Serologic diagnosis of *Helicobacter pylori* in endoscopy personnel

C. Velasco Elizalde, M. A. Fernández Ferrer and N. Rodríguez Muñiz


RESUMEN

**Objetivo:** el *Helicobacter pylori* irrumpió en el ámbito médico-gastroenterológico, revolucionando la fisiopatología y el tratamiento de la Ulcera Gastroduodenal. Esta infestación trae consigo una respuesta inmune, que se puede reconocer con las pruebas serológicas, las cuales son muy útiles en el reconocimiento de la infección, sobre todo entre los grupos de riesgo, tales como son las personas institucionalizadas y el personal sanitario y, entre estos, principalmente los trabajadores de los Departamentos de Gastroenterología.

**Método:** en el presente artículo realizamos un estudio prospectivo longitudinal en 38 trabajadores de los Departamentos de Gastroenterología de tres hospitales de Ciudad de La Habana, tomando como controles a 38 trabajadores de un hospital que no desempeñan actividad endoscópica digestiva. Pretendemos investigar la presencia entre ellos de anticuerpos contra el *H. pylori*. El personal analizado completó una encuesta diseñada al efecto y se consideraron los siguientes parámetros: edad, sexo, tiempo de trabajo como endoscopista, uso de medios de protección y antecedentes de patología gastroduodenal.

**Resultados:** nuestro grupo de investigación constaba de 38 endoscopistas y 38 trabajadores de un centro asistencial, ajenos a esta actividad laboral, ajenos a esta actividad laboral, que presentaba las mismas características socioeconómicas que el grupo investigado. Veinticuatro en ambos grupos eran mujeres, (63,16%) y 14 eran hombres (36,84%). El 39,47% de los endoscopistas fueron seropositivos mientras que esto ocurrió sólo en el 7,89% de los controles. Se analizó el tiempo que los endoscopistas llevaban en el trabajo y encontramos que estos seropositivos llevaban más tiempo trabajando como endoscopistas que los seronegativos.

**Conclusiones:** se demostró que los endoscopistas tienen un riesgo significativamente superior a los controles de infectarse por el *Helicobacter pylori*, y que los endoscopistas seropositivos presentaron sintomatología más frecuentemente que los seronegativos, aunque las diferencias no fueron estadísticamente significativas.


ABSTRACT

**Objective:** the *Helicobacter pylori* entered into the medical world, particularly in the field of the Gastroenterology, revolutionizing it, and changing partially our physiopathological concepts and treatment of the gastroduodenal ulcer. This infestation results in an immune response, that is measured by means of serologic tests, which are very useful in the massive screening studies, mainly in population at risk like those who are institutionalized and the personnel of health, particularly workers of the departments of Gastroenterology.

**Method:** motivated for this, we carry out a prospective study in 38 endoscopists using as controls 38 workers not related with a Gastroenterology department. Thus, we analyzed the presence of antibodies against *Helicobacter pylori* among the personnel of the departments of Gastroenterology of three hospitals of Havana City. These personnel filled a form designed for this purpose containing following data: age, sex, time of work as endoscopist, use of protection means, and history of gastroduodenal pathology.

**Results:** there were 24 women in each group (63,2%). Whereas the seroprevalence among endoscopists was 39,47%, in the control group, only three people were seropositives (7,89%). We found a positive correlation between the time working as endoscopists and the rate of seropositivity.

**Conclusions:** our study demonstrated that endoscopists have a significantly higher risk than the controls of contracting the infection by the *Helicobacter pylori*, and that the seropositive endoscopists have symptomatology more frequently than the seronegative endoscopists, although these differences were not statistically significant.

**Key words:** Immunoglobuline. Antibody. *Helicobacter pylori*. Endoscopists. Seropositive. Seronegative.

Received: 08-09-05.
Accepted: 14-09-06.

