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Peptic Ulcer Disease [PUD]
Review Article: Uncover the Newest Developments in Peptic Ulcer Disease! Event

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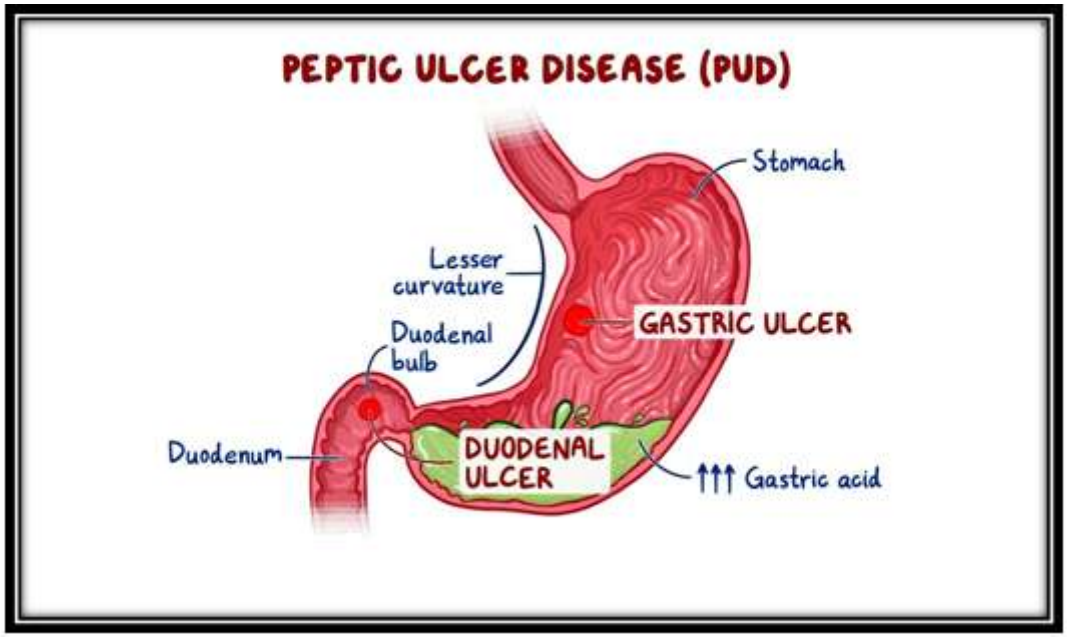

I. INTRODUCTION

1.1 DEFINITION

A peptic ulcer is unequivocally a chronic disease resulting from a clear imbalance of endogenous protective and aggressive factors in the stomach. The protective factors, including gastric mucosa such as mucus and bicarbonate secretion, adequate blood flow, prostaglandins E2, nitric oxide, sulfhydryl compounds, and antioxidants, are crucial for maintaining stomach health. In contrast, aggressive factors like acids and pepsin secretion, along with behavioral and environmental factors such as smoking, poor diet, alcohol use, and non-steroidal drugs, undeniably contribute to the development of peptic ulcers.Furthermore,the use ofanti-inflammatory medications and Helicobacter pylori infection unquestionably participate in causing stomach ulcers[3].

Peptic ulcers are common conditions affecting the submucosal layer of the stomach and duodenum, often associated with H.pylori infection and excessive use of NSAIDs (non-steroidal anti-inflammatory drugs)[4]. Nowadays and in the last 20-30 years, the incidence of the disease has shown a sharp decrease, and this phenomenon has been associated with the improvement of drug therapy and the increase of hospital facilities[4].

Peptic ulcers are among the most common diseases in the world, but the good news is that peptic ulcers are now treatable [10]. PUD (incidence of 0.1-0.3 % per year) affects about 5-10 % of the worldwide population and varies according to age, sex, and geographic location [9].Peptic ulcers are open sores that develop on the inside lining of your stomach and the upper portion of your small intestine[1]. A peptic ulcer is a sore on the inner lining of the stomach or duodenum, which is the first part of the small intestine.

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1.2 TYPE OF ULCER

There are two main types of peptic ulcers, which are named according to where they occur in the digestive tract:

- Gastric ulcers: These ulcers occur in the stomach.
- Duodenal ulcers: This ulcer occurs in the duodenum, which is the first part of the small intestine.

