Frequency of cancer in a specialty hospital in Mexico City. Implications for the development of early detection methods

ABSTRACT

Background: Cancer is the second cause of death in Mexico. Hospital Juárez de México is a highly specialized general hospital in which the frequency of cancer patients treated at the Oncology Unit is a representative sample of the frequency of cancer in the country. We undertook this study to determine the frequency of presentation of tumors diagnosed in a third-level hospital.

Methods: We reviewed all the biopsies and surgical specimens diagnosed as cancer or malignant tumors registered in the pathology unit during the years 2006 to 2010. We grouped the cases according to age, sex, and anatomic site.

Results: We identified the ten most common cancers for both sexes, age groups and sex affected, increasing the chances of early detection campaigns for the most common cancers and to attempt to increase control and cure rates and improve coverage for the economically challenged populations for their integration into health systems.

Conclusions: Information obtained reflects the reality of the country to the general population without insurance affiliation. In México, women experience cancer more than men due to breast and genital tract neoplasms, which are the most frequent. Timely detection systems exist and should be strengthened in order to accomplish early identification of cases in our population.

Key words: cancer, neoplasm by site, early detection.

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INTRODUCTION

Cancer is the second cause of death in México. Its incidence increases each year due to the aging population, with dietary habits different from the original culture, and with growing industrialization that favors greater exposure to carcinogens. The importance of knowing the frequency of occurrence of different malignancies lies in designing preventive and early detection measures, which allow early identification of new cancers at a potentially curable stage. Unfortunately, the low socioeconomic level of most of the population, poor health education, hygiene and disease prevention and the lack of access to health resources result in more than 75% of the malignant tumors diagnosed in Mexico are at locally and systemically advanced stages, with little probability of cure, increasing treatment costs. Hospital Juárez de México (HJM) is a high specialty general hospital that cares for an estimated 2 million inhabitants in the north of Mexico City and is a referral center for cancer cases diagnosed in the states of Queretaro, Tlaxcala, Guerrero, Oaxaca and the State of Mexico. The hospital cares for a population without social protection or medical insurance of any type so that the cancer cases treated in its Oncology Department are a representative sample of the frequency of cancer in the country.

The objective of this study is to determine the statistics of the tumors diagnosed in a third-level hospital.

MATERIALS AND METHODS

We carried out a retrospective study consisting of a review of all histopathological reports of pathology specimens diagnosed in the Pathology Department of the HJM from January 1, 2006 to December 31, 2010. All proven cases of cancer diagnosed by any type of biopsy (incisional, excisional, needle) or through the study of complete surgical specimens were recorded, with due care not to duplicate cases with biopsy and subsequent surgical specimen in the same patient. The cases reported as “suggestive” of cancer were excluded from this review. From the patient records, we obtained the following information: gender, age, site of primary tumor and histopathological strain. An annual review was done and the cases globally representative of 5 years of study were compiled. Compilation of the information was carried out from December 1, 2010 to September 30, 2011. Afterwards, the illustrated analytical tables were done with their respective graphs with the goal of facilitating the analysis of the demographic and epidemiological characteristics.

RESULTS

During a 5-year period, there were 5846 cancer cases identified (Figure 1). The age of greatest incidence was between 36 and 70 years with a peak maximum between 46 and 50 years of age (average age 58 years and standard deviation of 141 (or 14.4)). This places the age in a minimum range of concentration of 41 years and a maximum of 75 years (Figure 2). With respect to gender, females were most affected with 3742 cases; for males, 2104 cases were recorded (ratio 2:1). In our population, of each two females with cancer, one male also had cancer (Table 1).

When analyzing the total frequency of presentation by gender, the ten most frequent malignant neoplasms, in order of presentation, are breast (1086 cases), cervical (671 cases), lymphoma (371 cases), prostate (293 cases), colon (189 cases) and rectum (84 cases), skin melanoma and non-melanoma (494 cases), stomach (235 cases), ovary (243 cases), testicle (179 cases).

Grouped by gender, the most frequent cancer in females in order of frequency are breast, cervical, non-melanoma skin and melanoma,
ovarian, lymphoma, endometrial, stomach, thyroid, colon and rectum, renal, lung and bladder (Table 1). For males, the most frequent neoplasms in descending order of presentation are prostate, skin non-melanoma and melanoma, lymphoma, testicular, colon, rectum, stomach, bladder, lung, esophagus and kidney (Table 1). Topographically and for both genders, the most affected anatomic site corresponds to the female genitalia with 1,133 cases followed by breast cancer, gastrointestinal tract, male genitalia, skin non-melanoma and melanoma, head and neck neoplasms and central nervous system tumors (Table 1).

