

Prevalence and Diagnosis of Helicobacter Pylori Infection in a Tertiary Hospital in the Kingdom of Bahrain

Safa Alshaikh, MBBS* Ahmed Al Sharakhhat, MBBS* Zainab Toorani, MB BCh BAO* Eman Farid, MD* Maheeba Abdulla, MD**

ABSTRACT

Background: Helicobacter pylori, is a gram-negative bacterium. Helicobacter Pylori is one of the most common human infections in the world. It is a major cause of gastritis, gastric ulcer and gastric cancer.

Objective: To determine the prevalence of Helicobacter pylori infection in Bahrain and compare our prevalence with the prevalence of H. pylori infection in different countries through systemic review of the literature. We also attempted to determine the diagnostic tests used in Bahrain.

Setting: Salmaniya Medical Complex, Bahrain.

Design: Retrospective study.

Method: We conducted a retrospective study during one year interval from January 2018 to December 2018 for all gastric biopsies taken through endoscopy for dyspepsia, we determined the prevalence of H. pylori, and we also analyzed the diagnostic modalities used in our institution.

Result: A total of 942 patients had gastric biopsy, including 544(57.8%) females and 398 males (42.2%). A higher prevalence of H. pylori was found in men versus women (98/392) (25%) vs (110/536) (20.5%), respectively, which was statistically significant ($p < 0.00001$). The average age was 48.5. Out of 928 patients, 456 are >50 years (49.1%) and 472 patients are <50 years (50.9%). H. pylori prevalence was 22.4 % by histology and 38.5% by urea breath test (UBT). Among those with a result of both tests, there was 59.4% concordance.

Conclusion: This study revealed that the overall prevalence of H. pylori in patients with dyspepsia in our institute is 22.4%. The prevalence of H. pylori was higher in men. Concordance between histology and UBT was 59.4% in this group.

INTRODUCTION

Helicobacter Pylori, is a ubiquitous, flagellated gram-negative bacterium that infects the epithelial lining of the stomach. It was first isolated by Warren and Marshall in 1983¹.

Helicobacter Pylori is one of the most common human infections in the world. It is a major cause of human gastritis and gastric ulcer and it is also associated with an increased risk of gastric cancer²⁻⁴. The organism can survive in the acidic environment of the stomach partly owing to its high urease activity. Urease converts the urea present in gastric juice to alkaline ammonia and carbon dioxide. Helicobacter pylori is estimated to be present in the stomachs of half of the adult human population with a higher prevalence in developing countries and is typically acquired during childhood⁵⁻⁷. Infected individuals often have histological evidence of gastritis, however, the vast majority of patients are asymptomatic⁸. Epidemiological studies of H. Pylori suggest that the bacterium primarily spreads person-to-person via oral-oral and fecal-oral routes; however, conflicting results and knowledge gaps have precluded a clear understanding of pathogen transmission and the role of environmental factors. H. Pylori has 20 different strains that have been implicated in many diseases⁸. Acquisition rates during

childhood are much higher in developing countries and have been associated with living in impoverished regions with overcrowding, poor sanitation and hygiene and poor water supply. Also, the rate will decrease in successive generations of children as the living standards improved and if untreated remain for the rest of an individual's life⁹⁻¹². There are considerable variations in incidence geographically and the overall yearly incidence rates globally are 15.6 to 18.1 and 6.7 to 7.8 per 100 000 individuals in men and women, respectively. Transmission of H. Pylori infection within families turns out to be an important risk factor¹³.

Diagnosis of H. Pylori infections can be performed by variable invasive and non-invasive methods. Histology, culture, rapid urease test and polymerase chain reaction are the tests which are carried out on antral biopsies collected by invasive methods. Histology has been considered to be the gold standard for detection of H. Pylori. However, Combinations of more than one test usually give the quite satisfactory diagnosis¹³.

