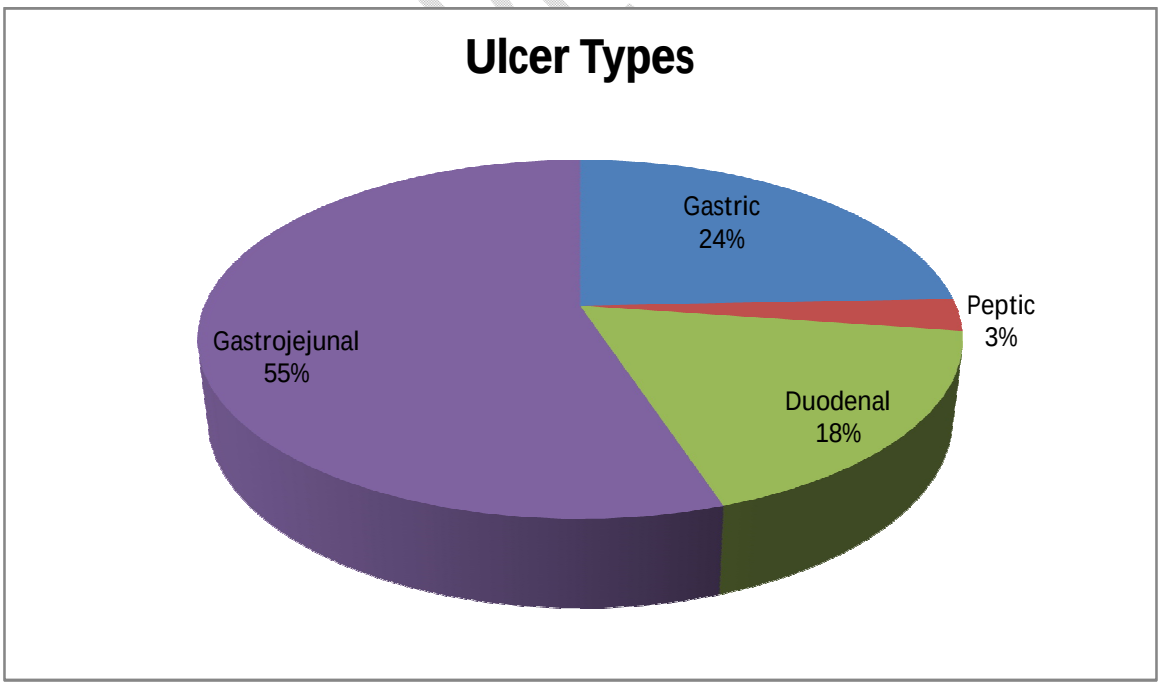

Figure 1 Incidence Of Different Ulcer Types[14]