**Analysis by Anatomic Site and Topography**

**Head and neck cancer**

Head and neck cancers represent 9.05% of all cancers with 529 cases. The most frequent cancer pathology of this anatomic area is thyroid, 142 cases (26.84%); floor of the mouth, 50 cases (9.45%); larynx, 48 cases (9.07%); tongue, 46 cases (8.70%); lips, 27 cases (5.10%); palate, 23 cases (4.35%); parotid gland, 21 cases (3.97%); oral cavity, 18 cases (3.40%) (Figure 3).

**Cancer of the gastrointestinal tract**

There were 749 cases recorded representing 12.81% of the total cases. The most common cancer of the gastrointestinal tract was that of the large intestine located in the colon and rectum representing 273 cases (36%), 25% in the colon and 11% in the rectum, which reflects an important epidemiological turning point because 10 years ago the most common cancer of the gastrointestinal tract in Mexico was that of the stomach, which in our sample was 253 cases (31%). Next is periampullar cancer that comprises the pancreas, bile duct and ampulla of Vater with 81 cases (10.81%) and duodenum with 20 cases (2.67%) (Figure 4).

**Cancer of the respiratory system**

These cancers represented 2.29% of all cancers. The following neoplasms were included: trachea, lung, heart, mediastinum and pleura. In the respiratory system the most common tumors were lung, 106 cases (79.10%); pleura, 16 cases (11.94%); mediastinum, eight cases (5.97%); heart, three cases (2.24%); and trachea, one case (0.75%).
Table 1. Cancers observed in males and females according to year (2006-2010)

<table>
<thead>
<tr>
<th>Type of cancer</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
<th>Structure %</th>
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<tbody>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Breast</td>
<td>212</td>
<td>151</td>
<td>203</td>
<td>238</td>
<td>279</td>
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<td>Cervical</td>
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<td>71</td>
<td>68</td>
<td>47</td>
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<tr>
<td>Ovary</td>
<td>63</td>
<td>72</td>
<td>73</td>
<td>68</td>
<td>89</td>
<td>243</td>
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<tr>
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<td>34</td>
<td>32</td>
<td>31</td>
<td>42</td>
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<tr>
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<td>21</td>
<td>28</td>
<td>26</td>
<td>24</td>
<td>115</td>
<td>3.07</td>
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<td>19</td>
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<td>18</td>
<td>23</td>
<td>24</td>
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<tr>
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<td>24</td>
<td>12</td>
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<tr>
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<td>5</td>
<td>6</td>
<td>9</td>
<td>21</td>
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<td>1.23</td>
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<tr>
<td>Bladder</td>
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<td>9</td>
<td>12</td>
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<tr>
<td>Esophagus</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>20</td>
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</tr>
<tr>
<td>Others</td>
<td>155</td>
<td>143</td>
<td>150</td>
<td>157</td>
<td>176</td>
<td>781</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>737</td>
<td>695</td>
<td>750</td>
<td>808</td>
<td>900</td>
<td>3,742</td>
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<td>66</td>
<td>51</td>
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<td>57</td>
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<td>33</td>
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<td>45</td>
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<td>31</td>
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<td>17</td>
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<td>4.18</td>
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<td>16</td>
<td>15</td>
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<td>74</td>
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<tr>
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<td>4</td>
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<td>3</td>
<td>10</td>
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</tr>
<tr>
<td>Breast</td>
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<td>0</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>13</td>
<td>0.62</td>
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<tr>
<td>Others</td>
<td>98</td>
<td>105</td>
<td>133</td>
<td>171</td>
<td>164</td>
<td>671</td>
<td>31.89</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>344</td>
<td>371</td>
<td>435</td>
<td>488</td>
<td>486</td>
<td>2,104</td>
<td>100</td>
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<tr>
<td><strong>General total</strong></td>
<td>1,081</td>
<td>1,066</td>
<td>1,185</td>
<td>1,296</td>
<td>1,386</td>
<td>5,846</td>
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</tbody>
</table>

Source: Archives of the Department of Pathology of Hospital Juárez de México.
Cancer of the connective tissue, subcutaneous tissue, bones, joints, joint cartilage and other soft tissues

These cancers represented only 3.81% (223) of the 5846 cases recorded that comprised the different cancers reported in the connective tissue, subcutaneous, bones, joints and joint cartilage. In this group of cancers the different sarcomas have precedence (liposarcoma, malignant fibrous histiocytoma, neurofibrosarcoma, osteosarcoma, chondrosarcoma, angiosarcoma) that are rare neoplasms but with significant appearance in the oncology departments.

Foot cancer

In this organ we found melanoma and non-melanoma skin cancers that in general represent 8.45% of the cancer diagnoses in the HJM, corresponding to 494 cases of the 5846 cases reported. Non-melanoma skin cancer represented 82.39% with 407 cases, morphologically represented for the most part by the following histological strains: basocellular 55.47% (274 cases), epidermoid 20.85% (103 cases), Kaposi 4.05% (20 cases) and melanoma skin cancer only represented 17.61% with 87 cases (Figure 5).