H. Pylori is characterized as a group I carcinogen by the International Agency for Research on Cancer (World Health Organization)¹⁴. Chronic infection with H. Pylori is strongly associated with gastric

* Department of Pathology,
Salmaniya Medical Complex, Ministry of Health, Manama,
Kingdom of Bahrain
E-mail: dr_Salshaikh@hotmail.com

** Department of Medicine,
Internal Medicine
Consultant Medicine
Department of pathology, Salmaniya Medical Complex

cancer, the highest incidence of which is observed in Korea, Mongolia, Japan, and China¹⁵. There have been many reviews of the prevalence of H. Pylori. However, they have usually been global, have been confined to the small volume of national surveys of H. Pylori prevalence or have included selected patient groups with specific disease associations or are now dated¹⁶. To our knowledge, there is no or very limited studies about the prevalence and diagnosis of H. Pylori in Bahrain, in gulf countries or even in the Middle East. The main aims of the present study were to determine the prevalence of H. Pylori in Bahrain among symptomatic patients by histology and urea breath test, to report on the relationship between H. Pylori prevalence and sex and age group and also to determine the test modalities used in the diagnosis of H. Pylori.

METHOD

This was a retrospective study, we searched the electronic records of our Pathology Department for all gastric biopsies taken from patients presenting for gastroscopy at Salmaniya Medical Complex, between the period (January 2018-December 2018).

Patient identifiers (name and record number) were excluded on extraction of the data from the database. As the study was retrospective and observational, and involved a routinely collected hospital database, individual informed consent was not sought. Ethical approval was obtained from our institutional Review Board. The data were entered into a Microsoft Excel spread sheet. A total of 942 patients undergoing upper endoscopy were biopsied and tested in histopathology. All the data were collected through the institutional laboratory information system (I-Seha). The following parameters were calculated for all biopsies: the age, gender, presence or absence of H. pylori, urea breath test and serology test. All p values for differences between study groups were calculated using the x2 test and were two-tailed, with significance level of p0.05. All biopsy materials for histological testing were fixed in 10% buffered formalin and embedded in paraffin. Then serial sections were stained with hematoxylin and eosin in which H. Pylori was tested on H & E. We searched PubMed to look for original studies reporting prevalence of H. Pylori up to 2020. The search terms used were ‘H. pylori’, ‘Helicobacter pylori’ or ‘pylori’ combined with ‘prevalence, epidemiology and diagnosis’. The search was directed at studies appearing only in English-language medical journals. All studies identified by the electronic database search were examined and additional references were also identified from the references listed in each of these studies.

RESULTS

The search yielded a total of 942 gastric biopsies from patients with dyspeptic symptoms (544 females and 398 males; average age of 48.5 years), during the study interval (January 2018-December 2018). 14 patients were excluded from the analysis because of incomplete data, leaving 928 Endoscopic biopsies available for analysis.

As shown in Table 1, A higher prevalence was found in men versus women (98/392) (25%) vs 110/536) (20.5%), respectively (p<.00001).

Table 1: Prevalence of H. Pylori in gastric biopsy

	Gastric biopsy		Total
	Positive	Negative	
Females	110(20.5%)	426(79.5%)	536
Males	98(25%)	294(75%)	392
Total	208(22.4%)	720(77.6%)	928

However, in our study, there was no statistically significant difference in the prevalence of H. Pylori with reference to age (> or < 50 years),

in which the prevalence of H. Pylori in patients >50 years was 49.1% while 50.9% for patients <50 years (Figure 1).

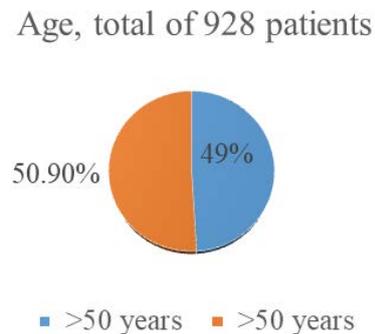


Figure 1: H. Pylori positivity by histology related to the age.