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INTRODUCTION

The gram-negative bacterium *Helicobacter pylori* entered into the medical setting, particularly in the field of the gastroenterology, in 1982, and it partly revolutionized our concepts on the pathophysiology and treatment of the peptic ulcer disease (1). Following investigations confirmed the hypothesis involving the *Helicobacter pylori* in the etiopathogenesis of chronic gastritis (CG) and peptic ulcer (PU) (2,3). At the present time, two groups of diagnostic tests for detecting this bacterium exist: invasive and non-invasive. Serologic tests era including in the latter group (2,3). These tests recognize the immune response of the organism against the infection, particularly this from the B-lymphocytes present in the inflammatory infiltrates and lymphoid follicles; these cells produce specific antibodies (immunoglobulins A, G, M, and E) against antigens from this bacterium (CaGa, Vac A, among others) (2,4), which are mainly determined using ELISA (enzyme-linked assay) (2,5). However, different texts exist to this end: bacterial agglutination, hemagglutination, complement-fixation, indirect immunofluorescence, and immunoblots, among others (5,6). Of these tests, ELISA is the technique of choice to detect antibodies against *Helicobacter pylori* (IgG) in serum samples, (5); these circulating antibodies can be detected in the blood (2,6), saliva (6), and urine (6,7), with an excellent sensitivity, approaching 95%, but a low specificity, or in feces (6-8), with high sensitivity and specificity (6,8-10). There is also a new ELISA technique aimed to the fecal detection of antigens in the stools. A number of studies have demonstrated a sensitivity and specificity higher than 90% in adults and children. The test is also sensitive in the post-treatment setting to assess *Helicobacter pylori* eradication. It is a non-invasive, easy, low-cost test whose use is quite promising for developing countries (11); it is mainly used in pediatric patients with good diagnostic results (12).

IgA class antibodies inhibit bacterial motility and adhesion, neutralize biologically active bacterial products, block the complement activation, and inhibit cytotoxin-induced vacuolization of epithelial cells (2). This indirect evidence allows us to detect infection by this microorganism, and hence is used for epidemic studies or screening in groups at risk (13), qualitatively or quantitatively. Though it can be used to evaluate eradication at 3 to 6 months after treatment (14), it is also used for detecting infection in groups at risks, such as institutionalized patients (15), including children (5), and in studies on professionals at risk of exposure, as is the case of healthcare professionals such as gastroenterology department staff (16,17) and dentists (30%), the latter with a lower infection rate compared with the former (13).

Studies carried out in industrialized countries show an increased risk among endoscopists for *Helicobacter pylori* infection, which positively correlates with the number of endoscopies performed (16-18). One advantage of this diagnostic tests is that its results are not affected by the previous use of proton pump inhibitors (PPIs) or antibiotics, and that it may be carried out both in children and pregnant women (2).

The objective of the present study was to assess the frequency of *Helicobacter pylori* infection among the workers of gastroenterology departments in three Havana hospitals, and to relate this infection rate with the presence of symptoms of the upper gastrointestinal tract or pathological conditions present in these subjects.

MATERIAL AND METHODS

We carried out a prospective longitudinal study in 38 endoscopy workers at gastroenterology departments in three Havana hospitals: a) Centro de Investigaciones Médico Quirúrgicas (C.I.M.E.Q.); b) Hospital Militar Carlos Juan Finlay (H.M. C.J. Finlay); and c) Instituto de Gastroenterología (I.G.E.), which voluntarily accepted to participate in this study, and in 38 non-gastroenterology workers from the Hospital Freyre de Andrade, who were used as controls. All of them lived in the urban sector of Havana, and included doctors, nurses, and technicians of departments not related with the gastroenterology department. These subjects underwent to tests performed at the hospital’s clinical laboratory and gave their informed consent to participate as controls in this study. The studied personnel completed a specifically designed form that included various parameters such as: sex, age, past medical history and family history, symptoms, working time in endoscopy-related activities, and previous endoscopies.

