Cancer Patterns in the Middle East

Special Report from the Middle East Cancer Society

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To update its cancer statistics, the newly established Middle East Cancer Society examined the cancer frequency patterns in Egypt and the Gaza Strip. The results revealed differing overall patterns. For men the highest frequencies were found for lymphoma, bladder cancer and cancers of the oral cavity and pharynx in Egypt, and for lung cancer, leukaemia and lymphoma in Gaza. For women, breast cancer had the highest frequency in both areas, followed by cancers of the oral cavity and pharynx in Egypt, and leukaemia and lymphoma in Gaza. The distribution of cancer occurrence by organ system also varied. In the light of the different ethnicities, lifestyles, socioeconomic levels and carcinogenic exposure among the countries of the Middle East, this kind of comparison can provide the background for more sophisticated approaches for discerning risk factors in cancer. We believe that further cooperation among participating countries will overcome the present limitations in data collection, registration and access.

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In the Middle East, comprehensive population-based incidence data are available from the National Cancer Registries of Israel and Kuwait; however, our knowledge about other areas is limited (1). The figures in Israel tend to resemble those from Europe and North America, whereas those from Kuwait are significantly lower and the cancer patterns vary considerably (1, 2). These differences may be due to differences in ethnic origin, cultural and religious background, occupational exposures, nutritional status, socioeconomic status, and access to medical care. There is also considerable variation in the population age structures.

The advance of the peace process in the Middle East has allowed oncologists and epidemiologists from the region to coordinate their efforts in cancer research and control. In November 1994, the Middle East Cancer Society (MECS) was established in Cairo. It currently includes members from Egypt, the Palestinian Authority, Jordan, Cyprus, Turkey and Israel. To update its cancer statistics, the MECS included a session on the epidemiology of cancer among Egyptians, Israelis and Palestinians in its second meeting in 1995 at the United States National Cancer Institute in Bethesda and in its first congress in 1996 in Tel Aviv. This report summarizes the special features noted in these populations.

MATERIAL AND METHODS

For Egypt, cancer data were obtained for 1970–1994 from the Registry of the National Cancer Institute in Cairo (NCI-C), which comes under the auspices of Cairo University (3). The NCI-C is the only multidisciplinary medical centre specializing in cancer treatment on a national level in Egypt. It records all verified cancer cases with at least one hospitalization (non-hospitalization is rare for most types of cancer). All registrations are checked for duplicates. Population data were derived from the 1986 census conducted by the Central Agency for Public Mobilization and Statistics (4).

For the Gaza Strip, cancer data were obtained for 1990–1994 from the medical records of the Hemato-Oncology Clinic of Shifa Hospital. All cancer patients living in Gaza receive medical treatment in this clinic, and all pertinent records, histology reports, medical summaries,
Table 1a

Relative cancer frequency by percent and ranking for 15 selected sites: males

<table>
<thead>
<tr>
<th>Site</th>
<th>Gaza</th>
<th>Egypt</th>
<th>SEER</th>
<th>Sweden</th>
<th>Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Jews</td>
</tr>
<tr>
<td>Prostate</td>
<td>7.6</td>
<td>0.5</td>
<td>31.6</td>
<td>24.2</td>
<td>10.0</td>
</tr>
<tr>
<td>Lung</td>
<td>17.7</td>
<td>2.2</td>
<td>15.8</td>
<td>10.2</td>
<td>11.9</td>
</tr>
<tr>
<td>Colorectal</td>
<td>5.9</td>
<td>4.0</td>
<td>11.9</td>
<td>12.5</td>
<td>18.2</td>
</tr>
<tr>
<td>Bladder</td>
<td>7.7</td>
<td>40.1</td>
<td>60.0</td>
<td>7.1</td>
<td>9.8</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>10.3</td>
<td>9.6</td>
<td>4.6</td>
<td>4.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Oral &amp; pharynx</td>
<td>2.2</td>
<td>7.6</td>
<td>3.1</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Melanoma</td>
<td>1.3</td>
<td>2.1</td>
<td>2.7</td>
<td>3.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Kidney</td>
<td>10.0</td>
<td>0.5</td>
<td>2.7</td>
<td>4.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>10.0</td>
<td>4.9</td>
<td>2.6</td>
<td>2.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Stomach</td>
<td>3.5</td>
<td>1.3</td>
<td>2.4</td>
<td>5.6</td>
<td>6.1</td>
</tr>
<tr>
<td>Pancreas</td>
<td>3.1</td>
<td>0.6</td>
<td>2.1</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Larynx</td>
<td>4.4</td>
<td>5.5</td>
<td>1.5</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Brain</td>
<td>7.4</td>
<td>N.A.</td>
<td>1.5</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Liver</td>
<td>4.9</td>
<td>0.3</td>
<td>1.4</td>
<td>2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>0.3</td>
<td>3.6</td>
<td>1.3</td>
<td>1.3</td>
<td>0.8</td>
</tr>
</tbody>
</table>

a Rank in parentheses. Sites with the same cancer frequency are given the same ranking. Data for US SEER areas and Sweden provided for comparison.


d Based on the estimated number of cancers for 1994 (2).

RESULTS

In 1986, the population of Egypt was 48.2 million, and that of the Cairo metropolitan area, 9.7 million (4). A total of 50,638 cancer patients (30,383 males and 20,255 females) were registered between 1970 and 1994 (about 2,000 cases annually).

The population of the Gaza Strip in 1992 was 842,000; following the signing of the peace agreement with Israel, approximately 50,000 Palestinians have returned thereafter. Between 1990 and 1994, an average of almost 350 new cancer cases were diagnosed annually.

