Histological Types of Gastric Cancer in Mexico

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Background. Gastric cancer is the second leading cause of malignant tumours in Mexico. The distribution of the histological types of this tumour has not been estimated from a population-based representative sample.

Methods. The histological types of gastric cancer according to the Lauren classification and selected socio-demographic characteristics for 220 patients from different socioeconomic levels are reported. The study population represents 66% of all new gastric cancer cases during 1989–1990 reported to the Mexico City Cancer Registry. The patients attended four public hospitals, seven social security hospitals and four private hospitals in Mexico City. A second histological diagnosis was performed by one pathologist.

Results. No specific histological type of gastric cancer predominated since the estimated distribution for intestinal gastric cancer was 44.5%, for diffuse gastric cancer 43.2% (and the remaining 12.3% corresponded to indeterminate tumours). The distribution of intestinal and diffuse gastric cancer did not vary significantly according to socioeconomic level or medical care unit and it showed a clear relationship with gender, the intestinal type of gastric cancer being more common among males.

Conclusions. Mexico may not have been affected by the gastric cancer epidemic at the beginning of the twentieth century but the available information and the results of this study are only useful to demonstrate that, currently, no histological type of gastric cancer (according to Lauren’s classification) predominates significantly in this country.

Keywords: gastric cancer, Lauren, Mexico, socio-demographic characteristics, reproducibility

In Mexico during 1995, 4685 people died of gastric cancer (GC). The crude mortality rate was 5.1 per 100,000 total population and contributed 10% of all malignant neoplasms registered that year. In contrast to the declining trend worldwide mortality due to GC has not declined in Mexico. These statistics place stomach cancer as the major cause of death due to malignant tumours from 1980 to 1982, a rate which has only been exceeded by lung cancer thereafter.1,2

According to the classification proposed by Lauren in 1965, this tumour has two histological subtypes: intestinal and diffuse.3 The intestinal type of gastric cancer (IGC) is characterized by the presence of glands, and occasionally papillar or solid components can be observed when the tumour is only slightly differentiated. In contrast, in a diffuse gastric tumour (DGC) glands are not identified and cells are isolated or form small nests.4 Some authors have suggested that IGC is the predominant type of GC in high risk countries,5–7 and that the decrease in morbidity due to this tumour observed in the US, Norway and among immigrants from Japan to Hawaii is the result of a real decrease in the incidence of this histological subtype.7,8

Distribution of morbidity due to DGC is similar in high and low risk populations. Since its presence is more common in young people and in individuals with type A blood, it is thought that its aetiology is predominantly genetic.6–9 The results of some recent investigations show, in addition, that diet is a determinate factor not only for IGC but also for DGC.10–12

In Mexico, information exists about the frequency of GC by histological type in isolated groups of patients from different health institutions, which are public13–18 or within the social security system.19,20 Recently, histological information has also been generated about GC in subjects cared for at private hospitals.21

This information suggests that the distribution of the histological types of GC varies according to the characteristics of the population of patients studied and also that this variability could be present among groups of
patients cared for at the same institution during a similar time period. Nevertheless, these findings have not been supported by the necessary statistical tests, which would allow exclusion of existing differences which occur by chance. More important, these data have been obtained from case series in individual hospitals.

In this article, the distribution of histological types of GC in a representative study population of 220 patients are presented, with their principal socio-demographic characteristics. These patients were cared for during 1989 to 1990 in four public, seven social security and four private hospitals in Mexico City.

**MATERIAL AND METHODS**

In this article we present selected socio-demographic information (age, sex, medical care unit, duration of residence in the Metropolitan Area of Mexico City, socioeconomic level and occupation) according to the histological results of 220 gastric biopsies from patients with gastric adenocarcinoma. The biopsies were read a second time by a single pathologist and classified according to Lauren.³

The information about individuals is taken from an epidemiological population-based case-control study, which aimed to evaluate the Mexican diet and GC incidence. The methodology of this study has been described in detail previously.¹⁰

The study population included 220 individuals newly diagnosed with GC, from different socioeconomic backgrounds. They represent about 66% of the cases reported annually in Mexico City to the Cancer Registry of the Ministry of Health.

