SHORT REPORT: SOCIOECONOMIC AND SEASONAL VARIATIONS OF HELICOBACTER PYLORI INFECTION IN PATIENTS IN VENEZUELA

MARÍA G. DOMÍNGUEZ-BELLO, BERNARDO BEKER, MOISÉS GUELRUD, JORGE VIVAS, SIMÓN PERAZA, MARÍA E. PÉREZ, AND LUIS R. PERICCHI
Instituto Venezolano de Investigaciones Científicas, Caracas, Venezuela; Hospital General del Oeste, Caracas, Venezuela; Centro Médico de Caracas, Caracas, Venezuela; Policlínica Metropolitana, Caracas, Venezuela; Centro de Control de Cáncer Gástrico, San Cristóbal; Departamento de Cómputo Científico y Estadística, Universidad Simón Bolívar, Caracas, Venezuela

Abstract. Infection by Helicobacter pylori is recognized as a risk factor for gastric cancer and peptic ulcer disease. Venezuela has regions with different gastric cancer risks; the Andean region has the highest gastric cancer mortality in the country. We performed a cross-sectional study on 357 patients who underwent endoscopy attending 2 private (n = 76) and one public hospital in Caracas, Venezuela (n = 215), and one public hospital in the Andes (n = 66) to determine H. pylori infection (by a rapid biopsy urease test and histology). The proportion of infected patients in Caracas was significantly higher in public hospitals (72%) than in private hospitals (46%; P = 0.00001), and there was no significant variation the Andes and Caracas (P = 0.7001). When analyzing the data from the public hospital in Caracas, we found that the frequency of infected patients was significantly higher during the rainy season (96%) than during the dry months (70%, P = 0.00000001). Differences in prevalence of infection in symptomatic patients was not related to the risk of gastric cancer but to socioeconomic differences. Rain-dependent factors that may be exacerbating the clinical activity of nonulcer dyspepsia in people infected with H. pylori deserve further study.

Although most infected people remain asymptomatic, infection by Helicobacter pylori is recognized as a risk factor for gastric cancer, chronic gastritis, and peptic ulcer disease.1 The outcome of peptic ulceration or gastric adenocarcinoma shows geographical variations. There are duodenal ulcer clusters in Scotland, Africa, Ethiopia, southern India, southern China, and eastern Australia.2-4 Japan has a high incidence of gastric cancer,5 with other clusters in northern China,6 northern Italy,7 southern Mexico,8 and the Andean region.9 Cancer is the first cause of mortality in the Venezuelan Andean states. As many as 4.1% of registered deaths were caused by gastric malignant tumors, compared with 1.4% in the Central states.10 Because H. pylori infection plays a role in the etiology of gastric cancer, we hypothesized that prevalence of H. pylori in symptomatic patients in the Andes may be higher than in Caracas, Venezuela.

We studied 357 patients who were referred to endoscopy who attended one public hospital in the Andean city of San Cristóbal (66 patients) and 3 hospitals in Caracas. Caracas hospitals comprised a single public hospital (215 patients) and 2 private hospitals (76 patients). Patients (or the legal representative) voluntarily signed a consent of participation. Patients referred to endoscopy who had not received antibiotics, anti-inflammatory steroids, H2 antihistaminics, or proton pump inhibitors in 30 days before endoscopy, were enrolled in the study. Helicobacter pylori infection was determined in 2 antrum gastric specimens from each patient. One was introduced in a rapid urease test11 and the other was fixed in formaldehyde for the histology study after staining with hematoxylin and eosin. Patients were considered infected if one or both tests were positive.

Statistical analyses included adjustment to a generalized linear model with binomial errors and approximation of proportions to normal distribution to estimate 95% confidence intervals. P values were based on generalized linear model. We incidentally noticed an increase in the proportion of infected patients in Caracas (March–May, dry season) and decided to continue sampling during the rainy season (June–October). We obtained data of rainfall in Caracas and compared it with the frequency of infection by season.

The predominant pathology was nonulcer dyspepsia (61%), followed by peptic ulcer disease (8%) and gastric tumor (0.7%; Table 1). The duodenal ulcer/gastric ulcer ratios were 1.33 and 2.0 in Caracas public and private hospitals, respectively, and 0 in the Andes hospital. Overall frequency of H. pylori infection was 64% (Table 1) with no significant sex differences (P = 0.6689) but significant differences between hospitals (P = 0.000013). Prevalence of infection was not significantly different between regions (P = 0.7001; 76% in Andes, 70% in Caracas), in contrast with reports showing a higher prevalence of H. pylori infection in populations with high gastric cancer risk.12

Prevalence of infection was lower in private than in public hospitals (46 versus 72%, respectively). These hospitals serve different socioeconomic classes. The precarious condition of the Venezuelan public hospitals leads middle-class patients to attend private hospitals, where the proportion of enrolled professional patients was 48%, in contrast with only 18% in the public hospital. Our results confirm the inverse relationship between socioeconomic status and infection,14 even for a developing country, where a minority middle class shares many environmental factors with a highly infected majority of low socioeconomic condition. As reported in other developing countries,15 a high rate of infection was observed at early ages.

In the Caracas public hospital, the frequency of infection increased from 70% in the dry season to 96% in the rainy months (Table 1; P = 0.00000001). This increase corresponded to 91% in patients aged < 20 years, and to 23 and 49% in patients aged 21–50 years and > 50 years, respectively. These seasonal differences may reflect new infections for the younger cohort, but not for the older cohorts because infection is believed to occur at early ages. Peptic ulcer symptoms have been shown to be seasonal, with a peak during autumn and winter months.16 This is the first preliminary evidence of seasonality of clinical activity of nonulcer dyspepsia in H. pylori-infected subjects, and deserves further study. There are well-known rain-associated factors that increase the prevalence of diarrhea during rainy months, and...
TABLE 1

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Numbers and proportions of infected patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Infected</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Andes Public</td>
<td>88/91</td>
</tr>
<tr>
<td></td>
<td>91%</td>
</tr>
<tr>
<td>Caracas Public</td>
<td>91/100</td>
</tr>
<tr>
<td></td>
<td>91%</td>
</tr>
<tr>
<td>All hospitals</td>
<td>189/191</td>
</tr>
<tr>
<td></td>
<td>99%</td>
</tr>
</tbody>
</table>

**Notes:**
- %Tumor: Percentage of patients with tumors.
- %NDD: Percentage of nonulcer dyspepsia.
- %PUD: Percentage of peptic ulcer disease.

**References**

10. Ministerio de Sanidad y Asistencia Social (MSAS), 1994. An-
H. PYLORI INFECTION IN PATIENTS IN VENEZUELA