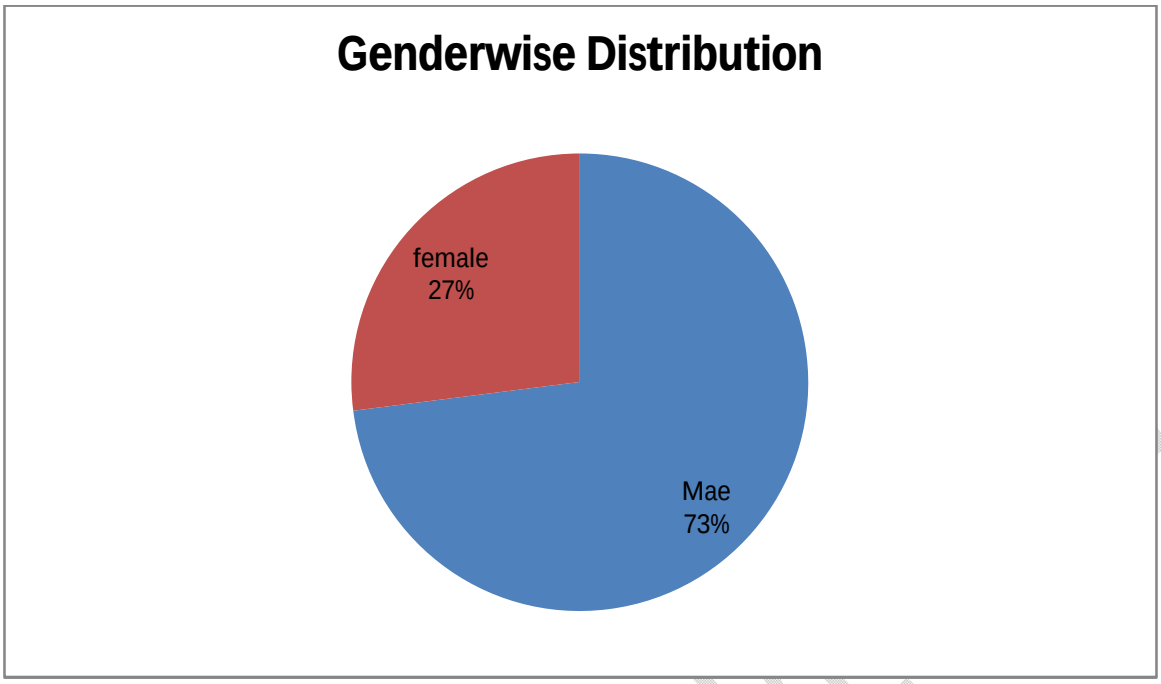

Figure 2Gender Wise Incidence Of Peptic Ulcers[15]

3. Etiology:

The two most frequent causes of stomach ulcers are gastric prostaglandin loss brought on by non-steroidal anti-inflammatory drugs and H. pylori bacterium infection. Hypergastrinemia (Zollinger-Ellison syndrome), viral infections like Cytomegalovirus CMV, chemotherapy, radiation, gastric outlet blockage, gastric infiltrative illnesses like malignancy, smoking, and Crohn's disease are some of the less frequent etiologies.

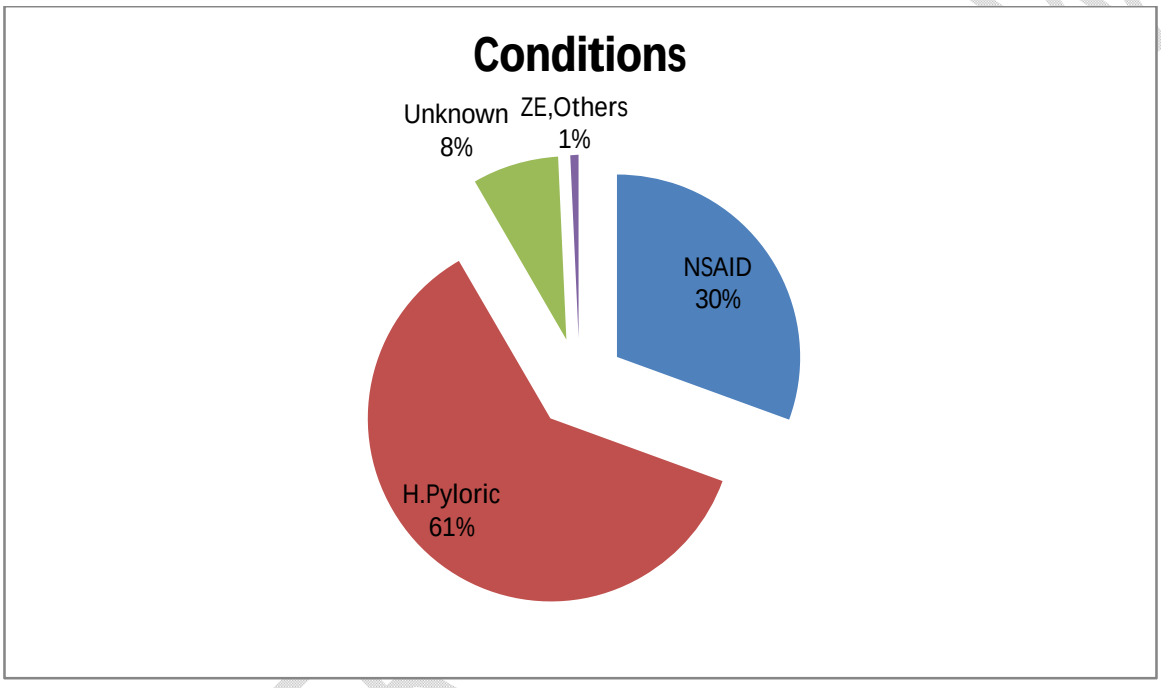

Figure 3 Rough Estimates of Conditions Associated With stomach Ulcers (Kayali et al., 2018)

All of these etiologies share the trait of encouraging a breach in the mucosal barrier, which exposes the gastric mucosa to the harmful effects of acid [16, 17].

