

Prevalence and histological features of *Helicobacter pylori* in patients underwent Esophagogastroduodenoscopy

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Abstract

Helicobacter pylori (*H. pylori*) are gram-negative bacilli and a common chronic bacterial infection in humans, linked to chronic gastritis, gastric and duodenal ulcers, and stomach cancer. This study aimed to determine the prevalence of *H. pylori* infection among symptomatic patients undergoing their first Esophagogastrroduodenoscopy (EGD) at Sultan Qaboos University Hospital (SQUH), examining its distribution across different age and gender groups, and identifying related histological findings, comparing results with other Middle Eastern countries. A cross-sectional study was conducted at SQUH which includes all symptomatic adult outpatients underwent first time EGD between Jan 2015 to Jan 2016. Histology test was used to investigate the histopathological features associated with *H. pylori* infection. Appropriate statistical tests were used for comparison and analysis of the data. A total of 170 symptomatic patients were included in this study. Among those symptomatic patients, 49.4% (n=84) were males, whereas, 50.6% (n=86) were females. The prevalence of *H. pylori* infection was 45.3% (n=77/170). The distribution of *H. pylori* infection among males was 42.9% (n=36/84) compared to females 47.7% (n=41/86). The highest frequency of infection was among 50-59 and >60 age groups (20 patients), whereas, the lowest was among <29 age group (6 patient). Chronic gastritis was the highest histopathological features present in patients with *H. pylori* infection 76.62% (n=59). This study shows that females and older age groups had the highest prevalence of *H. pylori* infection compared to the other groups. It shows also that the prevalence of *H. pylori* infection was lower than other Middle East countries.

Keywords: *H. pylori*; Prevalence; Oman; Histopathological features; Chronic gastritis

1. Introduction

Helicobacter pylori, *H. pylori*, are considered as gram negative bacilli. They are spirally shaped with multiple unipolar flagella measuring from 2-4 µm in length while their width is 0.5 to 1 µm. they belong to microaerophilic group of microorganisms which requires high rich growth media and carbon dioxide (CO₂) (1, 2). *H. pylori* are mainly colonizing the mucosa of the stomach, especially in the antrum (3).

Therefore, gastric acid which is produced by parietal cells in the gastric mucosa is harmful to the bacteria; however, they have the ability to survive by neutralizing the acid through the production of urease which acts on the gastric mucosa to produce ammonia (1).

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H. pylori infection can be detected in different age groups throughout the world. On the other hand, *H. pylori* can be transmitted by different routes such as oral-oral and oral-fecal (4). Furthermore, in developed countries, the most common mode of transmission seems to be horizontally from mother to child (5). Invasive and noninvasive tests are usually used to diagnose the *H. pylori* infection. One of the common invasive tests is EGD. This procedure is done by passing a flexible tube into the stomach that allows small sample to be taken and visualize it under the microscope (6). However, the most sensitive test used to diagnose the *H. pylori* infection is Polymerase Chain Reaction (PCR); as it has the ability to detect the DNA of *H. pylori* (7).

Colonization with *H. pylori* may induce chronic gastritis in infected individuals as well as it is a risk factor for development of gastric and duodenal ulcers (1). Moreover, according to the international agency for research on cancer, *H. pylori* increase the risk for development of gastric cancer and mucosal associated lymphoid tissue (MALT) lymphoma as it has been classified as group one carcinogen (2). However, the development of these diseases depends on different environmental and host factors (8). The majority of patients with *H. pylori* infection will not develop any symptoms, however, some patients with *H. pylori* infection may present with different symptoms. These symptoms include: abdominal pain especially in the upper part, dyspepsia, nausea, vomiting, flatulence, feeling full even after eating small meal, lack of appetite, dark stool, and in severe cases bleeding per rectum. *H. pylori* infection can be treated using the eradication therapy which contains antibiotics; however, the major cause of failure to treat and eradicate *H. pylori* infection is antibiotic resistance (3).