96 patients were tested by urea breath test (UBT). The results of the H. Pylori UBT were categorized as positive or negative. Of the 96 patients, 59 (61.4%) were negative and 37(38.5%) were positive. Among those with a result for both histology and UBT, there was 59.4% concordance (Table 2).

Table 2: Prevalence of H.Pylori and the diagnostic method used

Method of Detecting H.Pylori	Sample size(n)	Positive cases(%)	Negative cases(%)
Histology	928	208(22.4%)	720(77.6%)
UBT	96	37(38.5%)	59(61.5%)

DISCUSSION

Histology was the first method used for the detection of H. Pylori. Presence of typical bacteria along with the inflammatory reaction in the tissue is considered as diagnostic test for H. pylori infection. Prior antibiotics and PPI may change the typical shape of H. Pylori from spiral to coccid which becomes undetectable by the light microscope. H. Pylori may cause dyspeptic symptoms, gastritis and result in peptic ulcer disease (PUD) and gastric cancer. The recognized role of H. Pylori as a carcinogen makes eradication of H. Pylori infection the preferred way for the prevention of gastric cancer^{18,19}.

The global prevalence of H. Pylori infection was estimated at 48.5% in 2017²⁰. The prevalence of H. Pylori infection ranges widely across populations, ranging from under 15% to greater than 85% of the population with a decreasing prevalence in several areas of the world²¹. In developed countries, H. Pylori infection is acquired at a constant rate of 2-6% per year with a prevalence of 20-40% in adults. In developing countries, the infection is acquired in early childhood at higher rates, in which 70-90% of people are infected by age 20²². Ueda et al from Japan stated in his study that the prevalence of H. Pylori infection increases with age and exhibits geographic variation in Japan and he mentioned that there has been a striking decrease in the prevalence of H. Pylori infection, especially in younger Japanese populations²³.

A study from in Rwanda done by T. D. Walker et al in 2014, found that in the subset of endoscopy patients who underwent H. pylori testing (n: 825), the overall prevalence of H. Pylori was 75.3% (622/825), which is similar to that reported 25 years ago in Rwanda by Rouvroy et al²⁴. Estimating the national and regional prevalence, trends of infection and associated factors is crucial to establish appropriate strategies for the diagnosis, prevention and control of H. Pylori infection. Our study sought to determine the prevalence of H. Pylori in patients presented at

our institute with symptoms of gastritis and underwent endoscopy and biopsy. Wubejig Abebaw et al in his study stated that the prevalence of H. Pylori was slightly higher in females than males. This is similar to a study done in South Africa (Tanih et al., 2010)¹⁷.

The prevalence of H. Pylori infection differs on the bases of laboratory tests used. Higher prevalence was observed when detection is supplemented with sensitive tests including PCR, culture, rapid urease test and histopathology. However, combination of at least two diagnostic methods is recommended to increase the validity of the results.

According to a previously published systemic review related to the prevalence of H. pylori worldwide through thirty-seven studies done from 22 countries, the highest prevalence was found in Asia and Latin America. Countries with a high gastric cancer rate was found to have two-fold higher prevalence of H. Pylori infection. There are also studies performed in the Middle East. It included 26 articles from eight countries reporting data from 1989 to 2013. There were two studies on the healthy population in Iran published in 2009 and 2007, and the prevalence was 69 and 67.5%, respectively. Among the other countries, Egypt had the highest prevalence in healthy adults. In all of these countries, the prevalence was 70% or more. In general, the prevalence of H. Pylori is decreasing with improvement in social and hygiene status.

Serological tests for the diagnosis of chronic gastritis and gastric atrophy have been in use for more than 25 years, which include H. Pylori serology (crude antigen with or without determination of anti-Cag A antibodies) for the diagnosis of gastritis, and serum pepsinogen I and II and gastrin for the diagnosis of gland loss resulting in hypoacidity.