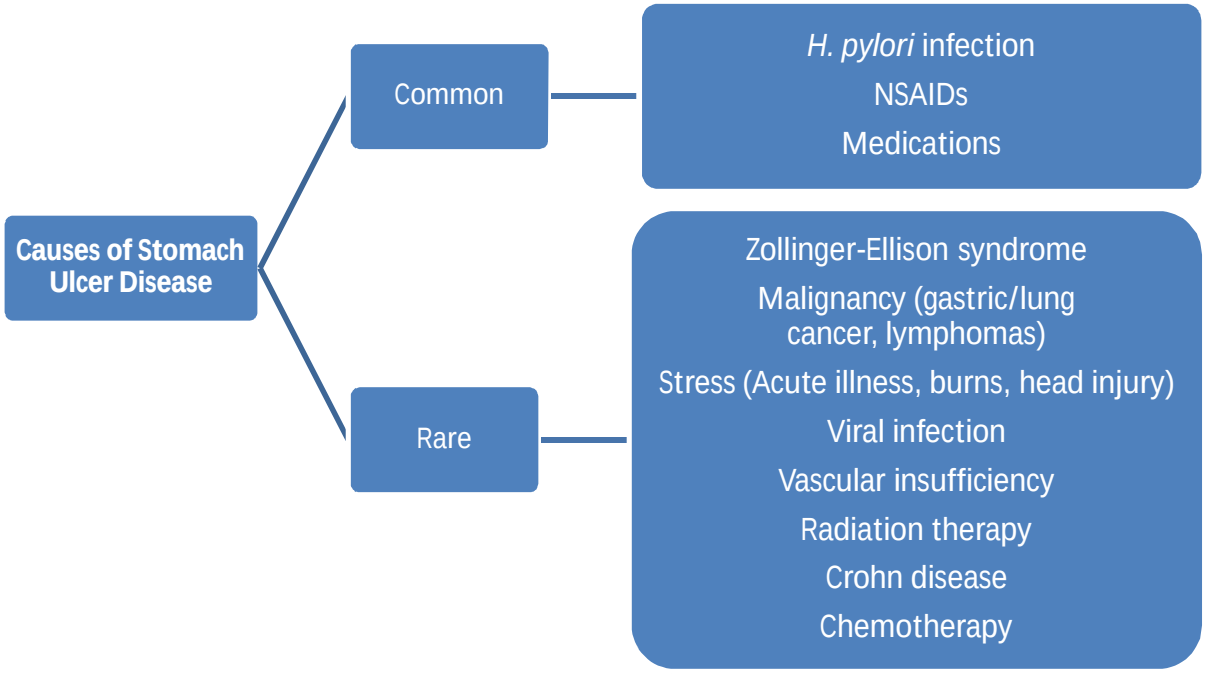

Figure 4causes of stomach Ulcer Disease [18]

4. Path-physiology:

The injury determines the pathophysiology of stomach ulcer formation. A thorough explanation will concentrate on each since NSAID use and/or H. pylori infection cause 80 to 90% [19] of stomach ulcers, respectively. First, focusing on H. pylori, which colonize 45–50% of the stomach mucosa globally. People get immunized against this bacterium at a young age, particularly in developing nations with lower socioeconomic levelsand crowded households. In the host, these bacteria cause an inflammatory reaction that results in an epithelial reaction, degeneration, and damage, which is known as gastritis. Patients who have this illness typically develop pan-gastritis. Due to the damage to the antral somatostatin release, increased gastrin secretion and thus higher acid generation result. Patients with the germs still present in the antrum eventually develop stomach ulcers. The more proximal stomach body's parietal cells still have full production capacity, preventing the creation of ulcers there.Not all individuals with this infection experience symptom which depends on the virulence of the bacteria and other host risk factors. The development of cagA, which causes greater cytokine cell death and mucosal injury, is a typical bacterial virulence factor. [20-22].

