Helicobacter pylori seropositivity with heart diseases and effect of some risk factors associated with infection

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Abstract:

**Background:** Helicobacter pylori (H. pylori) infection is one of the commonest bacterial pathogens in humans. Several studies have shown that this bacterium involved in pathogenesis of some extra gastrointestinal disorders like Raynaud phenomena and migraine. Knowing the inflammation as a cardiovascular risk factor in the one hand and H. Pylori involvement in extra digestive disorders on the other hand made researchers to evaluate H. pylori role in atherosclerosis processes. Some studies have shown the association of H. pylori infection with CHD while others could not documented its role in atherosclerosis processes.

**Objective:** To find a possible association between Helicobacter pylori infection and some heart diseases (cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)). And in this study, attempted to study the correlation between this infectious factor with other risk factors such as diabetes, hypertension, smoking, residence and level of education.

**Method:** We studied the prevalence of anti-H. pylori antibodies in 91, 46 patients who were admitted with the diagnosis of AMI, CSX and As and 45 healthy individuals who were age and sex matched. This was done using ELISA technique.

**Results:** In this study revealed that seropositivity of anti-H pylori IgG in patients with (cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)) and control group was positive in all patients except patients with AMI was 9 (90%), and the positive result in control group was 44(97.77%).

**Conclusion:** These findings raise the possibility that exposure to H. pylori may lead to increased risk of heart disease independent of other risk factors.

**Keywords:** Helicobacter pylori, cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)


**Introduction:**

*H pylori* is one of the commonest bacterial pathogens in humans. Helicobacter pylori is one of various spiral, gram negative and microaerophilic bacteria which produces colonies in human and primates’ stomach and results in infectious and inflammatory diseases (1). The association between Helicobacter pylori infection of the stomach and ischemic heart disease has been documented by many studies (2). Helicobacter pylori (H. pylori) is a bacterium that causes various extra-digestive diseases, including functional vascular disorders such as primary migraine and primary Raynaud's phenomenon, as well as ischemic heart disease (3). An inflammatory response possibly due to *H. pylori* has been proposed as a mechanism in patients with coronary artery disease (CAD). In
addition, \textit{H. pylori} has been recently also associated with ischemic heart disease and Cardiac syndrome X (CSX\textsuperscript{2and3}).

The prevalence of \textit{H. pylori} infection varies widely by geographic area, age, race, and socioeconomic status (SES). Because it is not possible to ascertain when infection occurs clinically \textsuperscript{(4)}, most of the information on the rates of \textit{H. pylori} in geographically and demographically diverse populations comes from seroprevalence studies. This has major disadvantages for epidemiologists, since it is generally not possible to distinguish between factors associated with acquiring versus maintaining \textit{H. pylori} infection \textsuperscript{(5)}.

\textit{Helicobacter pylori} (\textit{H. pylori}) infection is the most common infection worldwide, especially in developing countries \textsuperscript{(6)}. Several studies have shown that this bacterium involved in pathogenesis of some extra gastrointestinal disorders like Reynaud phenomena and migraine \textsuperscript{(7)}. Knowing the inflammation as a cardiovascular risk factor in the one hand and \textit{H. Pylori} involvement in extra digestive disorders on the other hand made researchers to evaluate \textit{H. pylori} role in atherosclerosis processes. Some studies have shown the association of \textit{H. pylori} infection with CHD \textsuperscript{(8 and 9)} while others could not documented its role in atherosclerosis processes.

Diabetes, blood hypertension, dyslipidemia and smoking have been known as the risk factors for atherosclerosis process which lead to coronary heart disease (CHD)\textsuperscript{(10)}. Data show that severity of CHD is different in various patients but the exact risks which affect on the severity of atherosclerosis process is still not obvious \textsuperscript{(11)}, while various researchers suggested some cardiovascular risk factor as responsible for the severity of CHD \textsuperscript{(12)}.

In this study, we attempted to study the link between \textit{H. pylori} infection and heart diseases and also correlation between this infectious factor with other risk factors such as diabetes, hypertension, smoking, residence and level of education.

\textbf{Materials and Methods}

The present study was conducted in Diayala province for the period from 1 / 10 / 2016 to 30/4/2017. It included; 46 patients with heart diseases were attended Baquba Teaching Hospital. 16 of patients were males and 30 were females, compared with 45 healthy human as control. 10 of controls were males and 35 were females. The age range was 25 to 90 years.

\textbf{Collection of serum specimens and Laboratory investigation:}

From each individual in this study, 5 ml of blood was drawn by vein puncture using disposable syringes. The blood was placed in plastic disposable tubes; it was left to stand at room temperature (20–25°C) to allow it to clot, then the sera was separated by centrifugation 10000 rpm for 5 minutes and stored at -20°C till examination. These specimens were transferred to the Virology Unit / Public Health Laboratory in Baquba for detection of IgG class antibodies to \textit{H. pylori} in serum.