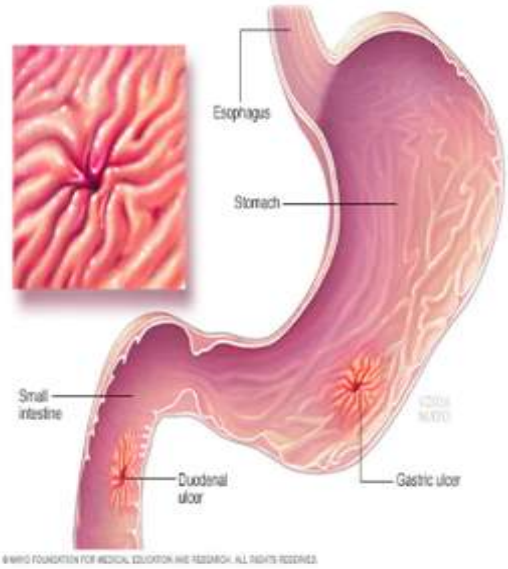

Figure: types of ulcer

1.2.1 Gastriculcer

Exposure to acid-peptic fluids can lead to the development of gastric ulcers, which are persistent, usually solitary lesions in the digestive tract. Gastric mucosal defects can emerge suddenly following severe stress.At least 98% of gastric ulcers can be found in the stomach or the first section of the duodenum, in a ratio of approximately 4:1.

H. pylori bacteria and excessive stomach acid are the main causes of peptic ulcers. Other factors such as non-steroidal anti-inflammatory drugs (NSAIDs), injuries, severe trauma, septic infection, head injuries, and irritants like alcohol, smoking, and spicy foods can also lead to peptic ulcers.

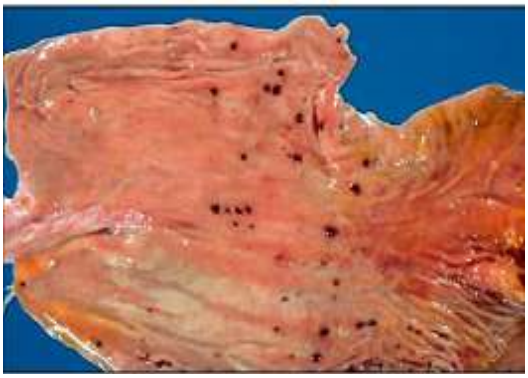

Figure: gastric ulcer (stress ulcer)

1.2.2 Duodenal ulcer

Peptic ulcers are chronic, recurring sores that typically affect middle-aged to older adults. They often occur without any obvious precipitating conditions, other than chronic gastritis. A duodenal ulcer is a sore in the lining of the duodenum, which is the first part of the small intestine. It's a type of peptic ulcer, which is an open sore in the stomach or upper small intestine.

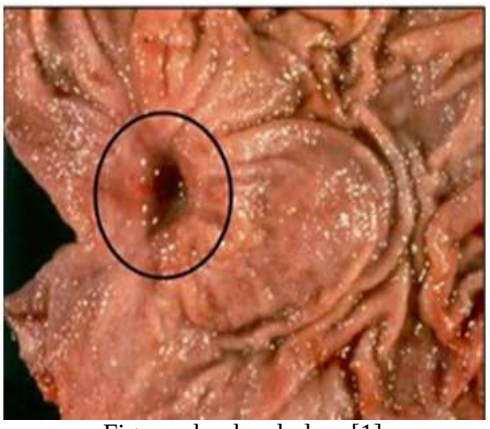

Figure: duodenal ulcer [1]

II. SYMPTOMS

The most common symptom of peptic ulcer disease is a dull or burning pain in the stomach. This pain can be felt anywhere between the navel and the breastbone. It usually occurs when the stomach is empty, such as between meals or during the night. The pain lessens briefly after eating food or taking antacids. It can last for minutes to hours and may come and go for several days, weeks, or months.[8]

- Vomiting or blood vomiting
- Unexplained weight loss

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- Dark blood in stool, or stools that, are black, tarry
- Nausea and vomiting
- Trouble breathing [3]

Figure: peptic ulcer symptoms [3]

2.1 Blood vomiting

Vomiting blood, also known as hematemesis, is a serious medical emergency. It can indicate severe bleeding in the upper gastrointestinal tract. Immediate treatment is crucial because significant blood loss can lead to hypovolemic shock, organ failure, and even death.