The second most frequent cause generating stomach ulcers is NSAID medicines. When compared to persons who do not take these medications, patients who do have a relative risk of four for stomach ulcers. NSAIDs can cause ulceration through a variety of different methods. When exposed to gastric acid, the medications themselves are weak acids. They persist in the epithelial cells and increase cellular permeability, which causes actual damage to the cells. The reduction in prostaglandin synthesis is the main cause of NSAID-induced ulceration. NSAIDs prevent the cyclooxygenase-1 enzyme from increasing prostaglandin synthesis, which in turn promotes the secretion of gastric bicarbonate, the formation of mucus barriers, an increase in mucosal blood flow, and an expedited rate of epithelial cell restitution and repair following damage or cell death. Overall, the decrease in gastric blood flow and the mild ischemia it generates in the stomach mucosa are what cause the most detrimental physiological damage.The pathophysiology of gastric ulcer development mostly varies on the etiology, but they all result in the destruction or loss of the integrity of the stomach mucosa[23-30].

5. Signs and Symptoms:

Depending on the location of the disease and age, the signs and symptoms of peptic ulcer disease can change. Differentiating between gastric and duodenal ulcers depends on when they first manifest themselves in relation to meals. Duodenal ulcers commonly cause nighttime pain. People who have a gastric outlet obstruction frequently describe having a bloated or full abdomen in the past[31-35].