Nowadays, *H. pylori* infection is considered as one of the most common chronic bacterial infections in humans (8). Studies have found that half of the world population is colonized with *H. pylori* (4). Moreover, the prevalence rates of infection are high (70 to 90 %) among people living in places with low socioeconomic status and poor hygiene. In these developing countries, there is a rapid increase in the prevalence of the infection in first five years of childhood and remains constant throughout the life which may indicate that *H. pylori* infection is acquired during the childhood. In contrast, in developed countries, the prevalence rates are less than (40%) which is may be explained due to decreased chance of getting the *H. pylori* infection during the childhood as a result of improved hygiene and sanitation (1, 2).

Nevertheless, recent studies showed that over the last decades, there was a decline in the prevalence of *H. pylori* infection in most countries due to development of the eradication therapy and because of the improvement of hygiene and living conditions (9). So far, little information is available about the prevalence of *H. pylori* infection in Oman. Therefore, this study was designed to determine the prevalence of *H. pylori* among patients underwent first time EGD at SQUH, and to correlate the prevalence with the distribution of different age and gender groups. In addition, it aims also to identify various histological findings related to *H. pylori* and to compare the results with other Middle East countries.

2. Material and methods

A cross-sectional study was conducted at SQUH. This hospital is considered as tertiary public hospital in Oman; therefore, all patients were referred from different regions in the country. All adult outpatients (above or equal to 18 years old) underwent EGD for the first time between Jan 2015 to Jan 2016 and never being treated with *H. pylori* were included. On the other hand, those patients who were taking Proton Pump Inhibitors (PPIs) were excluded as well as patients missing their major data.

Histology test was used by taking the biopsy specimens from the stomach, mainly in the antrum, which is then sent for histological examination. According to the presence of *H. pylori*, patients were classified into *H. pylori* positive and *H. pylori* negative. The histopathological findings were categorized into gastric ulcer, duodenal ulcer, gastritis, duodenitis, and neoplasm. In addition, chronic gastritis has been classified into acute, moderate, and chronic based on the number of inflammatory cells present.

Data on age, gender, histological findings, and colonization with *H. pylori* have been retrieved. The data were collected and gathered from Hospital Information System (TrakCare®).

Categorized variables such as frequency and percentage were calculated from the study as an appropriate to provide the overall picture. Analysis of the data was done using Statistical Package for Social Sciences (SPSS) software, version 23. Chi square test was used to find the p value and it is considered statistically significant if $p < 0.05$. Ethical approval was obtained from SQU Ethical Committee.

3. Results

A total of 170 symptomatic patients were studied. The patients' age ranged from 18-92 years with mean age of 50.75 ± 14.82 years. Among those symptomatic patients, 84 (49.4%) were males, whereas, 86 (50.6%) were females. The prevalence of *H. pylori* infection in patients underwent EGD was 45.3% ($n=77/170$). More than half of the patients 54.7% ($n=93/170$) were *H. pylori* negative (Table 1).

Table 1 Prevalence of *H. pylori* in patients underwent EGD

<i>H. pylori</i>	Frequency	Percent %
Positive	77	45.3%
Negative	93	54.7%
Total	170	100.0%

Among males, the distribution of *H. pylori* infection was 42.9% ($n=36/84$), compared to the females which was higher 47.7% ($n=41/86$). Since $p > 0.05$, there was no association between *H. pylori* infection and different gender groups (Table 2).

Table 2 Distribution of *H. pylori* among different gender groups

			<i>H. pylori</i>		Total
			Positive	Negative	
Gender	male	Count	36	48	84
		% within Gender	42.9%	57.1%	100.0 %
	female	Count	41	45	86
		% within Gender	47.7%	52.3%	100.0 %
Total		Count	77	93	170
		% within Gender	45.3%	54.7%	100.0 %

On the other hand, the frequency of *H. pylori* infection was equal (20 patients) in 50-59 years and >60 years age groups which was the highest among other age groups, whereas, the lowest frequency was seen in <29 years age group (6 patients). However, the difference was not statistically significant (Figure 1).