2.2 Unexplained Weight Loss

Losing weight without trying is concerning if it's more than 5% of your body weight or 10 pounds in 6 to 12 months.

2.3 Dark stool

Dark stools, also called melena, can indicate bleeding in the upper digestive tract, such as the stomach, small intestine, or right side of the colon.

2.4 Nausea & Vomiting

A stomach or intestinal infection can cause nausea, vomiting, and diarrhea. It's often called the stomach flu.

2.5 Trouble Breathing

A slow-bleeding ulcer can cause anemia. Anemia can lead to fatigue, shortness of breath, and pale skin.

III. PATHOGENESIS

The exact way H. pylori causes peptic or gastric ulcers is not fully understood. It is linked to both low and high levels of stomach acid, as well as the location of the infection [13]. In pangastritis H. pylori infection, this leads to the destruction of parietal cells, which make stomach acid. This destruction can be directly related to H. pylori or to the cytokines that are secreted. But the outcome in pangastritis is low levels of stomach acid, which can lead to gastric ulcers. In antral gastritis – the most common cause (10-15%) – the infection is mainly in the antrum, leading to irritation of G cells that make gastrin, and destruction of D cells that make somatostatin [14].

It is well established that the Gastrin hormone is predominantly increased and the led to increasing histaminic receptor activity in the enterochromaffin-like cells, and the outcome is increasing acid secretion. This is also modulated by somatostatin releasing cell destruction, so there is a loss of inhibition and increase in activation in antralH.pylori infection, and this will lead to an increase the level of gastric acidity and increase the level of HCL -hyperchlorhydria- the outcome will be a peptic ulcer [14].

3.1 Risk Factors

These ulcers occur following severe stress. The causes are as follows:

a) Psychological stress

• Shock
• Severe trauma
• Septicaemia
• Extensive burns (Curling's ulcers in the posterior aspect of the first part of the duodenum).
• Intracranial lesions (Cushing's ulcers developing from hyperacidity following excessive vagal stimulation).
• Drug intake (e.g. aspirin, steroids, butazolidine, and indomethacin).
• Local irritants (e.g. alcohol, smoking, coffee, etc).

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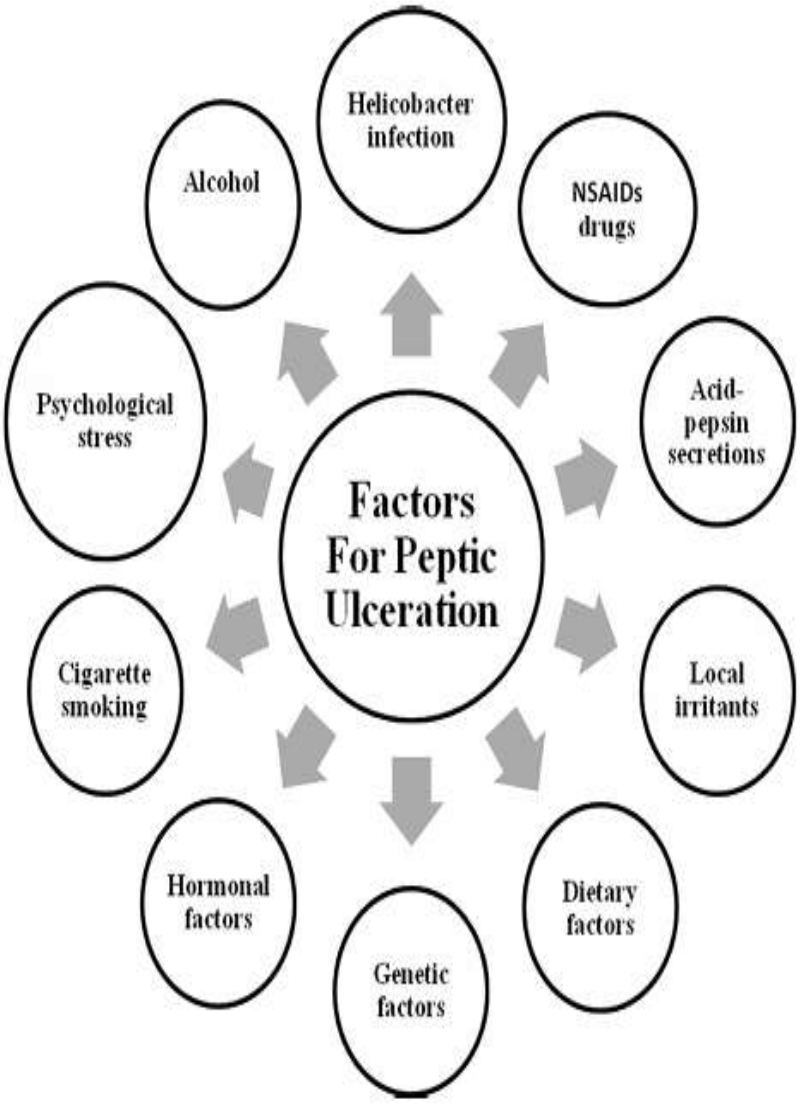

