DECREASE IN PREVALENCE OF HELICOBACTER PYLORI INFECTION DURING A 10-YEAR PERIOD IN BRAZILIAN CHILDREN

Elisabete KAWAKAMI, Rodrigo Strehl MACHADO, Silvio Kazuo OGATA and Marini LANGNER

ABSTRACT – Background - Decreasing prevalence of H pylori infection has been reported in some countries. Aim - To evaluate the prevalence of Helicobacter pylori infection in a 10-year period in children submitted to upper digestive endoscopy. Methods - It was a retrospective observational study. The records of 1,165 endoscopies performed during a 10-year period in a public hospital of the City of São Paulo, SP, Brazil, in patients up to 18-year-old. Only the first endoscopy was considered. Helicobacter pylori infection was defined by the rapid urease test, performed with one fragment of antral mucosa. Chi-square for trend has been estimated to compare Helicobacter pylori prevalence across the period. Results - The main indication for endoscopy was epigastric pain (47.4%). There were 392 patients with H pylori infection (33.6%), 12.8% being infants, 19.4% toddlers, 28.8% schoolchildren and 46.3% adolescents. Prevalence was 60.47% in the first year of the study and 30.43% in the last. Among the less than 6-year-old patients there was a decrease in infection prevalence from 25% for the 1993-6 period to 14.3% in the 2000-02 period, while among the over 12-year-old patients the decrease was from 55.5% in the first period to 39.6% in the latter. The decrease in H pylori infection prevalence was more intense within patients with epigastric pain, in which prevalence has decreased from 48.2% (92/191) in 1993-6, to 41.9% (65/155) in 1997-9 and 27.7% (57/206) in 2000-02. Conclusion - The study suggests a significant decrease in the prevalence of H pylori infection regarding the studied patients. The trend was mainly observed in the younger age group and in patients with epigastric pain.

INTRODUCTION

Adult individuals who live in precarious conditions during childhood constitute the population at the highest risk for morbidity due to Helicobacter pylori infection. The recent increase in life expectancy in most of these countries allows foreseeing an increase of its morbidity in the next years, particularly due to peptic ulcers and gastric cancer.

Study of the epidemiology of H pylori infection in childhood allows to visualize morbidity in adult life, since it is at this age that most patients acquire the infection, even in developed countries(18). On the other hand, incidence in childhood is related to prevalence in adults, since the child is more exposed to the bacterium by contagion within the family, particularly the infected mother(4). Presently it is believed that the infection is acquired during childhood, mainly in populations at high risk. Studies show a 2.2%-3.3% incidence among children of developing countries or groups at high risk in developed countries(5, 9, 11), although most of these studies are based on serology, a test of less accuracy in smaller children(2,15).

In developed countries, the past high prevalence of the infection was surpassed by improvement in environmental conditions, since its prevalence is closely related to socioeconomic factors. Some recent studies suggest that infection incidence in high-risk groups in developed countries, particularly immigrants, is declining, similarly to developing countries, as a consequence of better access to health, unintentional use of medications (antibiotics and antisecretory drugs) and improvement in environmental conditions(13, 17, 20).

In our country, documented improvement of infantile mortality and increase in life expectancy occurred in the last decades, attributed to improvement in basic sanitation and access to the public health system(10). We may experience a silent decrease in the prevalence of H pylori infection.

The objective of this study was to verify differences in H pylori infection based on a retrospective analysis of a data bank of an endoscopy service of a public university hospital in the city of São Paulo, Brazil.
METHODS

A retrospective study where the records of upper digestive endoscopy performed from 1993 to 2002 at the Digestive Endoscopy Sector of the Pediatric Gastroenterology Division, “Universidade Federal de São Paulo – Escola Paulista de Medicina” – UNIFESP/EPM, São Paulo, SP, Brazil, were reviewed. The attended patients are from the public health system, generally from low-income families, referred from Health Units or from the outpatient clinic of Pediatric Gastroenterology, UNIFESP/EPM. Records of 2003 to 2004 were not included because in those years part of the services were transferred to other sectors.

Patients

Only the first upper digestive endoscopies of less than 20-year-old patients performed in the studied period using the rapid urease test were analyzed (Figure 1). One thousand one hundred sixty-five patients, aged from 1 month to 19 years and 8 months were included (M/F 563:602, mean 8.82 years, standard deviation 4.31 years). These cases originated from several research protocols on diagnosis and treatment of infection with *H pylori* during the studied decade. Usually the rapid urease breath test was performed in all patients, except for those in use of antibiotics, antisecretory drugs or bismuth salts in the last months for non-digestive diseases and with a therapeutic purpose.

Endoscopy

It was performed after an 8-hour fast under conscious sedation with midazolam and meperidine (over 10-year-old patients) or under deep sedation administered by an anesthetist (the other patients).

Rapid urease test (RUT)

A non-commercial solution, prepared in the endoscopy room was used. This solution contains 100 mg urea in 1 mL distilled water, with a drop of phenol red. RUT is evaluated within 1 hour after immersion of two gastric antrum fragments, and was previously validated in our service, with 100% sensitivity and 84.2% specificity(12).

Statistics

The quantitative variables were summarized by estimation of mean and standard deviation, while the qualitative by proportion. Pearson’s chi-square test was used for comparison between treatment groups in 2x2 tables. Significance of trend to variation of positive results for RUT was evaluated by chi-square for trend, with a significance level of 0.05(1).

RESULTS

In the studied period most indication for endoscopy of the 1,165 cases was epigastric pain with 47.4%, followed by gastroesophageal reflux with 16.5% (Table 1). Indication for the test presented a significant variation during the period, significant trend to lower proportion of patients with epigastric pain and higher proportion of patients with malabsorption syndrome in the series of the more recent years (Table 2).

There was a higher proportion of patients less than 6 years old in the more recent years (16.3% in 1993, 36.6% in 2002, $\chi^2_{\text{trend}} = 33.68, P = 0.0001$). Correspondently there was a significant decrease in the proportion of patients with age equal to or more than 12 years (27.9% in 1933, 15.5% in 2002, $\chi^2_{\text{trend}} = 11.97, P = 0.0005$), as well as patients with age between 6 years and 12 years (55.8% in 1993, 47.8% in 2002, $\chi^2_{\text{trend}} = 4.76, P = 0.0291$).

General prevalence of *H pylori* infection was 33.6% (392/1165) in the studied period. There was no difference between male and female gender regarding prevalence (216/602F and 176/563M, $P = 0.107$), except for over 12-year-old patients, where a higher infection prevalence occurred in females (58.5%, vs 39.8%, $P = 0.002$). Infection was significantly associated with the endoscopic diagnoses of duodenal ulcer and nodular antrum gastritis, and inversely associated with a normal examination (Table 3). A direct and significant relationship between prevalence and the patient’s age was observed, with 12.8% (11/86) infected among those less...
TABLE 2. Indication for endoscopies according to year

<table>
<thead>
<tr>
<th>Year</th>
<th>Epigastric pain*</th>
<th>Gastroesophageal reflux†</th>
<th>Abdominal pain‡</th>
<th>Malabsorption syndrome§</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>24 (55.8%)</td>
<td>6 (13.9%)</td>
<td>11 (25.6%)</td>
<td>0 (0%)</td>
<td>43</td>
</tr>
<tr>
<td>1994</td>
<td>59 (54.6%)</td>
<td>11 (10.2%)</td>
<td>13 (12.9%)</td>
<td>7 (6.4%)</td>
<td>108</td>
</tr>
<tr>
<td>1995</td>
<td>63 (54.3%)</td>
<td>11 (9.5%)</td>
<td>19 (16.3%)</td>
<td>11 (9.5%)</td>
<td>116</td>
</tr>
<tr>
<td>1996</td>
<td>45 (44.5%)</td>
<td>17 (16.8%)</td>
<td>26 (25.7%)</td>
<td>7 (6.9%)</td>
<td>101</td>
</tr>
<tr>
<td>1997</td>
<td>35 (44.3%)</td>
<td>27 (34.1%)</td>
<td>9 (11.4%)</td>
<td>5 (6.3%)</td>
<td>79</td>
</tr>
<tr>
<td>1998</td>
<td>41 (56.9%)</td>
<td>11 (15.3%)</td>
<td>9 (12.5%)</td>
<td>3 (4.2%)</td>
<td>72</td>
</tr>
<tr>
<td>1999</td>
<td>79 (62.7%)</td>
<td>21 (16.7%)</td>
<td>8 (6.5%)</td>
<td>9 (7.1%)</td>
<td>126</td>
</tr>
<tr>
<td>2000</td>
<td>85 (45%)</td>
<td>37 (20.1%)</td>
<td>14 (7.4%)</td>
<td>33 (17.5%)</td>
<td>189</td>
</tr>
<tr>
<td>2001</td>
<td>77 (45.3%)</td>
<td>24 (14.1%)</td>
<td>18 (10.6%)</td>
<td>41 (24.1%)</td>
<td>170</td>
</tr>
<tr>
<td>2002</td>
<td>44 (27.3%)</td>
<td>26 (16.1%)</td>
<td>42 (26.1%)</td>
<td>42 (26.1%)</td>
<td>161</td>
</tr>
</tbody>
</table>

* $\chi^2 = 16.59, P = 0.0001$
† $\chi^2 = 1.29, P = 0.256$
‡ $\chi^2 = 0.44, P = 0.507$
§ $\chi^2 = 50.89, P = 0.0001$

TABLE 3. Endoscopic diagnosis and its relationship with H pylori infection (each patient may have more than one diagnosis)

<table>
<thead>
<tr>
<th>Endoscopy result</th>
<th>n</th>
<th>%</th>
<th>H pylori (%)</th>
<th>Chi-square</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>617</td>
<td>53</td>
<td>20.1</td>
<td>95.36</td>
<td>P &lt; 0.000001</td>
</tr>
<tr>
<td>Antrum nodularity</td>
<td>164</td>
<td>14.1</td>
<td>87.8</td>
<td>250.74</td>
<td>P &lt; 0.0000001</td>
</tr>
<tr>
<td>Gastric mucosal enanthema</td>
<td>116</td>
<td>10</td>
<td>35.3</td>
<td>0.17</td>
<td>P = 0.68</td>
</tr>
<tr>
<td>Esophagitis</td>
<td>114</td>
<td>9.8</td>
<td>27.1</td>
<td>2.36</td>
<td>P = 0.12</td>
</tr>
<tr>
<td>Non erosive duodenitis</td>
<td>73</td>
<td>6.5</td>
<td>34.2</td>
<td>0.01</td>
<td>P = 0.91</td>
</tr>
<tr>
<td>Duodenal ulcer</td>
<td>65</td>
<td>5.6</td>
<td>63.1</td>
<td>26.7</td>
<td>P = 0.0000002</td>
</tr>
<tr>
<td>Erosive gastritis</td>
<td>34</td>
<td>2.9</td>
<td>55.3</td>
<td>0.04</td>
<td>P = 0.84</td>
</tr>
<tr>
<td>Gastric ulcer</td>
<td>13</td>
<td>1.1</td>
<td>46.2</td>
<td>0.92</td>
<td>P = 0.34</td>
</tr>
<tr>
<td>Total</td>
<td>1165</td>
<td>100%</td>
<td>33.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

than 2 years old, 19.4% (46/273) among preschool children, 28.8% (90/313) among patients with age between 6 and 10 years and 46.3% (245/529) among the patients over ten years old ($\chi^2_{trend} = 165.69, P = 0.0001$).

During the studied period there occurred significant prevalence of infection reduction from 39.1% in the 1993-1994 biennium to 28.4% in the 2001-2002 biennium (Figure 2, $\chi^2_{trend} = 14.84, P = 0.0001$). In the analysis according to age range, the interval was divided into three periods (1993-6, 1997-9, 2000-2). Among the patients with age less than 6 years, there was a reduction in prevalence from 25% (18/72) in the first period to 19.3% (12/62) in the second period and finally 14.3% (27/189) in the last period ($\chi^2_{trend} = 4.27, P = 0.038$). In the patients aged 12 years or more, the percents were respectively 55.5% (61/110), 57.3% (47/82) and 39.6% (42/106) ($\chi^2_{trend} = 5.34, P = 0.021$). In the intermediary age range infection prevalence did not present variation (37.1%, 31.6% and 32.9%, $\chi^2_{trend} = 0.75, P = 0.386$) (Figure 3).

