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# Prevalence of *helicobacter pylori* infection in patients with upper GI symptoms: A comparison between normal and abnormal upper gastrointestinal endoscopy findings

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## Abstract

**Background and objective:** A staggering of more than half of the global population is affected by *Helicobacter pylori* infection. The infection is commonly obtained during childhood but may stay asymptomatic with long-term clinical consequences such as gastritis, peptic ulcer illness and stomach cancer. This study carried out to determine the prevalence rate of *Helicobacter pylori* infection and related variables such as age, gender, educational level, upper GI symptoms and previous infection among patients presenting with gastroduodenal disorders in Erbil city.

**Methods:** In this cross-sectional study, 240 patients with gastroduodenal disorders from January to June 2023 were enrolled who underwent endoscopy at Rzgary Teaching Hospital and Hawler Teaching Hospital in Erbil, Iraq. Blood samples and Biopsy were taken from the patients for screening anti-Helicobacter pylori antibodies by rapid immunochromatographic assay and histopathology identification, respectively. The extracted data then analyzed by GraphPad Prism with P value less than 0.05 considered statistically significant.

**Results:** The results showed a high prevalence of H. pylori positivity was 57% in symptomatic patients and higher in those with abnormal findings, 68.8%, compared to normal, 18.2%, *P* <0.0001. The *H. pylori* infection showed association with GI abnormalities, especially duodenal ulcers, which were 75% positive; gastro-duodenitis, where the positivity was as high as 62.5%. Lower educational attainment correlated with higher infection rates, thus giving emphasis to health education. Serology provided better sensitivity but possible false positives, therefore requiring confirmation.

**Conclusions:** It can be concluded the role of *H. pylori* in upper GI disease and routine testing of symptomatic patients, especially from high-prevalence areas whose symptoms cannot be otherwise explained. Public health methods focusing on hygiene, early detection and proper treatment can diminish the effects that *H. pylori* partake on gastrointestinal health.

**Keywords:** Gastrointestinal endoscopy; Gastrointestinal abnormalities; H pylori; Serology tests; Histology tests.

## Introduction

*Helicobacter pylori* infection represents the most common chronic bacterial infection worldwide; it is estimated that 50% of the world's population is infected. This Gram-negative, spiral-shaped bacterium mainly colonizes the gastric mucosa and creates a persisting inflammatory response.[1,2] Though very prevalent, the clinical manifestations of Infection with *H. pylori* causes a broad variety of symptoms, from asymptomatic carriage to severe conditions of the gastrointestinal tract, such as peptic ulcer disease, chronic gastritis, gastric adenocarcinoma, and mucosa-associated lymphoid tissue lymphoma.[3,4]

Understanding the prevalence of H. pylori

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in different patient groups is crucial for developing effective diagnostic and treatment plans for gastrointestinal diseases.[5]

The most common complaints that bring patients to the doctor include dyspepsia, nausea, vomiting, bloating, and epigastric pain. In most cases, these symptoms will prompt the need to an upper gastrointestinal endoscopy or esophagogastroduodenoscopy (EGD), which may reveal structural abnormalities such as gastritis, ulcers, or malignancies.[6,7] However, many patients who complain of upper GI symptoms have normal endoscopic results, hence making it difficult to diagnose. In this case, H. pylori Infection would, therefore, be suspected as an underlying cause, especially when no obvious structural cause of symptoms is found.[8]

Several studies have assessed the relationship between *H. pylori* infection and endoscopic findings. Abnormalities such as gastritis, duodenitis, gastric ulcers, and duodenal ulcers are well recognized as complications of *H. pylori* infection.[9-12] However, a significant number of cases with normal endoscopic appearances also test positive for *H. pylori*.[13] The presence of *H. pylori* in persons without obvious mucosal injury does call into question the role of this organism in the generation of symptoms.[14] This poses a diagnostic dilemma; does the presence of *H. pylori* in patients with normal endoscopy constitute an indication for aggressive treatment or is it just a bystander in the context of non-ulcer dyspepsia or functional dyspepsia?.[15]