Figure: factors affecting peptic ulcer

3.2 Epidemiology and Etiological Factors

Peptic ulcer disease (PUD) is a major cause of illness and death around the world. It can lead to problems such as gastrointestinal bleeding, abdominal pain, and blockage or tear in the stomach lining. The number of Americans with peptic ulcer disease has increased by 8.4% since 2000.[11]

Men, smokers, and people with chronic medical conditions are more likely to develop peptic ulcer disease (PUD). PUD becomes more common as people get older. Rare causes of PUD include Zollinger-Ellison syndrome, cancer, stress, viral infection, vascular problems, radiation therapy, Crohn's disease, and chemotherapy.Examples of PUD include cases associated with H. pylori and NSAIDs, as well as the clinical symptoms. [12]

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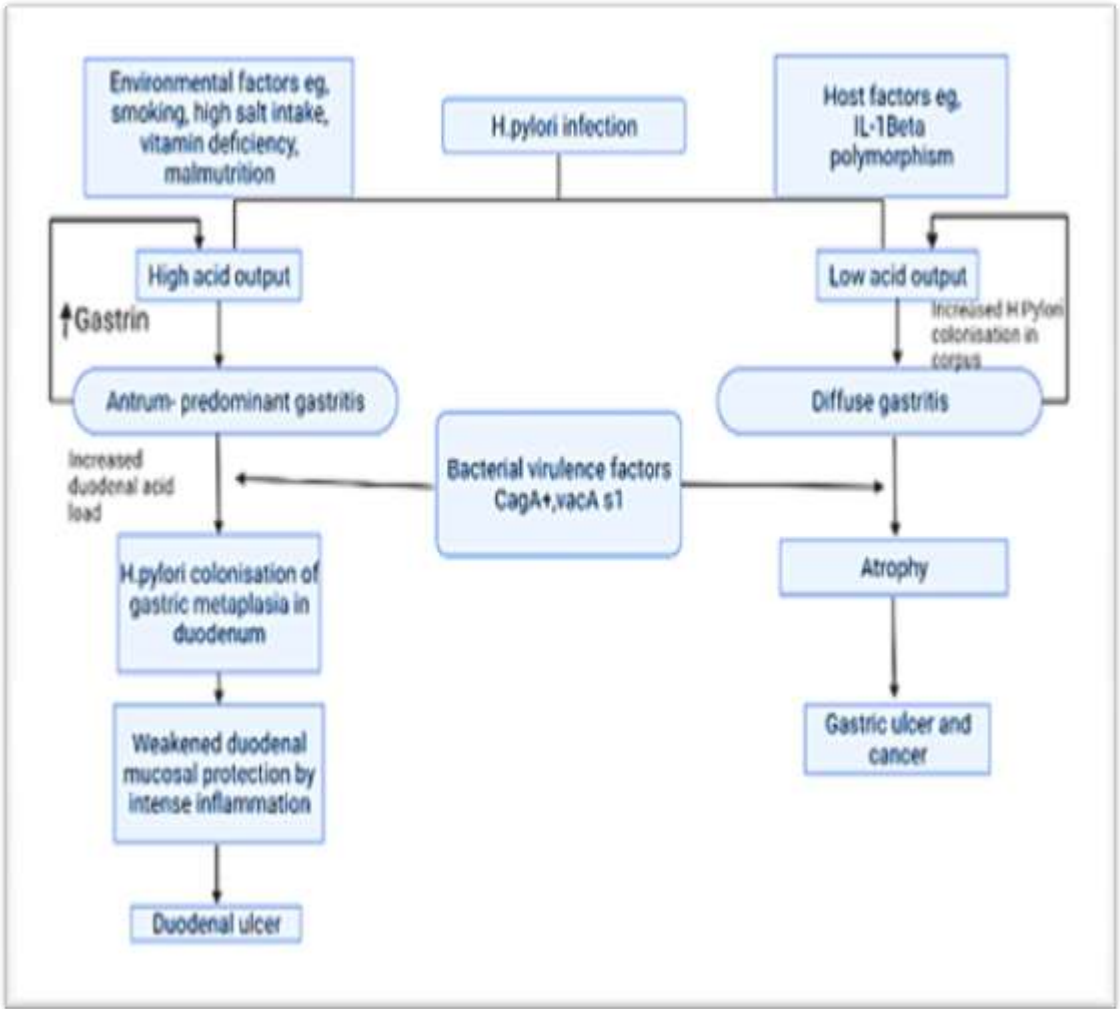