The participating cases were identified in 15 hospital units in Mexico City: National Cancerology Institute, Gea Gonzalez Institute, General Hospital, National Nutrition Institute (public), Adolfo Lopez Mateos Hospital, 20 de Noviembre Hospital, Specialities Hospital, Ignacio Zaragoza Hospital, La Raza Hospital, Oncology Hospital, PEMEX Picacho Hospital (social security) Spanish Hospital, London Hospital, Los Angeles Hospital, and Metropolitan Hospital (private).

Socioeconomic status was determined according to the methodology proposed by Bronfman et al., which has been validated previously for the Mexican population.²² It is principally based on assigning points for educational level of the head of the family, general housing characteristics (presence of services such as running water and sewage systems), and the number of inhabitants in the household. Statistical analyses included comparisons of socio-demographic characteristics by histological type using the Student’s t-test, χ². To test for trends, log linear Poisson models were used.

### TABLE 1 Socioeconomic characteristics of the study population⁴,⁵

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Histological type</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intestinal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diffuse</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median (n)</td>
<td>61.7 (98)</td>
<td>50.8 (95)</td>
</tr>
<tr>
<td>Standard Deviation (n)</td>
<td>12.4</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>(98)</td>
<td>(95)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males % (n)</td>
<td>66.3 (63)</td>
<td>47.4 (45)</td>
</tr>
<tr>
<td>Females % (n)</td>
<td>33.7 (35)</td>
<td>52.6 (50)</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security % (n)</td>
<td>58.2 (57)</td>
<td>46.3 (44)</td>
</tr>
<tr>
<td>Public % (n)</td>
<td>32.7 (32)</td>
<td>48.4 (46)</td>
</tr>
<tr>
<td>Private % (n)</td>
<td>9.1 (9)</td>
<td>5.3 (5)</td>
</tr>
<tr>
<td>Length of residence in Mexico City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–20 % (n)</td>
<td>6.3 (6)</td>
<td>8.7 (8)</td>
</tr>
<tr>
<td>21–40 % (n)</td>
<td>27.4 (26)</td>
<td>30.4 (28)</td>
</tr>
<tr>
<td>41–60 % (n)</td>
<td>25.3 (24)</td>
<td>34.8 (32)</td>
</tr>
<tr>
<td>61+ % (n)</td>
<td>41.1 (39)</td>
<td>26.1 (24)</td>
</tr>
<tr>
<td>Socioeconomic index c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low % (n)</td>
<td>31.5 (28)</td>
<td>37.6 (32)</td>
</tr>
<tr>
<td>Medium % (n)</td>
<td>41.6 (37)</td>
<td>36.5 (31)</td>
</tr>
<tr>
<td>High % (n)</td>
<td>27.0 (24)</td>
<td>25.9 (22)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White collar % (n)</td>
<td>22.2 (20)</td>
<td>30.0 (27)</td>
</tr>
<tr>
<td>Blue collar % (n)</td>
<td>31.1 (28)</td>
<td>26.7 (24)</td>
</tr>
<tr>
<td>Housewives % (n)</td>
<td>27.8 (25)</td>
<td>35.6 (32)</td>
</tr>
<tr>
<td>Students, retired and unemployed % (n)</td>
<td>18.9 (17)</td>
<td>7.8 (7)</td>
</tr>
</tbody>
</table>

⁴ Indeterminate histological cases were eliminated from the analysis (n = 27).
⁵ Total observations are not equal to the original sample size due to missing values.
⁶ According to Bronfman et al.²²

Kappa coefficients and percentage agreement were also estimated using the statistical software STATA 4.0 (Stata Corporation, College Station, Texas).

**RESULTS**

As is shown in Table 1, the average age of patients with IGC was 61.7 ± 12.4 years, while DGC cases were younger on average (50.8 ± 15.0 years). This difference was marginally significant (P = 0.065). We observed that IGC predominated significantly in men (66.3% versus 33.7%, P = 0.0179).
Approximately half the patients with IGC were diagnosed in hospitals within the social security system (58.2%). Approximately 7.2% of the patients, of both histological types, were found at private hospitals, compared with 35% of individuals at national level. On average, the study population had resided in the Metropolitan Area of Mexico City for 48.3 ± 18.8 years. When this variable was stratified in 20-year categories, a significant differential pattern between the subtypes of GC was not observed, although a greater percentage (41.1%) of subjects with IGC reported having resided in this area for more than 40 years.

