Epidemiology of *Helicobacter pylori* Infection among Symptomatic Patients, Correlation with Endoscopic Findings and its Association with Type II Diabetes Mellitus

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Abstract

**Background:** Helicobacter pylori (H. pylori) is an important global pathogen infecting approximately 50% of the world’s population. This study was undertaken in order to estimate the prevalence of Helicobacter pylori infections among symptomatic patients in Lebanese Hospital Geitaoui University Medical Center (HLG-CHU) and Middle East Institute of Health (MEIH), to investigate the associated risk factors, the endoscopic findings and its association with type 2 diabetes.

**Method:** This is an observational analytic case-control study, carried out over a period of 6 months, from January 2016 till June 2016, including all patients complaining of upper gastrointestinal (GI) symptoms. The patients (n=226) were enrolled following same protocol in both the hospitals. All subjects completed a validated questionnaire and underwent upper GI endoscopy. The histo-pathological diagnosis of H. pylori infection in biopsy specimen was done using the modified Giemsa stain. H. Pylori prevalence and associated factors were analysed by Students t-test, Chi-square test and Fisher exact test. Statistical analysis was performed using the statistical program SPSS version 22.

**Results:** The overall prevalence was 38.9% with no difference between sexes. There was no association with age, residential region, alcohol and caffeine use and smoking. Low level of education and non-steroidal anti-inflammatory (NSAIDs) use were the only significant factors. Bloating, nausea and early satiety were significant predictors of H. pylori infection. The most commonly identified endoscopic finding was gastritis (78.3%), only duodenitis and oesophagitis were significantly associated with H. pylori. Prevalence of H. pylori was 38.8% and 39%, respectively, in patients with diabetes and having no diabetes.

**Conclusion:** H. Pylori prevalence was found to be high. Individuals who had low educational level and NSAIDs consumers, were under higher risk of infection than others. H. pylori infection appears not to be associated with diabetes.

**Keywords:** Helicobacter pylori infection; Endoscopic findings; Type 2 diabetes mellitus

Introduction

Helicobacter pylori (*H. pylori*) is a gram negative, non-spore forming spiral bacterium which colonizes the human stomach and is prevalent worldwide. Since its discovery in the 1980s, much has been learned about this bacterium and its associated disease states. In 1994, the National Institute of Health Consensus Conference, recognized *H. pylori* as a cause of gastric and duodenal ulcers. Later that year, the International Agency for Research on Cancer declared *H. pylori* to be a group 1 human carcinogen for gastric adenocarcinoma. There is also evidence that *H. pylori* infection is a risk factor for gastric mucosa-associated lymphomas (MALT lymphomas). Furthermore, the organism is thought to be involved in other human illnesses such as hematologic, autoimmune disorders, insulin resistance and the metabolic syndrome [1,2]. High rates of *H. pylori* infection are associated with low socioeconomic status and educational levels.

Evidence has recently been published suggesting that the prevalence of *H. pylori* infection might be increased in diabetic patients and in obese patients with an impaired glucose tolerance as opposed to normal population. It was hypothesized that alterations in glucose metabolism may have a role in promoting *H. pylori* colonization due to chemical changes in the gastric mucosa. Another explanation may be that the immune status in diabetic patients, which is strongly compromised, may lead to an increased susceptibility to *H. pylori* infection [3]. However, the link between *H. pylori* infection and diabetes remains controversial, as some studies indicate a higher prevalence of infection in diabetic patients, [4-8], while others report no difference [9-12].

Since, in the current literature, there is no comprehensive review representing an evidence-based knowledge on the prevalence of *H. pylori* infection and its potential associations with dyspeptic symptoms in the Middle Eastern countries [12-16] and in Lebanon [17-19]; and on the association of *H. pylori* and diabetes mellitus [19] we conducted this study aiming to determine the prevalence of *H. pylori* infection by using gastric biopsy detection in symptomatic patients, to examine potential risk factors that may influence the acquisition of *H. pylori* infection, and its possible association with diabetes.

Methodological Approach

Subjects

All patients during the study period complaining of upper

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gastrointestinal symptoms (dyspepsia, epigastric pain, heart burn, hematemesis, dysphagia, nausea, vomiting, anorexia, early satiety, weight loss, melena, bloating) for more than one month presenting for upper GI endoscopy were recruited consecutively upon signing a written informed consent.