Figure: diagnosis 0f gastric ulcer and the number of associated complications.[14]

IV. DIAGNOSIS

It is mandatory to perform a good clinical history and a complete physical examination, to make a complete data collection of all the symptoms andsigns of PUD. It is extremely important to register all the past medical antecedents, the duration of alcohol intake, the history of NSAIDs and smoking consumption, and also the possible existence of previous episodes of peptic ulcer. [11]

4.1 Physical Exam

During a physical exam, a healthcare provider usually examines the patient to help diagnose the cause of peptic ulcer disease.

1."Checks for abdominal bloating."

2.Listening to sounds within the abdomen using a stethoscope.

3.Palpate the abdomen to check for tenderness or pain.

4.2 Lab Test

1.Urea Test

This test is highly sensitive and specific. It can be used four to six weeks after discontinuing the treatment to confirm the diagnosis.To conduct a breath test, the patient ingests a special liquid containing urea, a waste product produced when the body breaks down protein. If H. pylori bacteria are present, they will convert the urea into carbon dioxide. A nurse or technician will collect breath samples at a healthcare provider's office or a commercial facility and send them to a lab to measure the carbon dioxide levels.

2.Blood test

A blood test involves taking a sample of a patient's blood at a healthcare provider's office or a commercial facility and sending it to a lab for analysis. The test can detect the presence of H. pylori.

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3.Stool test

Stool antigen tests using monoclonal antibodies are as accurate as urea breath tests, are cheaper, require less equipment, detect only active infection, and can be used as a test of cure. Stopping PPIs for two weeks before testing is recommended, but stool antigen tests are less affected by PPI use than urea breath tests.

4.3 Endoscopic finding

Upper GI endoscopy is the most diagnostic test for peptic ulcer disease (PUD). It provides information about the size and location of the lesion. Additionally, mucosal biopsies can be performed to aid in differential diagnosis and to carry out endoscopic treatment in the event of a bleeding peptic ulcer. Signs suggesting a benign origin include the presence of regular mucosal folds surrounding the ulcer and fibrin deposits at the base of the crater.

Endoscopy with biopsy is recommended for patients aged 55 or older, or those with one or more alarm symptoms, in order to rule out cancer and other serious conditions. If patients have not been taking a PPI within one to two weeks of endoscopy, or bismuth or an antibiotic within four weeks, the rapid urease test performed on the biopsy specimen provides an accurate and inexpensive way to diagnose H. pylori infection.