Tests done were Enzyme linked immunosorbent assay (ELISA) for the detection of anti-\textit{Helicobacter pylori} antibodies using the manufacture’s specific cut off value for seropositivity. This kit is for the detection of IgG class antibodies to \textit{H. pylori} in serum. It is based on sandwich enzyme immunoassay technique with purified \textit{H. pylori} bacterial antigen adsorbed on a microwell plate BioHit, Finland).

\textbf{Results:}

Table (1) showed the association between some clinical and demographic factors with Seropositivity of anti-\textit{H pylori} IgG in patients with (cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)) and control group.
Table 1: Clinical and demographic factors of the study groups

<table>
<thead>
<tr>
<th>Clinical and demographic factors</th>
<th>CSX patients (N=3)</th>
<th>AMI patients (N=10)</th>
<th>AS patients (N=33)</th>
<th>Control (N=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years)</td>
<td>50.33</td>
<td>59.50</td>
<td>54.90</td>
<td>34.66</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1 (33.33%)</td>
<td>5 (50%)</td>
<td>14 (42.42%)</td>
<td>10 (22.2%)</td>
</tr>
<tr>
<td>Female</td>
<td>0 (0%)</td>
<td>5 (50%)</td>
<td>19 (57.57%)</td>
<td>35 (77.77%)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>3 (100%)</td>
<td>10 (10%)</td>
<td>5 (15.15%)</td>
<td>17 (37.37%)</td>
</tr>
<tr>
<td>Ruler</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>28 (84.84%)</td>
<td>28 (62.62%)</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literacy</td>
<td>0 (0%)</td>
<td>4 (40%)</td>
<td>21 (63.63%)</td>
<td>3 (6.66%)</td>
</tr>
<tr>
<td>Primary school</td>
<td>1 (33.33%)</td>
<td>2 (20%)</td>
<td>7 (21.21%)</td>
<td>25 (55.55%)</td>
</tr>
<tr>
<td>Medium school</td>
<td>1 (33.33%)</td>
<td>3 (30%)</td>
<td>4 (12.12%)</td>
<td>10 (22.22%)</td>
</tr>
<tr>
<td>Higher school</td>
<td>1 (33.33%)</td>
<td>1 (10%)</td>
<td>1 (3.03%)</td>
<td>7 (15.55%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1 (33.33%)</td>
<td>1 (10%)</td>
<td>12 (36.36%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Smokers</td>
<td>0 (0%)</td>
<td>1 (10%)</td>
<td>6 (18.18%)</td>
<td>4 (8.88%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1 (33.33%)</td>
<td>3 (30%)</td>
<td>9 (27.27%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Results in table (2) revealed that seropositivity of anti-H pylori IgG in patients with (cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)) and control group were positive in all patients except patients with AMI was 9 (90%), and the positive result in control group was 44(97.77%).

Table 2: Seropositivity of anti-H pylori IgG in patients with (cardiac syndrome X (CSX), Atherosclerosis (AMI) and acute myocardial infection (AS)) and control group

<table>
<thead>
<tr>
<th>H. pylori seropositivity</th>
<th>CSX N=3</th>
<th>AMI N=10</th>
<th>AS N=33</th>
<th>Control N=45</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. pylori seropositivity</td>
<td>3 (100%)</td>
<td>9 (90%)</td>
<td>33(100%)</td>
<td>44(97.77%)</td>
</tr>
</tbody>
</table>

Discussion:
In this study, we attempted to study the link between H. pylori infection and heart diseases and also correlation between this infectious factor with other risk factors such as diabetes, hypertension, smoking, residence and level of education.

Accordingly, H. pylori association with some cardiovascular risk factors has been suggested and also it was shown that this bacterium induces some inflammatory cytokines. In the present study, the role of these risk factors and cytokines were adjusted, therefore, the remained higher chance may be due this adjusting and reveal the independent role of H.pylori infection in atherosclerosis process.

In this study, we showed some limitations. Our criteria for being diagnosed as infection were IgG positivity to H. pylori. Because positivity of IgG to H. pylori can provide evidence of chronic infection even following eradication of H. pylori it is possible some of our patients not to have current active infection and probably they have been infected in the past. Therefore, it should be considered that infection to H. pylori in this research means patients who their plasma is currently positive for anti-H. pylori IgG antibody.

H. pylori may cause chronic inflammation and enhanced immune response due to the release of some cytotoxic substances which are responsible for the systemic manifestations of H. pylori. Chronic infection of H. pylori most probably causes increased production of various inflammatory metabolites, and this could also affect blood vessel motility and induce endothelial dysfunction. Epithelial cell act as the most probable target in H. pylori infection, and also as major interfaces between the host and pathogens. Thus, this interaction initiates acute mucosal inflammation, and interacts with the other mucosal cell proliferation via a cytokine network.

Thus, with the results in this study, the possible role of H. pylori infection in the pathogenesis of heart diseases is suggested.
References: