



Assessment of Helicobacter Pylori Infection

Bayan Omar Sharif *¹ , Zhino Raouf Ali², Hawar Mardan Mohammed³

¹Specialist Nurse, University of Human Development, College of Nursing, Sulaimani, Iraq, ²Specialist Nurse, Health Development and Training Center, Directorate of Health, Sulaimani, Iraq, ³Hiwa Hospital, Sulaimani Health Director, Iraq.

Abstract

Background: A Gram-negative bacteria called Helicobacter pylori (*H. pylori*) colonizes the stomach lining and is a substantial contributor to several gastrointestinal illnesses. It is a spiral-shaped bacterium with several modifications that enable it to live in the stomach's severely acidic environment.

Materials and Methods: In this paper, we discussed Helicobacter pylori (*H. pylori*) disease, its epidemiology, pathophysiology, hygiene, causes, risk factors, clinical manifestation and complications, method of transmission, diagnosis, treatment, and incubation period in the human body.

Results: The incidence and prevalence of *H. pylori* infection can be influenced by factors such as age, socioeconomic status, geographical location, and living conditions. Generally, *H. pylori* infection is more common in developing countries with poorer sanitation and hygiene standards. It is estimated that approximately 50% of the world's population is infected with *H. pylori*.

Conclusion: We have concluded that although the precise way of *H. pylori* transmission is not entirely understood, it is thought to largely spread via oral-oral or fecal-oral routes. It can manufacture the enzyme urease, which turns stomach urea into ammonia, neutralizing the acidic environment and creating a suitable environment for its life. Today, *H. pylori* is recognized as the primary contributor to chronic gastritis.

Key Words: Helicobacter pylori (*H. pylori*), epidemiology, causes, complication, prevalence, treatment

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Corresponding Author: Mrs. Bayan Omar Sharif,
Specialist Nurse, University of Human Development,
College of Nursing, Sulaimani, Iraq.
Email ID: bayan.sharef@uhd.edu.iq

Introduction

Helicobacter pylori (*H. pylori*) infection is a Gram-negative bacterium that occurs when *H. pylori* bacteria infect your stomach. Typically, this occurs when a youngster. Its discovery by Australian researchers Barry Marshall and Robin Warren in 1982 marked a significant advancement in our knowledge of the causes of gastritis and peptic ulcers. [1]

Epidemiology

A typical form of bacterium called *H. pylori* develops in the digestive tract and frequently attacks the stomach lining. A 2018 meta-analysis found that 44% of people globally have an infection with *H. pylori*. [2]

Age, ethnicity, related illnesses, geographical locations, socioeconomic position, and hygienic conditions all have a significant impact on prevalence. According to the 2002 study, the majority of recently acquired *H. pylori* infections occurred in young age groups before the age of 10 years. Between 2014 and 2020, low- and middle-income nations had greater rates of infection in both children and adults. The majority (90%) of *H. pylori* infections are contracted in infancy and remain throughout life, which accounts for the increased incidence in older people compared to children, rather than a larger risk of infection as people age. [3] After effective eradication, the yearly reinfection or recrudescence rate is modest (2%) in people living in wealthy nations, but it is greater (5–10%) in children and adults living in underdeveloped

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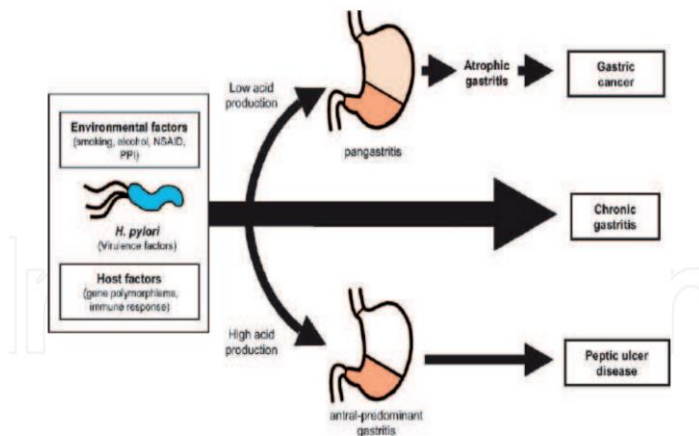
nations. [7, 8] A family-based approach to H. pylori screening and therapy can lower the recurrence rate more than a single-patient method, according to several randomized trials. [9] The validity of whether family-based screening and eradication may lessen the spread of H. pylori among family's needs for further well-designed, large-scale randomized studies. [10]