Exclusion criteria were:

a) Patients of type-1 diabetes
b) Non-cooperative patients who refuse to give consent or participate in the study
c) Patients on H. pylori eradication therapy.
d) Patients who had used antibiotics during the preceding 30 days.
e) Patients with a history of vagotomy or operations on the upper gastrointestinal tract.
f) Patients with endoscopic diagnosis of gastric cancer proven by histopathological examination.

Methods

Study design

This is a prospective observational analytic case-control study, including n=226 patients carried out in two hospitals; HLG-CHU & MEIH over a period of 6 months, from January 2016 till June 2016.

Data collection

The study protocol was reviewed and approved by the local ethics committee, and signed informed consents were obtained from each participant. All enrolled subjects were interviewed, by means of a structured questionnaire, to obtain general demographic details and to gather information regarding recent use of drugs and their medical history.

Data analysis

Data was collected retrospectively from 226 patients who underwent gastric biopsy. Data collection was conducted through paper CRFs that was provided to each investigational site for the collection of all study data for enrolled patients. Data validation was performed by the execution of programmed and manual edit checks in order to control any erroneous, ambiguous or incomplete data.

Statistical analysis was performed using the statistical program SPSS version 22. Descriptive analysis of qualitative variables comprised the sample size, the frequencies and the percentages. Descriptive analysis of quantitative variables included the number, the mean, and the standard deviation. A statistical significant relation exists if p-value is less than 5% using α error equal to 5%. Tests used for the analytical analysis were Chi-square test, Fisher exact test, and Students t-test.

Results

Among the 226 enrolled patients, 88 (38.9%) were positive for H. pylori infection: 40 males (54.54%) and 48 females (45.45%). The remaining 138 patients that were found negative for H. pylori infection. There were 60 males (43.47%) and 78 females (56.53%) among them as shown in (Table 1).

The infection occurred more frequently among male participants (40%) as compared to females (38.1%), however the difference was statistically not significant (p=0.771) as presented in (Table 1). The data shown in Table 2 predicted that exposure to H. pylori was higher among participants in the age group 28-39 years (57.58%), though age was not found to be associated with infection status.

The overall H. pylori infection rates were 40.9% in patients from villages, and 38.7% from towns; nonetheless, the difference was not statistically significant (P>0.05) as depicted in (Table 1).

Higher rates of H. pylori infection were found among smokers as compared to non-smokers (42.5% vs. 34.9%); however, the difference was found to be statistically non-significant (p=0.243).

All other variables; alcohol and caffeine consumption were not associated with H. pylori infection (p>0.05) (Table 3).

A significant (p=0.024) association of H. pylori infection rate was found with a decreased level of education. Individuals with lower educational levels had a higher risk than high school graduates and those with a higher education (Table 4).

No significant association (p>0.05) was found of H. pylori infection in patients with present medical history (Table 5). It is worth mentioning that in the diabetic group H. pylori was positive in 19/49 (38.8%) cases while in non-diabetics, H. pylori was positive in 69/177 (39%) cases (Table 5).

The most common presenting symptoms were epigastric pain (70.4%), bloating (41.6%) and heart burn (41.2%). The most commonly identified endoscopic findings were gastritis (78.3%), duodenitis (30.1%), and esophagitis (22.6%). Only duodenitis and oesophagitis (Table 6) were significantly associated with H. pylori (p=0.025 and 0.000 respectively).

Discussion

H. pylori is the most common chronic bacterial infection in humans [1-2]. Its prevalence varies greatly among countries and even among

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Biopsy Result</th>
<th>Chi-Square</th>
<th>p-Value</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Negative 60</td>
<td>60.0%</td>
<td>40.0%</td>
<td>0.085</td>
</tr>
<tr>
<td>Female</td>
<td>78</td>
<td>61.9%</td>
<td>48</td>
<td>38.1%</td>
</tr>
<tr>
<td>Place of residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village</td>
<td>13</td>
<td>59.1%</td>
<td>9</td>
<td>40.9%</td>
</tr>
<tr>
<td>Town</td>
<td>125</td>
<td>61.3%</td>
<td>79</td>
<td>38.7%</td>
</tr>
</tbody>
</table>

Table 1: Association between epidemiologic factors and H. pylori infection.