Cancer of the female genitalia

These represented 19.38% of all the cancers reported with 1,133 cases from the 5846 cases recorded. Under this category were listed such
anatomic sites as vulva, vagina, uterus, cervix, ovary and endometrium. The most common pathologies were cervical, 671 cases (59%), ovary, 243 cases (21%); endometrium, 137 cases (12%); vulva, 21 cases (2%); and vagina, eight cases (1%) (Figure 6).

In accordance with the pathology reports reviewed, 526 cases (78.40%) were invasive cervicouterine cancer and 145 (21.60%) cervicouterine cancer in situ. Morphologically, the histological strains with greatest frequency of cervicouterine cancer were epidermoid in 87% with 584 cases, followed by adenocarcinoma in 7% with 40 cases, squamous cell 5% with 31 cases and 2% of rare histology with 16 cases. In the morphology of ovarian cancer, the histological strains observed in 243 cases were: epithelial in 74.51% with 181 cases, granulosa cell tumors 4.6% with 11 cases, germinal 10.93% with 27 cases, rare strains 0.6% with two cases and borderline cancer of the ovary with 22 cases (9.5%). With regard to endometrial cancer there were 137 cases (10.88%) of the 1,133 cancers of the female genitalia. Morphologically there were 83.21% cases of endometrial cancer with 114 cases of the 137 cases, 13.86% papillary serous cancer with 19 cases, rare strains 2.9% with four cases of 137 cases.

**Cancer of the male genitalia**

These cancers represent the fourth cause of cancer in the HJM population with 513 cases (8.78%) from 5,846 cases. The anatomic sites were prostate, testicle and penis. Of all the cases analyzed, prostate was the most common cause of cancer in the male genitalia with 293 cases (57.12%), testicular, 178 cases (34.70%); and penile, 42 cases (8.19%).

Figure 5. Skin cancers.

![Figure 5. Skin cancers.](image-url)

Figure 6. Cancer of the female genitalia.

![Figure 6. Cancer of the female genitalia.](image-url)
Cancer of the urinary tract

Cancer of the urinary tract represents 3.97% of 232 cases from the 5,846 cases reported. The anatomic sites were kidney, bladder, and urethra. Of all the cases analyzed the bladder was the most common cause of cancer of the urinary tract with 133 cases (57.33%) followed by the kidney, 95 cases (40.95%); and urethra, four cases (1.72%).

CNS cancer

In this institution there were 195 cases (3.34%) of cancers of the CNS. The anatomic sites were meninges, brain, and spinal cord. Of all the cases recorded and analyzed, the most common were that of the brain, 174 cases (84.06%). Morphologically, for the brain the first five histological strains were meningioma 27.6% (54 cases), glioblastoma multiforme 14.8% (29 cases), astrocytoma 12.8% (25 cases), adenoma 5.1% (ten cases), medulloblastoma, Schwannoma and craniopharyngioma 4.6% (nine cases).

Other cancers

Other types of cancers correspond to 191 cases (3.27%) including germinal extragonadal, retroperitoneum, multiple myeloma, leukemias, carcinomatosis, peritoneum and adrenal gland.

DISCUSSION

In Mexico, cancer is a public health problem representing the second cause of death after cardiovascular disease. The statistics for malignant tumors has not updated since the latest revision of the Histopathological Registry of Malignant Neoplasias of 2003.14 The incidence and mortality from cancer is different when economically privileged and underprivileged classes are compared. When analyzing cancer frequency in a high specialty general hospital of the metropolitan area of Mexico City where the local and foreign population is concentrated, it is a mirror of the reality of the incidence of cancer in our country.5,6

According to the first consultation, frequency of the different neoplasms is similar to that reported in the Histopathological Registry of Malignant Neoplasms, which enables carrying out programs for early cancer detection.1

In Mexico, according to gender, females are more likely to suffer and die from cancer than males (ratio of 2:1). The majority of women are in the productive age at the time of the diagnosis, which affects the socioeconomic well-being of families.

When comparing the HJM statistics with respect to the last publication of the Histopathological Registry of Malignant Neoplasms, the most notable differences were as follows:9,10

A. Breast cancer occupies the first place of all cancers diagnosed.

B. Cervicouterine cancer occupies the second place at the expense of invasive tumors.

C. Cancer of the colon and rectum considerably surpass gastric cancer and occupy the fifth place and displaces stomach cancer to seventh place.

D. Tumors of the CNS occupy tenth place, specifically the brain.

Breast cancer is the new pandemia of neoplastic diseases in our country, which occupies the first place in frequency of presentation. The annual growth rate, calculated according to the patients diagnosed annually in the HJM with breast cancer, was 9.4%, which means that each year 40 to 60 new cases are expected. This cancer, of unknown
etiology, requires programs for early detection, to modify lifestyle, control weight, prevent and treat metabolic syndrome, monthly self-examination, and consuming a diet low in fat and exercise. Timely detection of cancer with mammography with wide population coverage is not possible in our country due to the cost of the radiology equipment and lack of health personnel to establish the diagnosis and treatment. Only massive health education and widespread communications and informational campaigns will favor that the clinical and radiological methods of early detection of cancer be carried out properly so that the patient will present immediately for a consultation when there is suspicion of some change, as well as continuous medical education in oncology for primary care physicians.  

Despite programs of early detection of cancer, cervicouterine cancer maintains a high frequency and represents the second most common neoplasm in our hospital. The majority of the patients are in the reproductive stage and present in clinically advanced stages, which represent 526 cases of invasive tumors against 145 cases of carcinoma in situ. This reflects failure due to different reasons for the methods of early detection of cancer, mainly because women do not present for their control and follow-up examinations.

Prostate cancer occupies the first place in males and its incidence increases as the life expectancy of the population increases. Its etiology is unknown and there are no preventive measures available; however, according to the Official Mexican Guidelines, timely detection of prostate cancer consists of rectal examination and yearly determination of the prostate-specific antigen. It is advised that there is little information given to the population and cultural factors prevent these examinations from being performed, as well as the cost implied. This is reflected by the advanced clinical stages when males are diagnosed in our hospital.

Malignant lymphoma is the fourth neoplasm reported in México that is similar to our experience and the greater proportion of cases corresponds to non-Hodgkin’s lymphoma and a lower proportion to Hodgkin’s disease, affecting both genders and all ages. There are no methods of early detection for this cancer and of specific or sensitive tumor markers. It does not present pre-malignant lesions and the symptoms are heterogeneous.

With regard to cancers of the gastrointestinal tract, there is an epidemiological transition and for a decade stomach cancer occupied the first place in México with a 2:1 ratio with cancer of the colon and rectum. This is a tendency towards change in favor of colon and rectal cancer, whose cause is unknown. Only known are the related environmental factors such as diet, which plays a role in the increase in the incidence. In our country there are no methods of early detection for colorectal cancer. Occult blood in the stool is not useful due to the high percentage of chronic parasitoses, which show occult blood in the stool. Flexible rectosigmoidoscopy is not available to all the population due to lack of material resources and specialized personnel, which also applies to gastric cancer where endoscopy has demonstrated excellent results in Japan.

Testicular cancer is a public health problem that affects children, adolescents, and those males in the reproductive age where the incidence is higher. The cause is unknown but it is highly curable and is associated with cryptorchidism. There are no methods for early detection of testicular cancer and health education only provides assistance and curative treatments when identified in early clinical stages.

Ovarian cancer is the third most frequent cancer in females. The incidence is considerable and its etiology is unknown. Methods for early detection of ovarian cancer have been suggested such as pelvic ultrasound, but it has a low sensitivity and
the rate of false positives in adnexal tumors is high. Many pelvic tumors have different causes that require surgical procedures for their diagnosis, sometimes unnecessary. However, in México and worldwide, epithelial cancer of the ovary is diagnosed in clinically advanced stages with a high rate of mortality.\(^1,12,16\)

Lung cancer is a lethal neoplasm, but less frequent in our environment as a result of the legislation on tobacco consumption and costs of its consumption; however, lung cancer represents the first cause of death in males, which requires strategies for its prevention.\(^1,12\)

The cost of diagnosing cancer in late stages has multiple implications in our country.\(^17,18\) At the international level, between 2.4 and 3.7 million preventable cancer deaths occur each year and 80% occur in developing countries. Death due to cancer in children and young adults is responsible for productive loss of years. Smoking is a risk factor for some neoplasms and affects the economy of a country by reducing the internal gross national product at 3.5% per year as a result of its associated morbidity. The economic repercussion of the loss of productivity due to preventable cancers and treatment is 1.16 trillion dollars, which is equal to 2% of the gross national product. Early detection of cancer will reduce the cost of cancer treatment in the amount of 130 million dollars.

In conclusion, the results of our investigation report that females are more affected than males in a ratio of 2:1. Breast cancer and cervico-uterine cancer continue being responsible for the greater number of deaths in our country, which are cancers easy to detect but continue to be seen in clinically advanced stages due to the diagnostic delay.

In developing countries such as México, lack of access to the health systems, poverty, lack of education and lifestyle changes have an impact on the epidemiological data. Although the types of cancers are similar, in our environment they are more frequently diagnosed in clinically advanced stages. There is a high incidence of breast and colorectal cancer, which used to be rare in our population. The increased coverage of methods of early detection of cancer, accessible to the population with specialized personnel, will be reflected in a better epidemiological overview of cancer in our country.

REFERENCES