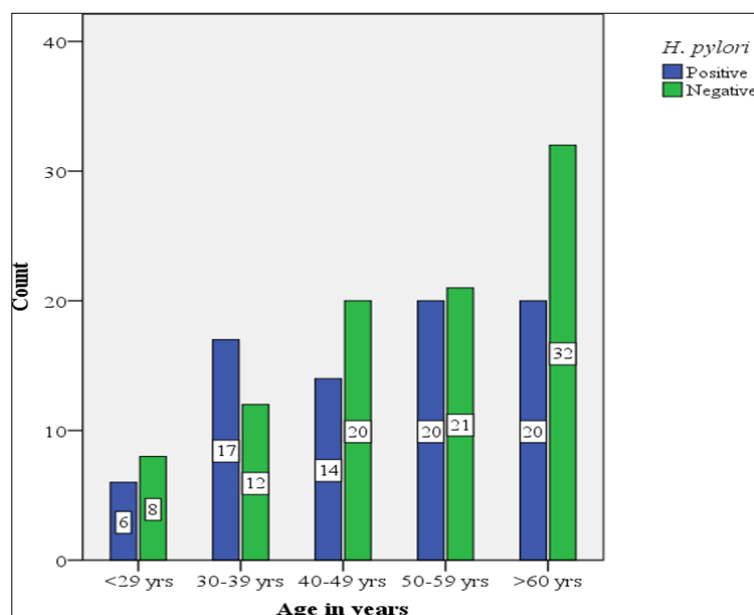


Figure 1 The prevalence of *H. pylori* among different age groups

Histopathological finding in *H. pylori* positive patients was divided into chronic gastritis, duodenitis, gastric ulcer, duodenal ulcer, carcinoma, Gastroesophageal Reflex Disease (GERD), and a combination of gastritis with duodenitis which was diagnosed in 59 (76.62%), 0 (0%), 5 (6.49%), 0 (0%), 1 (1.30%), 3 (3.90), and 9 (11.69%) respectively. In comparison with *H. pylori* negative patients, chronic gastritis, duodenitis, gastric ulcer, duodenal ulcer, carcinoma, GERD, and a combination of gastritis with duodenitis were diagnosed in 67 (72.04%), 1 (1.08%), 12 (12.90%), 1 (1.08%), 4 (4.30%), 1 (1.08%), and 7 (7.53%) respectively (Figure 2).

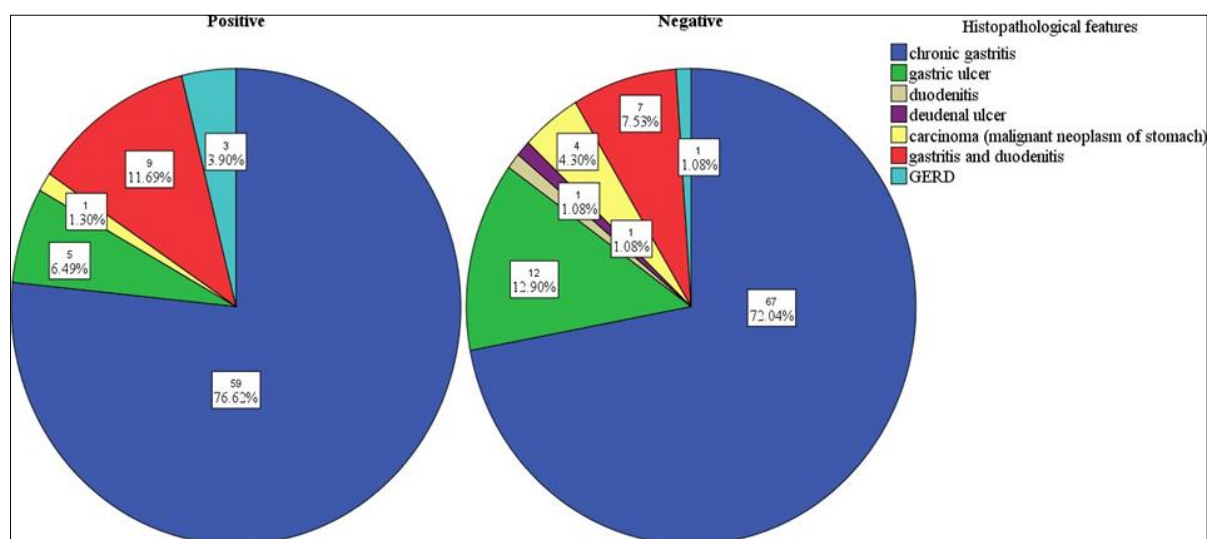


Figure 2 Histopathological findings among *H. pylori* positive and *H. pylori* negative patients