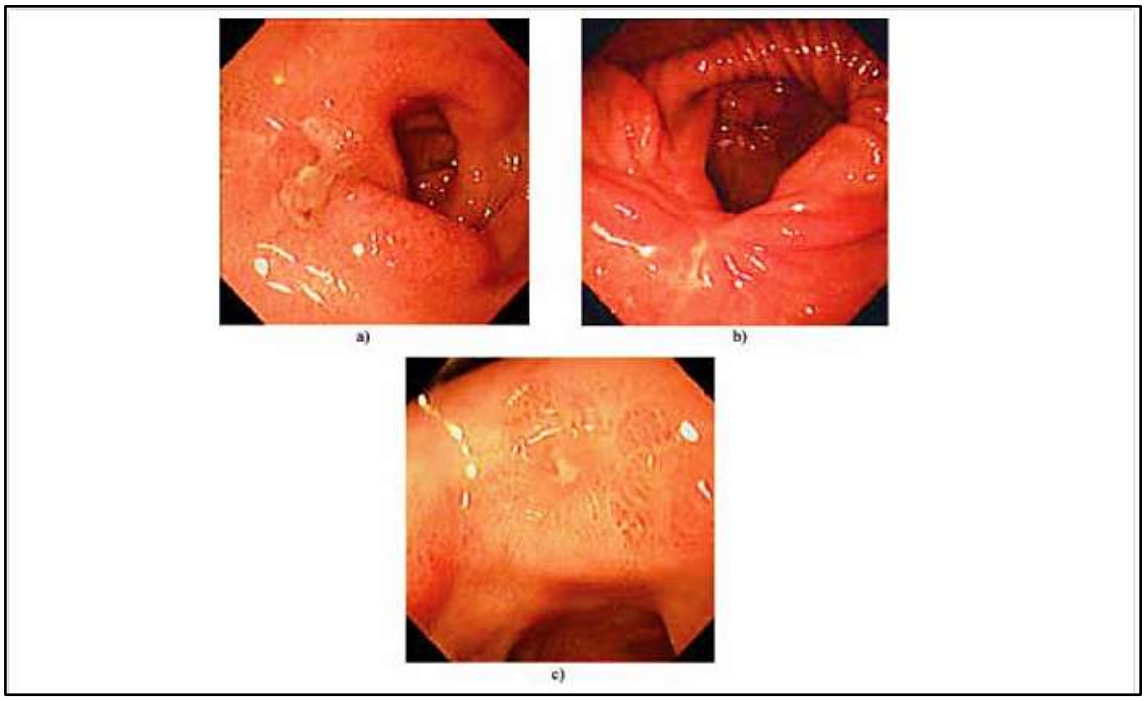

Figure**:** endoscopic images a) active ulcer, b)ulcer scar, c)last stage of the mucosal healing peptic ulcer[11]

The features thatsuggest malignancy, are the finding of overhanging margins, irregular or thickened borders, and/or the presence of an ulcerated mass, that protrudes into the lumen.A follow-up endoscopy will be performed until the healing is completed.

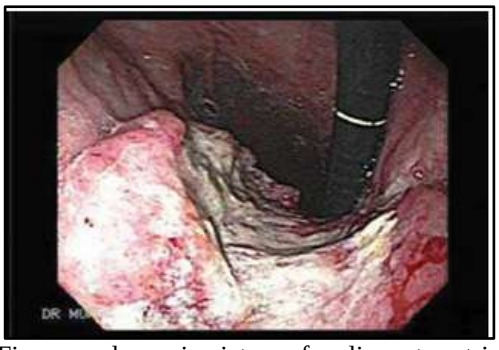

Figure: endoscopic picture of malignant gastric fundus ulcerated lesion (retroflection).[11]

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V. TREATMENT

Classification

Antiulcer drugs are classifiedby their mechanism of action or site of action.Some of the classes of antiulcer drugs include:

- Antacids

These neutralize gastric acid and include aluminum or magnesium hydroxide (Maalox, Mylanta) and calcium carbonate (Tums, Rolaids).

- H2-receptor antagonists

These block the action of histamine at the H2 receptor of the parietal cell, which reduces the production of hydrochloric acid.Examples include famotidine, cimetidine, and ranitidine.

- Proton pump inhibitors (PPIs)

These bind to the hydrogen-potassium ATPase enzyme system of the parietal cell, which inhibits the secretion of hydrochloric acid.Examples include pantoprazole, esomeprazole, and lansoprazole.