<table>
<thead>
<tr>
<th>Age</th>
<th>Positive biopsy</th>
<th>Chi-Square</th>
<th>p-value</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt; 18</td>
<td>2</td>
<td>50.00%</td>
<td>0.21</td>
<td>0.644 Fisher’s Exact Test</td>
</tr>
<tr>
<td>Age 18 - 28</td>
<td>7</td>
<td>26.92%</td>
<td>1.784</td>
<td>0.206 Fisher’s Exact Test</td>
</tr>
<tr>
<td>Age 29 - 39</td>
<td>19</td>
<td>57.58%</td>
<td>0.017</td>
<td>5.646 Chi-Square test</td>
</tr>
<tr>
<td>Age 40 - 50</td>
<td>20</td>
<td>45.45%</td>
<td>0.976</td>
<td>0.323 Chi-Square test</td>
</tr>
<tr>
<td>Age 51 - 61</td>
<td>11</td>
<td>27.50%</td>
<td>0.267</td>
<td>0.102 Chi-Square test</td>
</tr>
<tr>
<td>Age 62 - 72</td>
<td>10</td>
<td>31.25%</td>
<td>0.927</td>
<td>0.336 Chi-Square test</td>
</tr>
<tr>
<td>Age ≥ 73</td>
<td>3</td>
<td>21.43%</td>
<td>1.924</td>
<td>0.258 Fisher’s Exact Test</td>
</tr>
</tbody>
</table>

Table 2: Positivity of infection among different age groups.
population groups within the same country. The prevalence of *H. pylori* colonization is about 30% in the United States and other developed countries as opposed to >80% in many developing countries [16]. In general, the overall prevalence of *H. pylori* infection in the Middle East, irrespective of time and age groups, ranged from 22% to 87.6% [16].

In this prospective survey, the histologic prevalence of *H. pylori* among 226 patients who underwent biopsies during upper GI endoscopy was 38.9%. This number is in line with the three previously conducted studies in Lebanon that estimated the prevalence between 21% and 52% [13-15]. In our study we found no difference in *H. pylori* prevalence between the sexes. Regarding the influence of the lifestyle on the prevalence of *H. pylori* infection our data supports the hypothesis that there is no significant association between *H. pylori* and alcohol use or smoking which was shown in multiple studies [20-23]. Markers of low socioeconomic status such as a low family income [24] and low educational level [25-28], had all a higher likelihood of carrying *H. pylori* infection. Likewise, our current results established that: lower the education of people the higher is the risk for *H. pylori* infection. In our studied population, the most common reason for referral was dyspepsia (87.2%).

The prevalence of dyspepsia ranges from about 20-30% worldwide [29]. Despite a high prevalence of *H. pylori* in dyspeptic patients (40.6%) no significant association was found. These findings are in agreement with the earlier investigations reporting no association between dyspepsia and *H. pylori* [30,31].

The endoscopy results during our present study well demonstrated normal appearance just in 11.5% of cases. Our findings are fully contradictory to the earlier reports where normal endoscopy demonstrated the highest prevalence among symptomatic patients.
endoscopic finding. NSAID use was suggested as playing critical role as on gender, age, and area of residence. Gastritis is the most common showed that our study led to data comparable to those reported in the infection with IR or MetS, and concluded that the eradication of (MetS) among Lebanese adults that found no association of H. pylori This is in line with a study done by Naja et al. on the association of H. pylori between diabetic and control [10-17]. In our study we found no association of H. pylori infection with diabetes mellitus, nor with upper gastrointestinal symptoms in diabetes mellitus. Am J Gastroenterol 96: 1039-1046.


**Conclusion**

The analysis of the research results for *H. pylori* on 226 patients showed that our study led to data comparable to those reported in the literature, particularly to the overall prevalence which was 38.9%. This infection is associated with low level of education and does not depend on gender, age, and area of residence. Gastritis is the most common endoscopic finding. NSAID use was suggested as playing critical role as co-factor for *H. pylori* infection. Regarding the prevalence of *H. pylori* in ulcer disease, our results show a lower percentage compared with literature data. The present study suggests that *H. pylori* infection is not increased in diabetes mellitus.