The serum extracted from 5 ml of blood was obtained from each staff member, and the presence of antibodies against *Helicobacter pylori* was measured using a human’s dry-strip diagnostic kit, which is a chromatographic- immune assay that can be used to detect IgG antibodies in the serum, plasma or total blood. Fifty microliters of serum are applied to the dry strip, and two pink-to-purple lines define a positive test, while just only one line defines a negative result.

Statistical analysis

The following statistical analyses were used: descriptive measures such as mean and standard deviation values for quantitative variables. Student’s t-test was used to compare means of independent samples. Odds ratios, 95% confidence intervals, and Chi squared tests were used to compare the risk for positive results between endoscopists and controls, as well as the usefulness of protective measures in the endoscopist group. All statistical tests were calculated with a significance level of 5%.
RESULTS

Our study group was made up of 38 workers of the gastroenterology departments of following hospitals: “Medico-Surgical Research Center”, the Military Hospital “Carlos Juan Finlay”, and the Institute of Gastroenterology (endoscopists, technicians, and nurses); and of 38 staff members of the “Hospital Freyre of Andrade” who served as controls. In both groups (control and gastroenterology group) 24 participants were women (63.16%), and 14 were men (36.84%). The age among gastroenterologists was 43.16 ± 11.77 years and among controls 44.74 ± 11.11 years (p = 0.55). This difference was not significant. Positive antibodies against *Helicobacter pylori* were found: in 39.47% of endoscopists. Whereas, only 3 (7.89%) controls had antibodies against *Helicobacter pylori* [OR: 5.00; (95% CI: 1.57-5.87); p = 0.0012] (Fig. 1).

Thirty of all 38 (78.94%) endoscopists used gloves for protection; of these, in addition to gloves, nine (23.68%) also used a masks. Ten positive subjects (33.33%) were included among those who used protective means. Eight endoscopists (21.05%) reported having used no protective means; of these, 5 (62.5%) had circulating antibodies. The risk for positivity was not higher among endoscopists reporting no protective means than among those using these means. However, difference was not significant (OR = 3.33; IC 95% = 0.53-22.86; p = 0.1389). Time of work in an endoscopy-related activity ranged from 6 months to 30 years in seropositive subjects (mean, 14.68 years) (OR: 1.88; 95% CI: 0.90, 3.92; p = 0.1337). This lack of significance can be ascribed to the to the small size of the sample. Time worked as endoscopist was analyzed and it was shown to be longer in seropositive (13.8 ± 10.8 years) than in seronegative subjects (9.9 ± 9.3 years). This difference was not significant (p = 0.65).

Complaints from the studied endoscopists showed that 12 (80%) of 15 seropositive endoscopists had upper gastrointestinal symptoms; of these 6 (50%) had a history of upper gastrointestinal diseases such as duodenal ulcer in one case, chronic gastritis in two, and hiatal hernia with distal esophagitis in other two cases (Table I). Among the 23 seronegative endoscopists, 10 had upper digestive symptomatology (43.48%); of these, 50% had the following conditions: two, peptic ulcer; two, chronic gastritis, and one, distal esophagitis with no hiatal hernia (Table I).

<table>
<thead>
<tr>
<th>Sintomatología</th>
<th>Hp+</th>
<th>%</th>
<th>Hp−</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without symptoms</td>
<td>3</td>
<td>25.00</td>
<td>13</td>
<td>56.52</td>
</tr>
<tr>
<td>With symptoms</td>
<td>12</td>
<td>75.00</td>
<td>10</td>
<td>43.48</td>
</tr>
<tr>
<td>3 chronic gastritis</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 hiatal hernia with distal esophagitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 duodenal ulcer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With no diagnosis</td>
<td>6</td>
<td>50.00</td>
<td>5</td>
<td>50.00</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>39.42</td>
<td>23</td>
<td>60.58</td>
</tr>
</tbody>
</table>