Chronic gastritis was further divided into mild, moderate, severe, and undefined. Moderate chronic gastritis was the highest 30 (50.65%) among *H. pylori* positive patients followed by mild chronic gastritis 21 (35.59%), whereas, the mild chronic gastritis was the highest 60 (89.55%) among *H. pylori* negative patients followed by moderate chronic gastritis 6 (8.96%). In addition, severe chronic gastritis was only present among patients with *H. pylori* infection 4 (6.78%) (Figure 3).

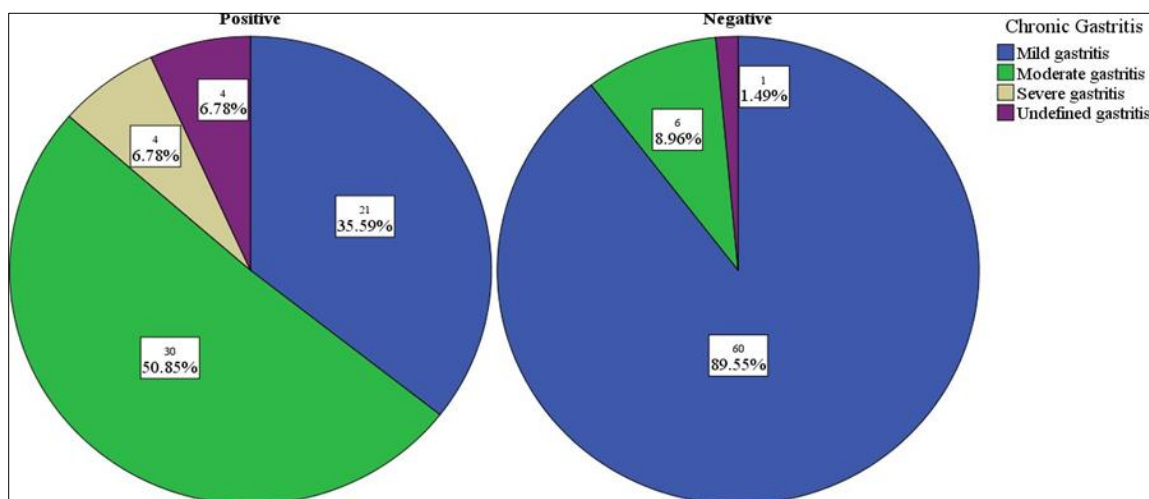


Figure 3 Distribution of different types of chronic gastritis among *H. pylori* positive and *H. pylori* negative patients

4. Discussion

Since the discovery of *H. pylori* in 1983 by Warren and Marshall, our knowledge and understanding about clinical management and epidemiology of gastrointestinal diseases have been changed radically (10). The incidence and prevalence of *H. pylori* infection usually differ in relation to different factors such as age, socio-economic factors, geography, and ethnicity. The *H. pylori* infection seems to be higher in developing countries and lower in developed world (9, 11).

In this study, the overall prevalence of *H. pylori* infection was 45.3% (n=77/170) among symptomatic patients underwent EGD for the first time at SQUH. In comparison with other Gulf Citizen Countries (GCC), the prevalence of *H. pylori* was lower. A study that was published in UAE showed that the prevalence of *H. pylori* infection among symptomatic patients was 90.39% (n=437) (12). Another study published in KSA showed that *H. pylori* were positive in 54.9% (n=488) of patients underwent gastric biopsies (13). In Kuwait, there was high prevalence of *H. pylori* infection 96.6% (n=204) (14). Moreover, in other Middle East Countries, the prevalence of *H. pylori* infection was again higher than in this study; such as in Yemen, Jordan, and Iran the prevalence was 82.2% (n=275), 82% (n=197), and 67.1% respectively (15-17). The low prevalence of *H. pylori* infection in this study compared to other Middle East countries could be explained due to use of selected sample population based on one governmental hospital. It could also be explained due to the exclusion of a lot of patients who were taking PPIs as it will give false negative results.