In a study done by Gong et al, he compared the accuracy of serological testing to histological diagnosis in a gastric cancer screening survey. He stated that serological testing underestimated the prevalence of H. Pylori by 30%.

A number of systematic reviews and meta-analyses have been published indicating the lowest prevalence rates of the infection in Oceania (24.4%), the highest in Africa (79.1%), and the global annual recurrence rate of H. Pylori (4.3%)²⁵.

N dip RN et al in Cameroon reported a high H. Pylori prevalence in patients referred for endoscopy (92.2%, 71/77). Two African studies included patients, either at endoscopy, or dyspeptic patients, stated that the H. Pylori prevalence was higher than 70%. We confirmed in our study that the H. Pylori infection prevalence in patient referred to endoscopy is low (22.4%, 208/928).

Agbor et al stated that the antigen prevalence in patients >50 years) was higher (53%) than in patients <50 years (42.8%) which was statistically significant (P<0.05). He stated in his report that the aging is associated with a diminished epithelial cell turnover rate, reduced capacity to repair the gastric mucosa and decreasing prostaglandin levels in the stomach making age a major risk factor for H. pylori colonization. We found in our study that the prevalence of H. Pylori in patients >50 years is 49.1% while it was 50.9% for patients <50 years.

Recurrence (either by recrudescence or reinfection) is defined as evidence of an active H. Pylori infection in a patient with previously confirmed H. Pylori eradication. Recrudescence is the reappearance of the original infection following an initially false-negative post eradication test result, and reinfection can be an infection with a

new strain^{26,27}. The definitive cure of H. Pylori infection, prevention of its complications, and cure of mucosa-associated lymphoid tissue (MALT) lymphoma, is dependent on the successful eradication of H. Pylori infection.

In developed countries, there is a low prevalence of H. Pylori infection, therefore, the eradication of H. Pylori is typically associated with a very low risk of infection and the recurrence rates ranging between 0.5% and 2.0% per year in adults²⁸. While, in developing countries where the prevalence of H. Pylori infection is often high ranging between 70%-90%, H. Pylori re-infection rates have reportedly varied substantially from 4.3% to 73%.

Benefits of H. Pylori eradication depend on the degree and extent of damage that has already occurred and the reversibility of that damage. These benefits are stopping the progression of mucosal damage, stabilization or reduction in risk of developing gastric cancer, resolution of mucosal inflammation, stabilization or improvement of gastric mucosal function, return of the normal mechanisms governing acid secretion, cure of H. Pylori-related PUD, reduction in risk of gastrointestinal complications of NSAID therapy and prevention of future development of H. Pylori-related peptic ulcer. Hybrid therapy appears to be an effective, safe, and well-tolerated treatment for H. Pylori infection in the era of increasing antibiotic resistance. H. Pylori recurrence is closely associated with socioeconomic and sanitary conditions. Worldwide elimination of H. Pylori will require attention to reducing both recrudescence and reinfection.

We have to acknowledge some of the limitations of this study. Firstly, there are few national or nationally representative studies that have reported on the prevalence of H. Pylori. Secondly, although the total number of gastric biopsies is 942 cases, it's much higher than the total UBT done in our institute which is done on only 96 cases and much higher than serology tests which is done on only 103 cases. Also this study needs to be expanded to include a wider populations. Some patients presented to the accident and emergency with dyspepsia or upper gastrointestinal bleeding were given antibiotics or proton pump inhibitors for H. Pylori prior to their endoscopy which can affect the status of H. Pylori on their subsequent biopsy. Finally, lack of socioeconomic information in our study is one of our limitation.

CONCLUSION

In conclusion, this study indicates that the overall prevalence of H. Pylori in Bahrain is 22.4% among patients undergoing endoscopy and biopsy. Our study also observed slightly higher prevalence of H. Pylori infection in males and in patients < 50 years. Concordance between histology and UBT is 59.4%.

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Competing Interest: None.

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