DISCUSSION

Goh et al. (16) reported to have screened endoscopists and non-endoscopists subjects and found that 32.9% of the former group and only 11.3% of the control subjects (hospital staff unrelated to endoscopy) were seropositive. The specificity of the test used for detecting seropositivity was 81.5%, and its sensitivity was 97.9% (Table II). Matysiak-Budnik T et al. (18) reported, in study carried out in Poland comparing endoscopists with other members of the staff hospital, that the seroprevalence among endoscopists was 75%, while among non-endoscopists was 59%; they also reported that the prevalence of *Helicobacter pylori* infection in medical staff (70%) y lower than in the adult general population (85-98%) (Table II). Mones et al. (19) found in their study a seroprevalence of 52.7% among doctors, a figure that slightly amounted to 53.3% among endoscopists, and to 50% among non-endoscopists; differences between endoscopists and non-endoscopists were not significant. Thus, the authors concluded that endoscopists had not a higher risk for *Helicobacter pylori* infection when compared with non-endoscopists (Table II). Pristautz et al. (20) studied 88 endoscopists and 100 controls in Austria using an ELISA test to detect IgG and IgA antibodies, and a latex test to
identify IgG and IgM antibodies; they reported a sero-prevalence of 48, 56, 62, and 57% respectively, among endoscopists. In the control group seropositivity was found to be 47, 48, 48, and 51%, respectively, and they found a positive correlation between antibody titers and longer working time as endoscopist (Table II). Noone et al. carried out a study in 222 people, 74 of whom were nurses working at endoscopy units in 10 hospitals; sero-prevalence was 32.4% in nurses, but no association was found between their professional activity and Helicobacter pylori infection (21) (Table II). Hildebrand et al. studied the prevalence of Helicobacter pylori infection among 92 gastroenterologists and 168 healthy individuals; of these subjects, 36 and 64 subjects, respectively, tested positive in the urea breath test (22). Hildebrand et al. followed for 5-8 years 54 of 56 gastroenterologists who tested negative for the Helicobacter pylori. They found that 7 acquired the infection during these years, with an annual rate of 2.6%, in spite of their routinely use of gloves in their work. In the control group only 1 of 731 subjects became infected during follow-up, with a rate of 0.41% per year. In their article, the authors conclude that gastroenterologists have a high risk of becoming infected with Helicobacter pylori, and comment on the potential transmission route from patients to endoscopists or gastroenterologists, claiming the potential role of saliva (Pflügge) or gastric juice droplets during endoscopy; they also advocate for further research to establish whether using a nasobuccal mask may protect against Helicobacter pylori infection (22) (Table II). Birkenfeld et al., in a study carried out in 191 workers at gastrointestinal care units and 98 primary care practitioners, report that 108 (73%) gastroenterology subjects and 70 (71%) primary care individuals were seropositive; both figures were clearly superior to that found among controls (53%). Infection rates for Helicobacter pylori in Israel are higher among staff members of primary care clinics and gastroenterology units than in the general population (23) (Table II). Chong et al. (24) found a seroprevalence of 69% among endoscopists and of 62.9% among controls. Lin et al. (17) obtained a seroprevalence of 53% among endoscopists. In our study, the seroprevalence among subjects working at endoscopy units was 39.47%, slightly superior to that reported by Goh et al (32.9%) (16) and by Noone (32.4%). The rest of our referenced authors report sero-prevalence rates superior to that found in the present study. In our control group we identified antibodies against Helicobacter pylori in only 7.89% of subjects. This is the lowest figure reported in these papers. The low rate of positivity results found in our study strongly attract our attention, as our study was carried out in a de-