The high prevalence of Infection with *H. pylori* and a possible contribution to the symptoms of the upper GI, even in cases where no abnormal endoscopic findings are found, have underlined the need for a comprehensive approach to patient evaluation.[16,17] This in turn has led to the recommendation of routine *H. pylori* testing in patients with unexplained dyspepsia, especially those in high-infection-prevalence countries.[1,18] While *H. pylori* eradication significantly improves symptoms in selected patients with non-ulcer dyspepsia, the benefit is not universal. This re -enforces the idea that the inter- relationship between *H. pylori* infection and upper GI symptoms is complex-at least in those cases where no obvious structural abnormalities are present.[19,20]

The association of *H. pylori* infection with abnormal endoscopic findings is less nebulous. For example, it has been well shown that *H. pylori* infection is a major cause of peptic ulcer disease; thus, eradication therapy significantly altered the management of ulcers by reducing recurrence rates and improving the outcomes of patients.[21] Likewise, in cases of chronic gastritis or duodenitis associated with *H. pylori*, eradication therapy has been used to reduce inflammation and will likely prevent the progression to more serious disease states, such as atrophic gastritis or gastric cancer.[22]

Despite the clear association between *H. pylori* and some GI conditions, the relative prevalence of *H. pylori* infection in patients with normal findings versus those with abnormal findings in endoscopy is not well-characterized.[23] It is known that the presence of *H. pylori* is common among patients whose endoscopic examination revealed abnormalities; however, the exact prevalence of this microorganism in subjects with normal findings remains unclear.[1,14] Several questions can be raised: How prevalent is. Does *H. pylori* infection correlate with the presence of particular symptoms in patients presenting with upper GI symptoms despite normal endoscopic results? What is an appropriate approach to the management of *H. pylori* in patients with upper GI symptoms when no endoscopic evidence of structural disease exists?

This study attempts to answer these questions by comparing *H. pylori* infection in patients with upper GI symptoms who have normal versus abnormal findings on

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upper gastrointestinal endoscopy.

The current research has, therefore, investigated the association of *H. pylori* status with endoscopic outcomes with the hope that this may provide clues that can assist in the diagnostic and therapeutic decision analysis for patients with unexplained upper GI symptoms. The results from this study might have an impact on the clinical strategy toward testing and treatment of *H. pylori* in different subgroups of patients help optimize the care of patients presenting with upper GI complaints.

## Methods

### Study design

This study is a cross-sectional study. All the patients who visit Rzgary teaching hospital and Hawler Teaching Hospital in Erbil city were asked to participate in the current study.

**Inclusion Criteria:**

- All adult patients aged 18 years and above presenting at Rzgary Teaching Hospital and Hawler Teaching Hospital in Erbil city (Kurdistan region-Iraq) with symptoms of upper GI disease such as epigastric pain, dyspepsia, bloating, nausea, vomiting, or heartburn.
- Patients referred for upper GI endoscopy at Rzgary Teaching Hospital and Hawler Teaching Hospital during January 2023 to June 2023.

**Exclusion Criteria:**

- Those who have been treated for *H. pylori* in the last 6 months.
- Those who had had gastric surgery or had severe co-morbidity which could influence the results of the study.
- Pregnant or lactating females

### Study Setting

The study was conducted in the endoscopy units of Rizgary Teaching Hospital and Hawler Teaching Hospital in Erbil city-Kurdistan region-Iraq, over a period of 6 months, from January 2023 to June 2023.

### Sample Size

This study targeted a convenient sample of 240 patients, who were from Erbil governorate and referred to the endoscopy units at Hawler and Rizgary Teaching Hospitals between January 2023 and June 2023.

### Sampling Method

A consecutive sampling method was adopted in which every patient fulfilling the inclusion criteria and willing to participate in the study is enrolled. All patients were subjected to upper GI endoscopy for their clinical assessment.

### Data Collection

Demographic Data of Patients and Symptoms. A structured questionnaire was completed by each participant, which has been designed to capture demographic data: age, gender, BMI, smoking status, and medication history. Clinical symptoms-capable of capturing the type, duration, and severity of upper GI symptoms.

All 240 patients underwent endoscopy with multiple biopsies from the antrum and body of the stomach for both histopathological examination and culture testing. Culturing is a gold-standard diagnostic method used in biopsy specimens to identify Helicobacter pylori infection.

**Endoscopic Examination:**

All patients were subjected to upper GI endoscopy, to be conducted by experienced gastroenterologists. Endoscopic findings were grouped into two categories, normal-that is, no abnormality in the mucosa, or abnormal, with the presence of gastritis, peptic ulcers, erosions, or other lesions. All abnormalities will be documented in detail, as for the type and the location of the lesion.

**Biopsy and Diagnosis of *H. pylori* Infection:**

Eighty biopsies were taken from the antrum and body during endoscopy for *H. pylori* testing. Diagnosis will be made by two methods:

1- Histopathological examination: Staining and microscopic examination of tissue samples will be conducted to detect *H. pylori*.

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2- Rapid urease test (RUT): Part of the biopsy sample will undergo the urease test-a popular diagnostic test for detection of *H. pylori*.

**Serological Testing:**

A serological test was used to analyze the samples for the presence of antibodies against *H. pylori* as a noninvasive diagnostic compared with endoscopic biopsy.

**Statistical Analysis**

For statistical analysis GraphPad Prism 8.0.2 was used. A chi-square test was performed to analyze the prevalence of *H. pylori* infection across different age groups in both males and females. Additionally, the test was used to compare the infection rates between patients with normal endoscopic findings and those with abnormalities. The *P*-value of <0.05 will be considered statistically significant.

**Ethical Considerations**

Ethical approval was obtained from the Ethics Committee of Faculty of medicine, Koya university. As well as, all patients will provide informed consent orally before the start of the study. Finally, the anonymity and confidentiality of the patients are guaranteed throughout the study.

## Results

Totally, 240 patients were enrolled to the study. The most participants were female (54.5%) the male to female ratio was 1:1.2. In addition, almost half of them were illiterate (48.34%) as shown in Table 1.

**Histological sampling for the prevalence *H. pylori***

Overall, when gastric biopsy sample from the patients were assayed for the presence of *H. pylori* bacteria, (41.8%) and (44.2%) were positive for males and females, respectively as shown in Figure 1.

**Table 1** Presents the characteristics of the patients

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 109 | (45.5%) |
| Female | 131 | (54.5%) |
| Illiterate | 116 | (48.34%) |
| Primary school | 41 | (17.08%) |
| High school and college | 83 | (34.58%) |

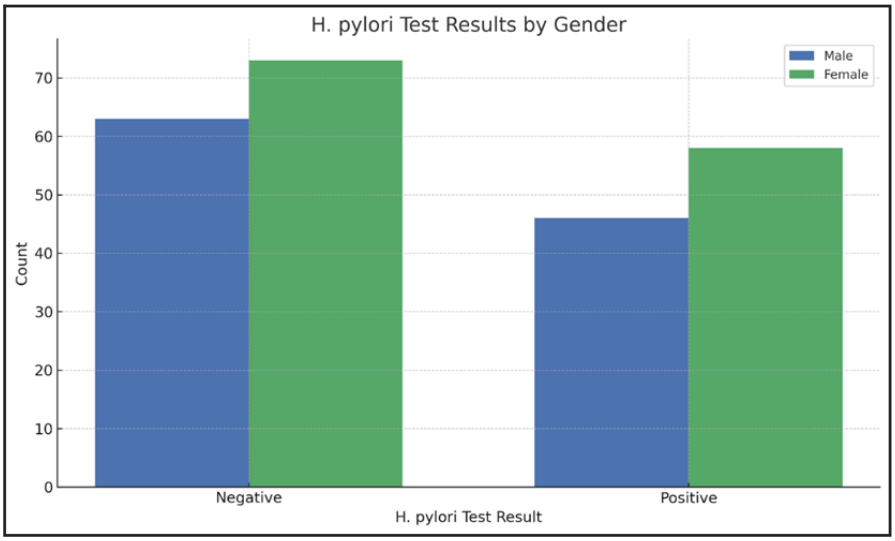


**Figure 1** Frequency of H. pylori test result among study sample

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**Blood sampling for the prevalence *H. pylori***

Also, blood sample has been taken from only 80 patients for assessing the accuracy of serological testing in comparison with the culture test. The results presented that (65%) were positive for the serological test, as well as, (40%) were positive for histological test as depicted in Figure 2. The Figure 3 showed that the positivity between extreme age groups (≤29) was 46.4% while in (≥50) was higher 65.1%.

