Esophageal Cancer in the Southern Region of Brazil

—Cases from Santa Catarina State—

R. M. C. Scaff\(^1,2\) and V. Scussel\(^1\)

Abstract

A survey on esophageal cancer exposure from 1995 to 1997 was carried at the radiotherapy service of the Charity Hospital in Florianopolis city, capital of Santa Catarina State, southern region of Brazil. From a total of 2,495 medical registers, 134 cases were of esophageal cancer affecting 80.5% of males and only 19.5% of females. Most of the patients were from the South and West regions of Santa Catarina (28 and 27%, respectively), regions of high corn flour consumption and maize production. It was observed that farmers presented the highest incidence of esophageal cancer, followed by bricklayers, miners, drivers, and carpenters. Most of the patients had the habit of smoking and drinking alcohol regularly, and 27% of patients used to drink chimarrao. Some patients had those habits associated i.e., they used to smoke, drink alcohol, and also have chimarrao.

Key words: esophageal cancer, drinking, smoking, chimarrao, Brazil.

Introduction

The esophageal tumour is the 5th cause of cancer in Brazil, being the South, the region with the highest incidence in the country, and that has been of concern among the scientists\(^3\). That cancer affects mainly males from 60 to 70 of age, although there have been registered some cases on patients of their 40's\(^2,3\). According to data reported on number of death by INCA\(^3\), the esophageal cancer (EC) occurs 3 to 4 times more in men than in women and the frequency is higher in the Southeast and South regions of Brazil and it will be the 4th cause of death by cancer in men at the end of 1999 in Brazil. Its epidemic behaviour, marked by great differences in the incidence inside small geographical limits and significant changes in incidence as the time passes by, suggests a predominant influence of external environmental factors. The risk factors were not very well established yet, but studies accomplished in São Paulo, in the South of Brazil and in neighbour countries suggest an association with smoke, consumption of alcohol beverages and hot drinking (chimarrao)\(^2,4\).

In order to contribute to the control of that pathology, the epidemiology of EC has been studying the genetic, nutritional and environmental factors which can modify the susceptibility of the esophageal epithelium for the neoplasy development. Among those factors, a mycotoxins group, the fumonisins, detected mainly in corn and corn based products has been suggested as one of those factors for esophageal cancer. Fumonisins, a carcinogenic group

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Table 1  Level of fumonisin B₁ and B₂ and percentage of positive samples in maize produced in the
South and Southeast regions of Brazil reported in literature.

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>No</th>
<th>State/Region</th>
<th>FB₁ mg/g</th>
<th>%b)</th>
<th>FB₂ mg/g</th>
<th>%b)</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBF&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21</td>
<td>Parana/South</td>
<td>0.2-38.5</td>
<td>95.2</td>
<td>0.1-12.0</td>
<td>85.7</td>
<td>(9)</td>
</tr>
<tr>
<td>Maize</td>
<td>39</td>
<td>Parana/South</td>
<td>0.6-12.55</td>
<td>97.4</td>
<td>1.2-10.24</td>
<td>94.8</td>
<td>(12)</td>
</tr>
<tr>
<td>Maize</td>
<td>113</td>
<td>Parana/South</td>
<td>0.06-10.59</td>
<td>98.2</td>
<td>0.01-0.68</td>
<td>88.5</td>
<td>(13)</td>
</tr>
<tr>
<td>Maize</td>
<td>35</td>
<td>São Paulo/Southeast</td>
<td>0.10-6.16</td>
<td>97.1</td>
<td>0.03-1.74</td>
<td>100</td>
<td>(14)</td>
</tr>
<tr>
<td>Maize</td>
<td>42</td>
<td>São Paulo/Southeast</td>
<td>0.15-12.25</td>
<td>95.2</td>
<td>0.13-4.49</td>
<td>95.2</td>
<td>(15)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Maize based feed
<sup>b</sup> Percentage of positive samples

of mycotoxins, are isolated from cultures of *Fusarium moniliforme* and *Fusarium proliferatum*. That cereal composes the basic diet of populations, such as in South Africa. This relationship between EC and fumonisin was also related to the northern area of Italy and South Carolina in USA<sup>9</sup>. The International Agency for Research on Cancer (IARC) consider "the toxins derived from *Fusarium moniliforme*" as possible carcinogenic for humans, related to the Group 2B<sup>9</sup>. Significant levels of contamination of fumonisins in corn have been detected in Brazil, especially in the South region (Table 1), as well as the *Fusarium moniliforme* which is a frequent contaminant in corn and other cereals<sup>9</sup>. Animal outbreaks of Leukoencephalomalacia (horses) and analyses of feed samples with high levels of contamination of fumonisins have been described<sup>8-11</sup>. Therefore a survey on esophageal cancer exposure in Santa Catarina State (SC) and its relation to region (maize production), profession, smoking and drinking habits was carried.

**Material and Methods**

Medical dossiers (2495) of patients with cancer, treated at the radiotherapy service of the Charity Hospital*, located in Florianopolis city, capital of SC State, Southern region of Brazil, from 1995 to 1997 were surveyed for EC. The information related to sex, age, where the patient lived in the last 10 years, his/her profession and habits (smoking, drinking and/or chimarrão) were obtained from the medical dossiers of each patients.* Reference hospital for cancer treatment in the SC State.

**Results and Discussion**

From the total of registers for cancer evaluated for three years, 134 cases were of esophageal cancer, being 44, 57, and 33 of the cases registered in 1995, 1996 and 1997, respectively. Most of the affected patients were males with 80.5% and only 19.5% females (Fig. 1A). On the other hand, 15.5, 23.8, 41.8, and 16.5% of the patients with esophageal cancer were on their 40's, 50's, 60's and over 70's, respectively (Fig. 1B). The South (coal mines, maize food consumption) and West (farming, chimarrão, high maize production and barbecue consumption) regions presented most of the cases of tumour with 28 and 27% respectively, followed by the Coast (cosmopolitan) region of the SC State with 20% (Fig. 2B).
It was observed that farmers were the group of patients with the highest percentage of esophageal cancer (24.5%) followed by 15.0, 7.5, 6.7 and 6.0% for bricklayers, miners, drivers and carpenters, respectively (Fig. 2A). As far as smoking and drinking habits of the patients are concerned 75% were smokers and 65% used to drink alcohol regularly. *Chimarrão*, a
hot, non alcoholic beverage, typical habit of the gauchos from the South of Brazil, Uruguay and Argentine was the drinking habit of 27% of the patients (Fig. 3A). It was observed that some patient had more than one of the above habits: drinking + smoking were 48.5% of the patients followed by drinking + smoking + drinking chimarrão with 20% and smoking + drinking chimarrão with 5.5% (Fig. 3B). The highest EC incidence was registered in males (4 time higher than females), farmers, and the regions of SC more affected were the South and West. Those regions are the main maize producing areas, have Italian background population that have, in some extent, their diet based on maize products (especially polenta), constant exposition to pesticides, as well as coal mines (SC South region). It is important to emphasize that smoking and drinking habits have been also observed in other regions of the country and they are 5 to 6 times lower (1) than in the South of Brazil. Therefore, the habits evaluated above, as well as others that could be responsible for that high incidence in those two regions of SC should be more studied in order to reduce/control the incidence of EC.

The present work, a preliminary survey of the project on fumonisins and esophageal cancer in the Southern Region of Brazil, has been carried out in the Food Science and Technology Department of the Federal University of Santa Catarina in collaboration with the Oncology Research Centre (CEPON) of the same State.

References