Table II. Serologic diagnosis of Helicobacter pylori in endoscopists. Seroprevalence in the literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Seroprevalence in staff (%)</th>
<th>Seroprevalence in controls (%)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goh KL et al.</td>
<td>32.9%</td>
<td>11.30%</td>
<td>Sensitivity: 97.9% Specificity: 81.5%</td>
</tr>
<tr>
<td>Matysiak-Budnik T et al.</td>
<td>75.0%</td>
<td>59.00%</td>
<td>Medical staff:: Prev: 70% Gastroenter: Prev: 75% No endosco: Prev: 59%</td>
</tr>
<tr>
<td>Mones J et al.</td>
<td>53.3%</td>
<td>50.00%</td>
<td>Non gastroenterologists Seroprevalence: 52.7%</td>
</tr>
<tr>
<td>Pristautz H et al.</td>
<td>ELISA: IgG, IgA: 48%, 56%.</td>
<td>ELISA: IgG, IgA: 47%, 48%.</td>
<td>+ correlation in antibody tities among those &gt; T as endoscopists</td>
</tr>
<tr>
<td>Noone PA et al.</td>
<td>Endoscopy nurses: 74 (32.4%)</td>
<td>148: 33%</td>
<td>No association between occupational risk and seropositivity</td>
</tr>
<tr>
<td>Hildebrand P et al.</td>
<td>92 gastroenterol: 36</td>
<td>168 controls: 34</td>
<td>Gastroenterol con ↑ riesgo de infectarse con HP, post 5-8 años de seguimiento</td>
</tr>
<tr>
<td>Birkenfeld S et al.</td>
<td>191/108 gastroenterol: 73%</td>
<td>4,633 asymptomatic patients with evidence of prior infection with H. pylori: 53%</td>
<td></td>
</tr>
<tr>
<td>Chong J et al.</td>
<td>69%</td>
<td>62.9%</td>
<td></td>
</tr>
<tr>
<td>Lin et al.</td>
<td>53%</td>
<td>71%</td>
<td></td>
</tr>
<tr>
<td>Present study</td>
<td>39.43%</td>
<td>7.89%</td>
<td>Time as an endoscopist: Seropositivity: 13.8 + 10.8 Seronegativity: 9.9 + 9.3 years p = 0.6556</td>
</tr>
</tbody>
</table>

**Table II. Serologic diagnosis of Helicobacter pylori in endoscopists. Seroprevalence in the literature**
veloping country, and hence our results should be poorer than those reported by the referenced authors; differences may result from the sample size, since studies carried out in our country report a high incidence of Helicobacter pylori infection in patients with ulcer.

It should be noted that, in our sample, 80% of positive endoscopists had upper digestive symptoms, and 6 of these (50%) had a history of upper digestive diseases: three were diagnosed with chronic gastritis, one, with duodenal ulcer, and two, with hiatal hernia and distal esophagitis. It is well known that the potential implication of the Helicobacter pylori in the gastroesophageal reflux disease (GERD) is controversial (25). While, some authors have reported an increased prevalence of Helicobacter pylori infection in patients with GERD (26,27), other authors report a low prevalence of this infection in such individuals (28,27); furthermore, an improvement in endoscopic esophagitis has been reported after Helicobacter pylori eradication in patients with duodenal ulcer (29). Forty to 90% of these patients experience a dramatic improvement using a proton pump inhibitor, which may also result from a non-diagnosed accompanying peptic ulcer, since the effectiveness of treatment regimens including these drugs is well known (30,31). The Maastricht-2 consensus meeting established that Helicobacter pylori eradication was advisable for GERD, and that proton pump inhibitors should be included in eradicating therapy schemes (32). According to a number of authors, Helicobacter pylori should not be eradicated in patients with GERD in the absence of gastroduodenal ulcer disease, since there is currently evidence that Helicobacter pylori may be protective for GERD, and that antisecretory effects of PPI are lower after eradication (25).

We conclude that a) endoscopists have a significantly higher risk of Helicobacter pylori infection than control subjects; b) endoscopists with positive Helicobacter pylori tests have worked longer times than those endoscopists with negative tests; however, the difference was not significant; c) the use of protective means allowed for no significant differences between endoscopists with positive and negative antibodies against Helicobacter pylori. Nevertheless, seropositivity was higher in those who did not use any protection versus those who use it; and d) endoscopists with antibodies against Helicobacter pylori had a higher percentage of upper gastrointestinal tract symptoms when compared with negative individuals, but differences were not statistically significant.

REFERENCES