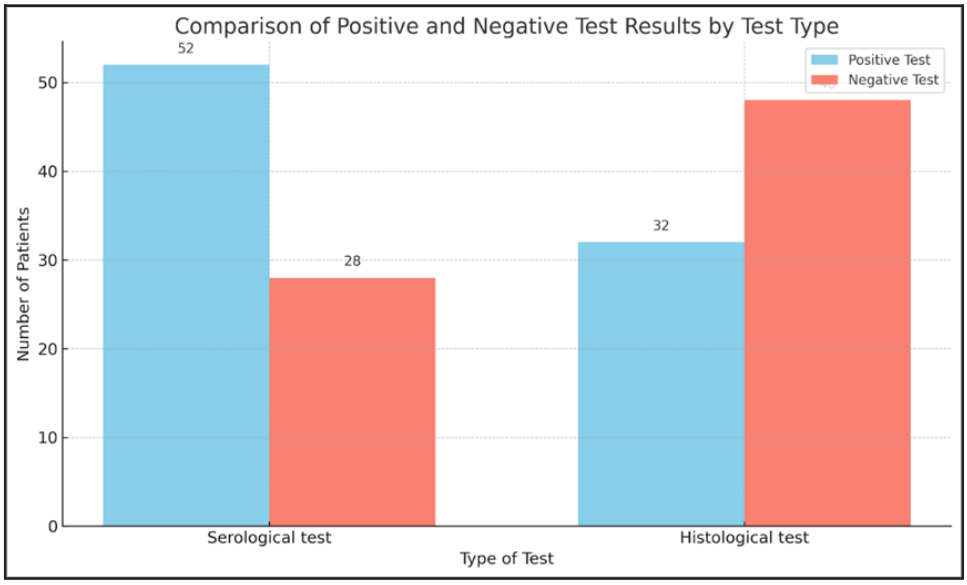


**Figure 2** Comparison of positive and Negative Test result by test type

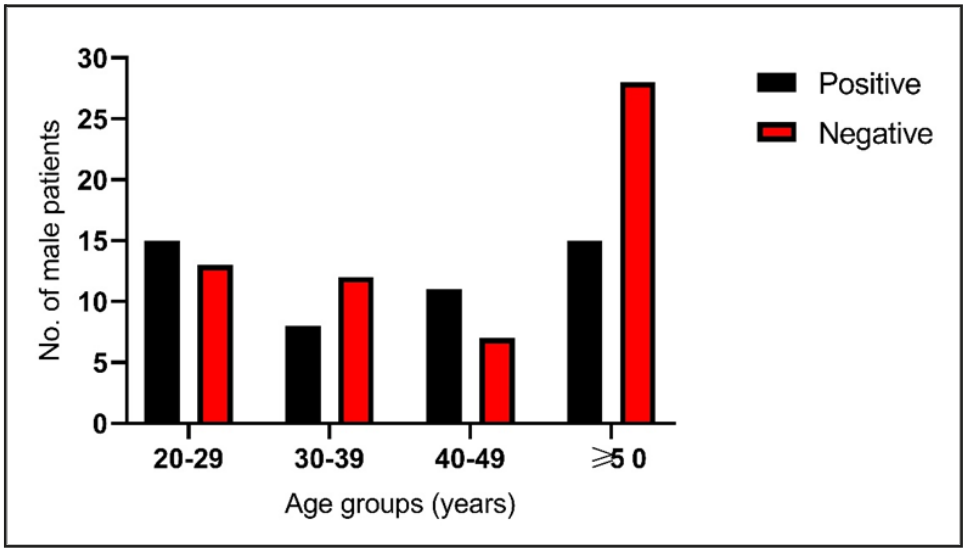


**Figure 3** Comparison of positivity and negativity among male age groups
Chi-square test: *P* = 0.195.

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Figure 4 showed that the proportion of positive patients showed no significant agreement with age at enrolment P 0.979. This was obvious in 10 years age group. Among women positivity tended to remain stable.

The data suggests significant relationship between educational level and *H. pylori* test results. People with a higher educational level (high school and college) have a lower proportion of positive *H. pylori* results (45.7%) compared to those who are illiterate or have only completed primary school (with positive rates of 62.9% and 60.9%, respectively). All the associations were statistically significant with *P* value of 0.0458 (Table 2).