Causes and risk factors of H pylori

Based on genetics and ethnicity, some studies show that ethnicities are more susceptible to H. pylori infection; nevertheless, food sharing and living practices may also be factors [4, 5, 6] The most likely transmission pathways are thought to be fecal-oral and oral-oral. [11] In impoverished nations, contaminated water may be a cause of illness. It is possible to grow H. pylori from the vomit, feces, and saliva of infected people, suggesting that this pathogen may be spread through these channels. Future research on transmission channels and their relative significance is nonetheless critically required. In underdeveloped nations, person-to-person transmission within families is typical, particularly from infected mothers and siblings. [12] Because of H. pylori's exceptionally high genetic diversity, even short nucleotide sequences can provide valuable information regarding transmission channels and the direction of transmission between two individuals. [13] Pets may provide a risk of H. pylori infection in rare circumstances; thus, pets should be segregated. [26] Smoking, alcohol, nonsteroidal anti-inflammatory drugs, proton pump inhibitors, and host variables including gene polymorphism and immunological response all contribute to the development of illnesses, not only H. pylori colonization alone. [18]

Pathogenesis of Helicobacter pylori

Figure-1 Diagram showing the causes of stomach pathology and the progression of the disease in H. pylori infection [27]



Clinical manifestation of H pylori

Most people who suffer duodenitis or chronic gastritis brought on by

H. pylori don't exhibit any symptoms. However, between 5 and 10% of patients experience more severe issues, such as duodenal or stomach tumors, or ulcers in the stomach or the duodenum. The most typical ulcer symptoms include the following: Ulcers can cause a wide range of symptoms or no symptoms at all.

- Pain or discomfort (usually in the upper abdomen)
- Bloating
- Feeling full after eating a small amount of food
- Lack of appetite
- Nausea or vomiting
- Dark or tar-colored stools
- Ulcers that bleed can cause a low blood count and fatigue

Chronic gastritis, which is less frequent, can result in abnormal changes in the stomach lining and some types of cancer. Cancer seldom arises because of H. pylori infection. However, due to the widespread prevalence of H. pylori infection, it is thought to be a significant contributor to stomach cancer. The largest risk of stomach cancer is among residents of nations where H. pylori infection starts at a young age. [23]

Diagnostic test of H pylori

Endoscopic and non-endoscopic techniques are used in the diagnostic evaluation of H. pylori infection. Use of urease, stool antigen, or an antibody response as a disease marker are examples of indirect techniques that are sometimes employed in conjunction with direct approaches (culture, microscopic evidence of the organism). [16]

Culture methods

Human stomach biopsy samples may frequently be used to routinely isolate H. pylori by culture. The organism needs complex media and a microaerophilic habitat. Different base media and additives have been suggested for the organism's isolation. [16]

Urease test

It is well known that H. pylori produce urease enzymes. In order to detect living organisms, the test uses H. pylori urease. For urease testing, a sensitivity of more than 93% and a specificity of 98% have been observed. [17]

Urea breath test

The gold standard for identifying H. pylori is the urea breath test. In contrast to other tests, this one provides exact and precise findings. [17]