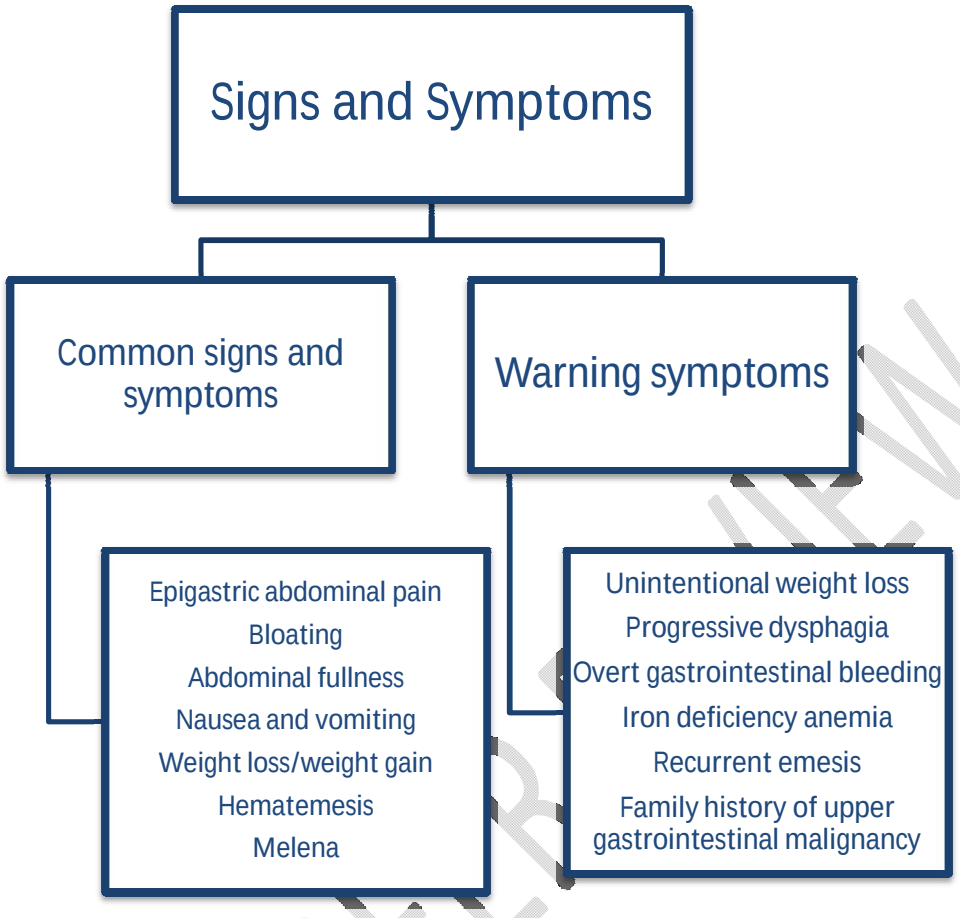

Figure 5: Flow chart model showing signs and symptoms

6. Diagnosis:

When patients exhibit symptoms such as epigastric stomach discomfort, burning, postprandial fullness, or early satiety, the diagnosis is initially made based on clinical suspicion. Traditionally, individuals with duodenal ulcers report stomach pain that worsens when they are hungry, two to three hours after eating, or at night. In contrast, people with stomach ulcers describe post-meal abdominal pain, nausea, and vomiting. Elderly people frequently have minor symptoms, and some PUD patients who have not received treatment may experience intermittent symptoms due to spontaneous healing before relapsing as a result of persistent risk factors including ongoing use of NSAIDs or H. pylori infection [24, 36-39].

Anti-secretory therapy may be initiated as an empiric course of treatment if the clinical symptoms point to a potential peptic ulcer illness and no alarm signals are present. In addition,

because H. pylori is a common cause of PUD, a test-and-treat strategy using a non-invasive H. pylori test (stool antigen or urea breath test) is advised for patients under the age of 55 who do not have any alarming symptoms, in areas where gastric cancer is uncommon and the prevalence of H. pylori is higher than 20%, and in patients who have no alarming symptoms elsewhere [40]. Endoscopy is advised to make a diagnosis in older patients and those with warning symptoms. Gastrointestinal (GI)bleeding, early satiety, weight loss, dysphagia or odynophagia, a family history of upper GI cancer, iron deficiency anemia, or new upper GI symptoms in patients over 55 are alarming symptoms [41]. The most accurate way to diagnose PUD is through an upper endoscopy or esophagogastroduodenoscopy (EGD). Gastric biopsies can be done to detect H. pylori and also rule out cancer [30, 42-44].

Table 1 diagnosis tests

Diagnostic Options	**Accuracy**	**References**
Urea Breath Test	95%	[45]
Serology	82-95%	[13]
Fecal antigen testing	95%	[46, 47]
Rapid urease test	98%	[47, 48]
Histology	>90%	[48]
Culture	>80%	[48]

7. Treatment Options:

Antisecretory medications for peptic ulcer diseaseinclude proton pump inhibitors and H2-receptor antagonists (PPIs). Due to PPIs' greater healing and efficacy, H2 receptor blockers have mostly been supplanted. PPIs suppress the stomach's ability to produce acid, relieving symptoms and accelerating recovery. Given that long-term PPI use raises the risk of bone fractures, treatment may include calcium supplements. Stopping the usage of NSAIDs or switching to a lower dose helps alleviate NSAID-induced PUD. Long and short-term discontinued usage of corticosteroids, bisphosphonates, and anticoagulants is best as well. .. Misoprostol, a prostaglandin analog, is occasionally used as a preventative measure for NSAID-induced peptic ulcers[49, 50].

A triple antibiotic, proton pump inhibitor, and pylori-inducing PUD therapy combination is the first line of defense. For 7 to 14 days, patients take pantoprazole, clarithromycin, metronidazole, or amoxicillin. PPIs and antibiotics cooperate to destroy H. pylori. The antibiotic chosen should take into account the existence of environmental antibiotic resistance. Quadruple therapy, which uses bismuth and several antibiotics, is used if first-line therapy is unsuccessful[3, 51, 52].

When a patient is unresponsive to medicinal therapy, noncompliant with the treatment regimen, , or at a high risk of consequences, surgical intervention may be recommended. Over 5 mm in diameter peptic ulcers that do not cure after 8–12 weeks of PPI medication are referred to as refractory peptic ulcers. Consistent H. pylori infection, continued NSAID usage, serious comorbidities that hinder ulcer healing, or other disorders such as gastrinoma or stomach cancer are the usual causes. Patients may be candidates for surgical therapy if the ulcer still exists despite considering the aforementioned risk factors. Vagotomy and partial gastrectomy are two surgical alternatives.[12, 53-59].