**Table 2** Distribution of dyspeptic patients by educational and *H. pylori* positivity

| Educational level | *H. pylori* test | | Total No. (%) | *P* value |
|---|---|---|---|---|
| | Negative No. (%) | Positive No. (%) | | |
| Illiterate | 43 (37.1) | 73 (62.9) | 116 (100) | 0.0458 |
| Primary school | 16 (39.1) | 25 (60.9) | 41 (100) | |
| High school and college | 45 (54.3 %) | 38 (45.7) | 83 (100) | |
| Total | 104 (43 %) | 136 (57) | 240 (100) | |

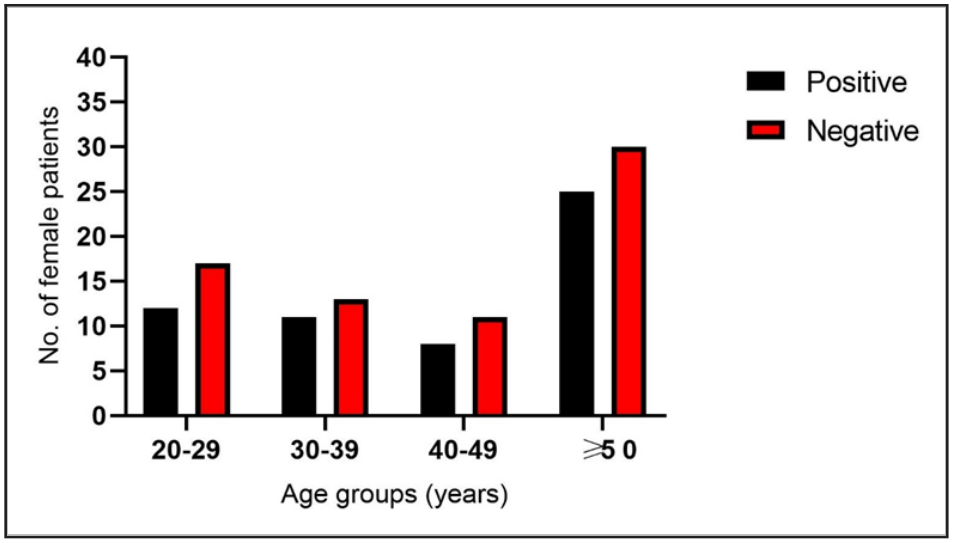


**Figure 4** Comparison of positivity and negativity among female age groups
Chi-square test: *P* = 0.979

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Table 3 indicated there is significant difference in the prevalence of *H. pylori* between patients with normal and abnormal endoscopic findings. It is shown that *H. pylori*-positive patients are more likely to have abnormal endoscopic findings (68.8%) compared to those who are *H. pylori*-negative (only 19.2% with abnormal findings) with *P* value <0.0001.

Gastro-duodenitis, in 62.5% of the cases, *H. pylori*-positive suggests association with the infection. In addition, gastric ulcer and GERD, the rate of positivity of both is 50%, possibly meaning that *H. pylori* has equal contribution to positivity and negativity.

Furthermore, duodenal ulcer, it has the highest positive rate, 75%, showing relation between *H. pylori* positivity and duodenal ulcer cases. Finally, it is clear that mucosal erosions and hyperemic mucosa, shows a higher negativity at a rate of 63%, and a weaker association for *H. pylori* infection. From the total cases of studied abnormalities, 56.3% proved positive with *H. pylori*. This germ is in especial suspected in several gastrointestinal pathologies, and its role was especially pointed out in gastro-duodenitis and duodenal ulcers. Table 4.

**Table 3** Relation between *H. pylori* positivity on histopathological study and endoscopic finding

| ***H. pylori* test (culture)** | **Endoscopic findings** | | **Total No. (%)** | ***P*-value** |
|---|---|---|---|---|
| | **Normal No. (%)** | **Abnormal No. (%)** | | |
| Positive with H. pylori culture with endoscopy | 22 (18.2) | 82 (68.8) | 104 (100) | <0.0001 |
| negative with H. pylori culture with endoscopy | 99 (81.8) | 37(19.2) | 136 (100) | |
| Total Endoscopic findings | 121 (50.41) | 119 (49.69) | 240 (100) | |

Chi-square test

**Table 4** Distribution of patients by type of abnormality and *H. pylori* positivity

| **Type of abnormality** | ***H.pylori* culture** | | **Total No. (%)** | ***P*-value** |
|---|---|---|---|---|
| | **Negative No. (%)** | **Positive No. (%)** | | |
| Gastro-duodenitis | 12 (37.5) | 20 (62.5) | 32 (100) | 0.109 |
| Gastric ulcer | 9 (50) | 9 (50) | 18 (100) | |
| Duodenal ulcer | 6 (25) | 18 (75) | 24 (100) | |
| GERD | 13 (50) | 13 (50) | 26 (100) | |
| Mucosal erosions & hyperemic mucosa | 12 (63) | 7 (27) | 19 (100) | |
| Total | 52 (43.7) | 67 (56.3) | 119 (100) | |