- Mucosal protective agents

These include sucralfate and prostaglandin analogs (misoprostol) [15]

a)Antibiotics
b)Proton pump inhibitors
c)Histamine receptor blockers
d) Bismuth subsalicylate
e) Antacid

Treatment is usually aimed at achieving the following two goals:
1. Eliminating the bacteria.
2. Reducing acid production in the digestive tract by relieving pain and accelerating the healing of peptic ulcers. [6]

5.1Antibiotics

Doctors use a combination of antibiotics to treat an H. pylori infection because using a single antibiotic is not sufficient to kill this type of bacteria. For the treatment to be successful, medicationshould be taken according to the doctor's instructions.Although antibiotics can cure most H.pylori-induced peptic ulcers, eliminating the bacteria can be difficult. People need to take all doses of their antibiotics exactly as their healthcare provider prescribes, even when the pain from a peptic ulcer is gone. [7,10]

5.2 Proton PumpInhibitors

This method reduces the amount of secreted gastric acid and relies on the closure of proton pumps in cells that secrete gastric acid. This class of drugs is only given with a prescription [7,10]

- Omeprazole (Prilosec, zegerid)
- Lansoprazole (privacid)
- Pantoprazole (protonix)
- Rabeprazole (Aciphex)
- Esomeprazole(Nexium)
- Dexlansoprazole (Dexilant)

5.3 Histamine Receptor Blockers

Histamine receptor blockers are medications that block histamine, a substance that stimulates acid production. Histamine receptor blockers include. [7,10]

- Cimetidine (Tagamet)
- Ranitidine (Zantac)
- Famotidine (Pepcid)
- Nizatidine (Axid)

5.4Bismuth Subsalicylate

Medications containing bismuth subsalicylate, such as Pepto Bismol, coat a peptic ulcer and protect it from stomach acid. Although bismuth subsalicylate may kill H. pylori, healthcare providers use it with, not in place of, antibiotics in some treatment regimens.

5.5Antacids

The doctor may add an antacid to the list of medications the patient prescribes, either along with or instead of an acid blocker. Antacids work by neutralizing existing stomach acid, providing rapid pain relief, rather than reducing stomach acid secretion. [7,410]

Healthcare providers use one of three standard therapies to treat H. pyloriincluced peptic ulcer disease:

- **Triple therapy**. The standard treatment for H. pylori infection involves taking the antibiotic clarithromycin, a PPI (proton pump inhibitor), and either metronidazole or amoxicillin for 7 to 14 days.Due to increasing resistance to clarithromycin, this regimen is not recommended in areas where more than 15-20% of H. pylori strains are resistant toclarithromycin. An alternative regimen replaces amoxicillin with metronidazole. Adding probiotics such as Saccharomyces boulardii and Lactobacillus to the treatment has been shown to improve eradication rates and reduce the risk of diarrhea.[5]

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- **Quadruple therapy.** The traditional quadruple regimen includes bismuth salt, metronidazole, and tetracycline, all taken four times daily, along with a PPI taken twice per day. This therapy is used as a backup if initial treatment fails or as the first-line therapy in areas of high resistance or when cost is a concern. A combination capsule has been developed to reduce the pill burden, but patients still need to take three capsules four times per day in addition to a PPI. The regimen is usually given for 10 to 14 days.[5]
- **Sequential therapy.** The patient is prescribed a5-day course of a proton pump inhibitor (PPI)and amoxicillin, followed by another 5-day course of a PPI, clarithromycin, and tinidazole. The overall eradication rate is 84%, with a rate of 73% for clarithromycin-resistant strains. Recent analysis shows that this sequential therapy is better than seven-day triple therapy but not as effective as 14-day triple therapy, bismuth-based quadruple therapy, or non-bismuth-based quadruple therapy.[5]

VI. PREVENTION

1. Avoid spicy food (pickles, pepper…etc).
2. Avoid smoking to ward off the effect of nicotine on the lining of the stomach and intestines.
3. Avoid excessive use of painkillers such as NSAIDs, and if necessary, then use panadol.
4. Control gastric acid reflux by avoiding spicy and fatty foods, and avoiding leaning back after meals for at least 3 hours.

5.wash their hands with soap and water after using the bathroom and before eating.
6. drink water from a clean, safe source.[2]

VII. CONCLUSION

Peptic ulcer disease (PUD) is not common in childhood. However, it is a prevalent clinical issue. The two main risk factors associated with PUD are NSAID use and H. pylori infection. The clinical features of PUD are nonspecific. Prompt treatment anderadication of H. pylori bacteria lead to symptom improvement and long-term cure through complete healing.[4,9,13]

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