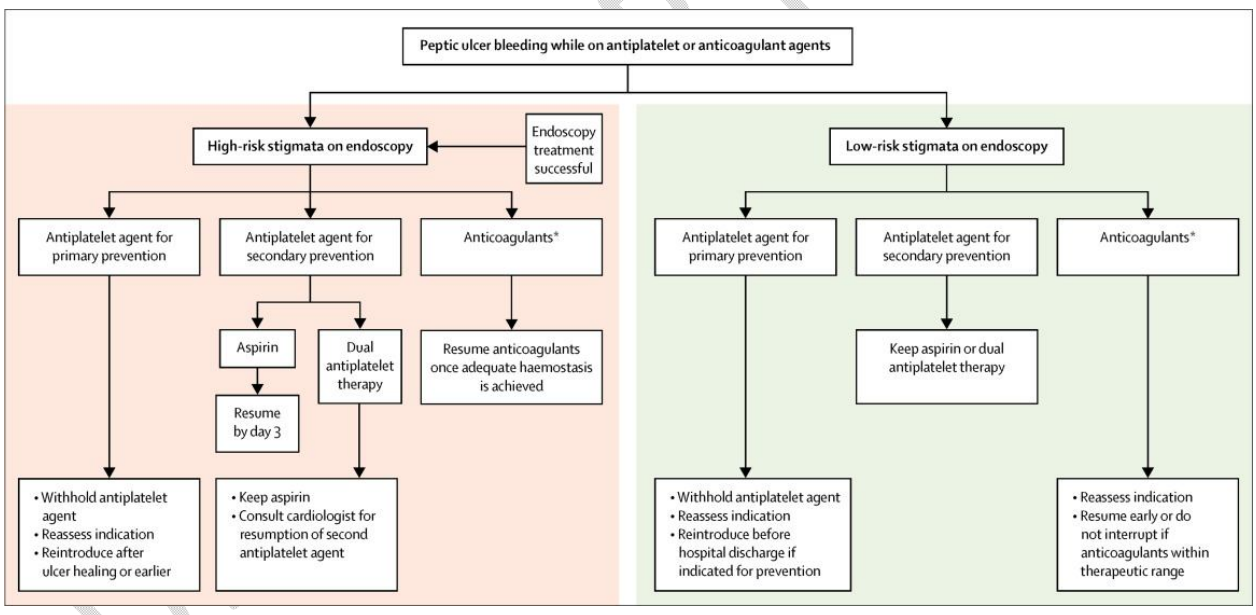

Figure 1management options[60]

7.1. Efficiency of herbal products in peptic ulcers:

The use of herbal remedies along with conventional antigastric ulcer medications may have a synergistic effect in the fight against H. pylori and gastric ulcer disease and enhance the

prognosis for patients with gastric ulcers. More clinical research should be carried out with bigger sample sizes on the efficacy and safety of medicinal plants with antiulcer activity because there are so few human studies available. Designing studies to look into and clarify the mechanisms of action of medicinal plants used in the treatment or prevention of peptic ulcers would also be beneficial [11, 61-64].

Last but not least, herbal items used for medical purposes need to be licensedto improve their safety and quality and guarantee that randomized controlled studies support claims of their potential usefulness. Despite an increase in reports of herb-drug interactions, there still exists inadequate studies in this area and no steps have been done to rectify the I lack of literature. Because of this, pharmacists and doctors in particular should be aware of the dangers related to the use of herbal medicines, whether alone or in conjunction with other herbal or conventional standard therapy [36, 65, 66].

Conclusions:

Due to the drop in H. pylori infections, better accessibility to antisecretory medication, and more prudent NSAID use, PUD is a disease with a declining clinical burden. Due to its persistently high lifetime frequency and variable clinical presentation, PUD must be recognized and managed properly to prevent and limit serious problems. When assessing PUD, it is important to test for and treat H. pylori as well as prevent mucosal damage brought on by NSAIDs (either by concomitant PPI prophylaxis or by selecting COX-2 selective NSAIDs, if available). The most frequent consequence, PUD hemorrhage, is treated with resuscitation, anti-secretory medication, endoscopy, and administration of antithrombotic medicines.

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