Chi-square test

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## Discussion

The current study estimated the prevalence and clinical implications of *H. pylori* infection in 240 symptomatic patients attending hospitals in Erbil governorate. Our results indicated that *H. pylori* infection is highly prevailing between both genders, with 41.8% and 44.2% infection rates in males and females, respectively. Thus, no significant difference was found between genders in relation to *H. pylori* infection, agreeing with other studies indicating that gender is not a major risk determinant for the infection in symptomatic populations.[24,25]

A statistically significant relationship was established between the infection of *H. pylori* and educational level, $P$ <0.05. The positivity rates of the *H. pylori* infection among the lower educationally attained patients, that is, illiterate and only those who completed primary school, were 62.9% and 60.9%, respectively, compared to those who attained high school and college, which was 45.7%. This trend follows studies that indicate a positive correlation of lower socioeconomic and educational levels with the prevalence of *H. pylori*, perhaps due to poor healthcare, poor sanitation, and a lack of information on how to avoid infectious agents.[26,27] These findings indicate a greater need for health education and preventive interventions among less educated populations in order to reduce the transmission of *H. pylori*.

The comparison of diagnostic methods was made in terms of serological and histological testing against culture results. Serology resulted in a positivity rate of 65% out of 80 patients, while histology showed a positivity rate of 40%. The higher the positivity would, therefore, suggest greater sensitivity but also the possibility of false positives, which might be the drawback in using serology as an exclusive modality of diagnosis.[28,29] This does reinforce the need for confirmatory testing through histological or culture methods for the proper diagnosis of infection with *H. pylori*.

The endoscopic findings denote that all abnormal findings had a significant association with *H. pylori* positivity, as 68.8% of the abnormal endoscopic examinations showed the presence of the bacterium. This is seen more prominently in diseases such as duodenal ulcers, which presented a 75% positivity rate. Similarly, other research has documented that the relation of infection with *H. pylori* to peptic ulcer disease is obvious and well demarcated, especially for duodenal ulcers.[30,31]

Gastro-duodenitis was also a common finding in the *H. pylori*-positive patient, further reinforcing the association of *H. pylori* with chronic gastritis and peptic ulcer disease.[9] However, this weaker association, such as in the case of mucosal erosions and hyperemic mucosa, where 63% were found to be negative for *H. pylori*, points out the fact that infection with *H. pylori* is not the cause of these conditions. This is in agreement with the study conducted by other researchers.[32]

Overall, the current results further strengthen the pathogenic role of *H. pylori* in gastrointestinal diseases, with a particular interest in duodenal ulcers and gastro-duodenitis. The strong association between abnormal endoscopic findings and infection with *H. pylori*, besides its higher prevalence among subjects with lower educational attainment, calls for targeted public health action. Health education programs should be directed at-risk populations on hygiene practices and emphasize early diagnosis and appropriate treatment strategies for *H. pylori* to reduce its burden on gastrointestinal health.[13,33,34]

The major shortcomings include a small sample size and the scope of the study that was not representative to the catchment area. The cross-sectional design cannot assure a cause-and-effect relationship for *H. pylori* infection. Regarding the diagnosis, the limitations were the false positives from serological testing, analysis of limited blood samples,

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and selection bias because it was a single-center study. It also lacks longitudinal follow-up for an assessment of the impact of *H. pylori* infection, and diet and lifestyle variables among others are not comprehensively looked into. However, it gives a significant insight into the prevalence and associations of *H. pylori* infection in patients presenting with upper gastrointestinal symptoms in Erbil.

## Conclusion

These findings, in general, draw on the role of this bacterium in the pathogenesis of gastrointestinal diseases, especially gastroduodenitis and duodenal ulcers. Awareness, early detection, and targeted health interventions are cardinal in the effort toward combating the infection, especially in the population with lower education levels. Public health education and access to diagnostic tests can play a very important role in managing Helicobacter pylori infection and its complications.

## Competing interests

The author declares that he has no competing interests.

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