On the other hand, there was a slight difference in the prevalence of *H. pylori* among males and females 42.9% (n=36/84) and 47.7% (n=41/86) respectively. In comparison with other studies, this prevalence was in disagreement; where males had more *H. pylori* infection compared to females (17). According to our findings, p value was statistically not significant; therefore, there was no association between *H. pylori* infection and different gender groups. In this study, *H. pylori* infection was highest in 50-59 and >60 age groups, whereas, the lowest prevalence was among <29 age group. This could be explained due to differences in the risk factors for *H. pylori* infection among old patients and younger patients, or it could be due to a cohort effect (18). Another study showed that the prevalence of *H. pylori* infection was highest among younger age group of <20 years (90.9%); which may be explained due to acquisition of infection during the childhood (19).

Studies proved that *H. pylori* are the main cause for development of chronic gastritis as well as it is strongly associated with Peptic Ulcer Disease (PUD) and gastric cancer (19). Like other studies, this study showed that there is a strong association between the presence of *H. pylori* infection and chronic gastritis, which was found in 76.62% among *H. pylori* positive group. Surprisingly, there were no cases of duodenal ulcer associated with *H. pylori* infection although it is a risk factor for development of duodenal ulcer. Chronic gastritis with duodenitis was the second highest histopathological findings among *H. pylori* positive patients 11.96% (n=9) followed by gastric ulcer 6.49% (n=5), GERD 3.39% (n=3), and malignant neoplasm of stomach was present in one case. In contrast, among *H. pylori* negative patients, chronic gastritis was again the highest histopathological feature which present in 67 of patients (72.04%), followed by gastric ulcer, gastritis with duodenitis, malignant neoplasm of stomach which their prevalence was 12 (12.90%), 7

(7.53%), and 4 (4.30%). Moreover, GERD, duodenitis, and duodenal ulcer prevalence among *H. pylori* negative patients were equal 1 (1.08%).

Although *H. pylori* seem to be strongly associated with gastric cancer, our findings were surprisingly different. *H. pylori* negative group had higher prevalence of gastric carcinoma 4 (4.30%) compared to *H. pylori* positive group 1 (1.30%). On the other hand, according to the endoscopic findings, intestinal metaplasia was present in 24.7% (n=42/168) among symptomatic patients. Other endoscopic findings such as antral erosion, erythema, nodularity, bleeding, and rugal atrophy were present in 13 (7.6%), 5 (2.9%), 3 (1.8%), 2 (1.2%), and 2 (1.2%) respectively. Due to small number of patients who have complete endoscopic reports, it was very difficult to comment on the findings. Therefore, further studies need to be done in order to find the endoscopic features of patients with *H. pylori* infection in Oman.

Several limitations are present in this study. Firstly, the study was restricted to only one hospital in one region of Oman. Secondly, there were no other diagnostic methods to detect the presence of *H. pylori* microorganism. Thirdly, this study run over one year only; which result in small sample size.

5. Conclusion

In conclusion, the prevalence of *H. pylori* infection detected by histopathology among symptomatic adult outpatient underwent EGD was 45.3% (n=77/170). The rate of the infection was high (20 patients) in 50-59 and >60 age groups, whereas, the lowest rate of infection (6 patients) was among <29 age group. In addition, the infection was slightly higher among females 47.7% (n=41/86) compared to males 42.9% (n=36/84). *H. pylori* infection was strongly associated with chronic gastritis 76.62% (n=59). Although the prevalence of *H. pylori* infection in this study was lower than other Middle East countries, it still reflects that it is one of the major health burdens in Oman. Therefore, it is crucial agenda for public health to report such these issues and implement appropriate strategies to control the *H. pylori* infection.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this study.

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