The decrease in $H$ pylori infection prevalence was more intense within patients with epigastric pain, in which prevalence has decreased from 48.2% (92/191) in 1993-6, to 41.9% (65/155) in 1997-9 and 27.7% (57/206) in 2000-02 ($\chi^2_{trend} = 17.66, P = 0.00003$), but it was not significant in patients with malabsorption, in which prevalence was 28% (7/25) in 1993-6, to 29.4% (5/17) in 1997-9 and 19.8% (23/116) in 2000-02 ($\chi^2_{trend} = 1.125, P = 0.29$).

**DISCUSSION**

The study showed decrease in $H$ pylori prevalence during a 10-year period, with a 39.1% reduction in the 1993 to 1994 biennium to 28.4% in the 2003-2004 biennium. Despite the increase during the period in the number of examinations performed in younger patients, we could show that decrease in prevalence was significant in two age ranges: less than 6-year-old patients and adolescents. A more detailed analysis of the variation according to age range is difficult because of the small number of patients. However, reduction in infection prevalence in children less than 6 years old constitutes a strong evidence of the current change in the epidemiology among us. Recently, ROWLAND et al.\(^{(18)}\) evaluated prospectively the incidence of $H$ pylori infection during 4 consecutive years using the $^{13}$C-urea breath test in 227 Irish children aged 2 to 4 years. The authors observed that infection rate for 100 individuals/year was higher between 2 and 3 years (5.05; CI 95%: 1.64-11.78); 47/48 infected children acquired the infection before the age of 5 years and only one, after the age of 5. This study shows that even in a developed country, the first infection occurred early. In Germany, in children of Turkish descent, incidence in those less than 4 years old was 7%, being higher during the second year of life\(^{(16)}\). The importance of childhood in the epidemiology of the infection is similar in the different situations and not dependent on the socioeconomic condition\(^{(19)}\).

Retrospective evaluation imposes restrictions: population-based prospective design is undoubtedly more consistent for the study of the epidemiology of the pathogen in a historical series. However, the different research protocols of $H$ pylori infection in children in the studied period led to the natural exclusion of patients where the urease test was less accurate, since routinely the patient or representative is asked about medications in use. Finally,
The present study detected reduction in the prevalence of Helicobacter pylori infection in an endoscopy data bank of patients attended at a public hospital in the city of São Paulo, particularly those at a higher risk to acquire the infection. Prospective studies on the epidemiology of the infection among us are needed to better establish goals to fight it.

RESUMO – Racional – Redução da prevalência de infecção por *Helicobacter pylori* tem sido relatada em alguns países. Objetivo – Avaliar, em crianças, a prevalência de infecção por *H pylori* em um período de 10 anos, realizando endoscopia digestiva alta. Métodos – Estudo retrospectivo observacional. Os relatórios de 1.165 endoscopias digestivas altas realizadas em 10 anos em um hospital público da cidade de São Paulo, SP, foram revisados, sendo incluídas as primeiras endoscopias de pacientes com idade inferior a 18 anos. A infecção por *H pylori* foi definida pelo teste rápido da urease, com um fragmento de mucosa antral. Resultados – A principal indicação de endoscopia foi dor epigástrica (47,4%). A prevalência de infecção foi 33,6% (12,8% em lactentes, 19,4% em pré-escolares, 28,8% em escolares e 46,3% em adolescentes). No primeiro ano de estudo foi 60,47%, e 30,43% no último. Entre os pacientes menores de 6 anos, houve diminuição na prevalência de 25% (1993-6) para 14,3% (2000-02), enquanto entre os pacientes maiores de 12 anos a diminuição foi de 55,5% (1993-6) para 39,6% (2000-02). A diminuição da prevalência foi significativa nos pacientes com dor epigástrica, nos quais passou de 48,2% (92/191) em 1993-6, para 41,9% (65/155) em 1997-9 e 27,7% (57/206) em 2000-02. Conclusão – O estudo sugere que houve diminuição significativa na prevalência da infecção por *H pylori* nos pacientes estudados. A tendência foi principalmente observada no grupo etário mais jovem e nos pacientes com dor epigástrica.

DESCRITORES – Infecções por Helicobacter, epidemiologia. Urease. Criança.

**REFERENCES**