Complications of H pylori

1. **Gastritis:** This ailment causes inflammation of the stomach lining. Gastritis progresses through three stages: acute, chronic, and atrophy.
2. **Peptic ulcer:** H. pylori causes an inflammatory response in the gastric mucosa by upregulating epithelium-derived cytokines, primarily interleukin 8 (IL8) and IL 1 [14] by the action of neutrophils, macrophages, lysosomal enzymes, leukotrienes (LT), and reactive oxygen species, hindering mucosal defense and starting the immune-pathogenetic process of ulcer formation. Along with phospholipases A and C, urease catalyzes the production of ammonia, which when its concentration rises results in the formation of toxic complexes like ammonium chloride and compromises the phospholipid-rich layer in the mucosa that keeps the mucosa hydrated and the integrity of the gastric epithelial barrier, causing ulcers. [15]
3. **Gastric cancer:** which accounts for roughly 11% of malignancies in men and 7% in women, is the second leading cause of cancer-related mortality globally. [19]
4. **Gastroesophageal reflux disease (GERD):** This complex ailment occurs when stomach acid rises into the esophagus. [20]
5. **Functional dyspepsia:** also known as non-ulcer dyspepsia, is an upper gastrointestinal discomfort symptom without any obvious anatomical abnormalities at the time of diagnosis. [18]

The existence of dyspepsia symptoms without any additional diagnostic testing has been deemed uninvestigated dyspepsia. [21] Numerous reasons, including stress, changes in visceral feeling, enhanced serotonin sensitivity, changes in stomach acid production, changes in gastric emptying, and psycho-social impairment, are potential causes of this. The multifactorial etiology of the illness may include several causes, one of which being H. pylori infection. According to research done in Kuala Lumpur by Goh et al., 31.2% of patients with non-ulcer dyspepsia had H. pylori. [22]

Prevention of H. pylori

As a result of a mother-to-child and sibling-to-sibling transmission pattern, H. pylori-infected mothers and siblings are the main risk factors for childhood H. pylori infection. It has been hypothesized that intimate interaction is crucial. Most of the research have mentioned moms or other people who look after the kids. In addition to having access to clean water sources, parents, particularly mothers and grandparents, should be taught about sanitation best practices and encouraged to take part in the "screen/therapy/follow up for recurrence" program for adults with digestive issues. Children can avoid H. pylori infection by completely washing their hands, eating food that has been cooked correctly, and drinking water from a dependable source. Although hand cleaning before nursing and food preparation will be simple and more effective to minimize home contamination, breastfeeding makes children healthier.

With advancements in sanitary infrastructure and home hygiene habits, H. pylori infection rates may be drastically reduced. Teaching mothers how to prevent H. pylori infection for themselves and their progeny is the most effective strategy to reduce the prevalence of H. pylori infection in children. [25]

Treatment of H. pylori

At least two different antibiotics are often used concurrently to treat H. pylori infections. This lessens the chance that the bacteria may become resistant to a certain drug. Medications that promote stomach healing may also be used as part of the treatment, including:

1. Proton pump inhibitors (PPIs): These medications prevent the stomach from producing acid. Omeprazole (Prilosec), esomeprazole (Nexium), lansoprazole (Prevacid), and pantoprazole (Protonix) are a few examples of PPIs.

2. Bismuth subsalicylate: Also referred to as Pepto-Bismol, this medication coats the ulcer to shield it from stomach acid.

3. Histamine (H-2) blockers: These drugs inhibit a chemical called histamine, which causes the creation of acid. Cimetidine (Tagamet HB) is one illustration. Only in cases when PPIs are ineffective are H-2 blockers used for H. pylori infection. Repeat testing for H. pylori at least four weeks after the treatment is recommended. If the tests show the treatment didn't get rid of the infection, may need more treatment with a different combination of antibiotics. [24]

Conclusion

We have concluded that H pylori is an infection mostly related to fecal-oral transmission due to poor hand hygiene, contaminated water may be a cause of illness. It is possible to grow H. pylori from the vomit, feces, and saliva of infected people, and this parasite leads to gastritis, peptic ulcer, and gastroesophageal reflux disease. Most people who suffer duodenitis or chronic gastritis brought on by H. pylori don't exhibit any symptoms. However, less than 15% of patients experience more severe issues, such as upper abdominal Pain or discomfort, abdominal distention, feeling full after eating a small amount of food, Lack of appetite, and nausea or vomiting. Because prevention is crucial to prevent this contagious disease, such as personal cleanliness and elementary hygienic conditions should be observed during meals, stopping the fecal contamination of food and water, and correcting poor sanitation, avoiding.

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Here, BOS – Bayan Omar Sharif; ZRA – Zhino Raouf Ali; HMM – Hawar Mardan Mohammed

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