In relation to socioeconomic status, the proportions observed by histological type according to the three categories (low, middle and high) did not show significant differences. Patients’ occupation was not related to histological type of tumour either.

The results of this study (Table 2) show that none of the histological subtypes of GC predominate in Mexico City, since the estimated distribution for IGC was 44.5% while that for DGC was 43.2% (the remaining 12.3% corresponded to indeterminate tumours). The frequency of IGC was significantly higher among males.

In Table 3, the Kappa coefficients and percentage agreement between a single pathologist and hospitals which contributed at least 10 histological readings are presented. Kappa coefficients varied from 0.27 to 0.83, while the range of percentage agreement was 65.0–92.0%.

**DISCUSSION**

The results of this study show that in Mexico no specific histological type of GC (classified according to Lauren) predominates, and that the distribution of these histological types (IGC and DGC) did not vary significantly according to socioeconomic status.
It is important to point out that, for the first time in Mexico, estimated distributions of IGC (44.5%) and DGC (43.2%) are reported based on a sample of patients which cover at least 66% of the total GC cases reported to the Mexico City Cancer Registry in a certain year, and which includes individuals from different socioeconomic levels. Previous studies have been based on a series of cases from individual hospitals. Since the Registry’s coverage is not national it is difficult to estimate the representativeness of our sample in relation to individuals with this disease in the country as a whole.

Our results, in terms of the distribution of the histological types of GC in Mexico, do not agree with those published previously (Table 2). Among the sources of variation which could explain this situation are the following: the nature and representativeness of the samples studied (biopsies, autopsies or surgical parts), variation in the diagnostic criteria used in the different studies (intra-observer error), and finally, even when these criteria were totally explicit and correctly applied, inherent variation of the observer also exists (inter-observer variability).

As an example of the magnitude of this last source of error, suffice to say that Kappa correlation coefficients between the results of the slide readings obtained in the main participating hospital units in this study, as compared to the second reading performed by a single pathologist (experienced and recognized in the field) varied from 0.27 to 0.83 while the corresponding percentages of agreement were 61.5–92.0%. These results, that demonstrate low reproducibility and thus low validity, are very similar to those found in a similar study performed in Italy.24

Specifically, the studies carried out in six public hospitals13,18 show a greater frequency of DGC than of IGC, while the two studies developed among social security system patients,19,20 suggest the opposite; i.e. a predominance of IGC. Likewise, it is noteworthy that the results of studies by Pedroza et al.15 and Rubio et al.16 which were carried out in the same hospital with an overlap of 4 years (during 1985 and 1989) are very different. The first study reports a diffuse carcinoma distribution of 50.0% while the second reports 89.3%. These results suggest not only possible variations in the diagnostic criteria used within a single institution but other sources of error which have been discussed previously. However, the most important limitation of these studies is that the patients studied are not representative of the population which reduces possibilities for comparison between them, and extrapolation to the national level.

According to Figure 1, mortality due to GC in Mexico has not shown a decreasing trend in recent years as has been observed in other countries such as Japan. The standardized mortality GC rate has been almost constant since 1979 (around 8 per 100 000 inhabitants) while in Japan a marked decrease has been observed, reaching a rate near 20 per 100 000 inhabitants in 1993. In contrast, the mortality trend of other types of cancer, such as lung cancer, has been increasing in Mexico.

Data on GC mortality in Mexico since 1965 by histological type corresponds to a series of isolated cases. Hence, it is not possible to estimate what the trend of the ratio of DGC to IGC has been at a national level nor to evaluate whether the current distribution of IGC and DGC is the result of a decrease in IGC, as has been the case in the countries that were affected by the epidemic of GC which occurred during the earlier part of the twentieth century.

Finally, although previous studies have been useful in highlighting distribution of the histological types of GC in Mexico they do not confirm that one type of GC has predominated significantly in Mexico, nor can Mexico be considered a low risk area for stomach cancer. This last classification was based on results obtained at the beginning of the 1960s, in patients from a single hospital in Mexico City,13 in whom a greater percentage of DGC was observed. It is difficult to establish if this finding could be extrapolated to all stomach cancer patients in this period at the national level, due to the incomplete sample of individuals studied.

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