Sex

Males (Table 1a): In Egypt, the leading cancer diagnosed among males was bladder cancer (40.1%). Lymphomas (9.6%) and cancer of the larynx (7.6%) and oesophagus (3.6%) also occurred quite frequently, while cancers of the prostate (0.5%) and lung (2.2%) were relatively rare. In Gaza, lung cancer had the highest relative frequency (17.7%), followed by leukaemia (10.0%) and lymphoma (10.3%).

Females (Table 1b): In Egypt and Gaza, breast cancer accounted for 34% of all cancers. In Gaza, this was followed by leukaemia (7.8%), lymphoma (6.2%) and cancer of the brain (6.1%); cancer of the corpus uteri (2.8%) was infrequent. In Egypt, bladder cancer (14.4%), and cancers of the oral cavity and pharynx (7.9%) occupied second and third positions in the leading cancers; lung cancer was relatively rare. Melanoma was relatively uncommon in both males and females in all countries.

Organ systems

The distribution of cancer occurrence within several organ systems also varied considerably in the different population groups (Table 2).
Table 1b

Relative cancer frequency by percent and ranking for 15 selected sites: females*

<table>
<thead>
<tr>
<th>Site</th>
<th>Gaza</th>
<th>Egypt</th>
<th>SEER</th>
<th>Sweden</th>
<th>Israel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jews</td>
<td>Non-Jews</td>
<td>Jews</td>
<td>Non-Jews</td>
<td>Jews</td>
</tr>
<tr>
<td>Breast</td>
<td>34.3</td>
<td>33.9</td>
<td>31.6</td>
<td>25.0</td>
<td>28.3</td>
</tr>
<tr>
<td>Colorectal</td>
<td>5.6</td>
<td>1.9</td>
<td>12.8</td>
<td>12.8</td>
<td>14.5</td>
</tr>
<tr>
<td>Lung</td>
<td>4.8</td>
<td>0.6</td>
<td>12.5</td>
<td>4.2</td>
<td>4.4</td>
</tr>
<tr>
<td>Corpus uteri</td>
<td>2.8</td>
<td>2.1</td>
<td>5.4</td>
<td>5.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Ovary</td>
<td>3.1</td>
<td>2.8</td>
<td>4.2</td>
<td>5.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>6.2</td>
<td>5.4</td>
<td>4.0</td>
<td>3.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Cervix uteri</td>
<td>2.8</td>
<td>4.6</td>
<td>2.6</td>
<td>2.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Melanoma</td>
<td>0.5</td>
<td>1.4</td>
<td>2.6</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1.7</td>
<td>0.3</td>
<td>2.4</td>
<td>3.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.7</td>
<td>14.4</td>
<td>2.3</td>
<td>4.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>7.8</td>
<td>2.9</td>
<td>2.2</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Oral &amp; Pharynx</td>
<td>0.6</td>
<td>7.9</td>
<td>1.7</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Stomach</td>
<td>5.2</td>
<td>0.7</td>
<td>1.5</td>
<td>3.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Brain</td>
<td>6.1</td>
<td>N.A.</td>
<td>1.4</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Liver</td>
<td>5.6</td>
<td>0.3</td>
<td>1.3</td>
<td>1.5</td>
<td>0.8</td>
</tr>
</tbody>
</table>

* Rank in parentheses. Sites with the same cancer frequency are given the same ranking. Data for US SEER areas and Sweden provided for comparison.

Based on the estimated number of cancers for 1994 (2).
Cancers diagnosed between 1983 and 1987 (1).
Cancers diagnosed between 1987 and 1989 (5).
Includes non-invasive tumours.
Non-Hodgkin’s lymphoma only.

Oral cavity and respiratory system: The hypopharynx was the predominant subsite of cancer of the oral cavity and pharynx in both Gaza (25%) and Egypt (33.3%). Up to 66% of respiratory cancers in Egypt occurred in the larynx.

Digestive organs: In Egypt, cancers of the rectum (34.3%) and oesophagus (30.8%) were the most prevalent malignancies of the digestive organs. The Gazans had a large proportion of liver (26.1%) and stomach cancers (21.5%).

Lymphomas and leukaemias: An unusually high percentage (62%) of the leukaemias in Gaza were lymphatic.

Age

The age distribution of cancer patients varied substantially. Table 3 presents the percentage of cancer cases by age. More than 50% of the Arab population and 10% of Arab cancer patients were less than 20 years old, compared with 38% and 2%, respectively, of Jewish Israelis. At the other extreme, less than 5% of the Arab population and slightly more than 30% of Arab cancer patients were over 65 years old, compared with 10% and 58% of Jewish Israelis. In Egypt, only 12% of cancer patients were over age 65 years. Therefore, as expected, the median age for various cancer types was lower among the Arab populations than among Israeli Jews. Median age at diagnosis of the different cancers (by site) can be found in Table 4. For the most part, diagnoses were made later in Gazans than in Egyptians.

DISCUSSION

This paper is the first to compare cancer patterns in four populations living in the Middle East. Because population-based cancer registries do not currently exist in either Egypt or Gaza, we evaluated the distribution of cancers by sex and age, and the relative frequencies of different cancers.

While our findings are informative, they are limited by several weaknesses: the incomplete incidence data from Gaza and Egypt for several types of cancers; the relatively few reported cancer cases in some of the populations; and the comparison of data collected partly from different years. For example, the data from Gaza cover the period from 1990 to 1994 and owing to the relatively sparse population of the area during this period (less than one million) and its young age structure, only 1 700 cancer cases were reported. Similarly, the number of cancer cases among Israeli Arabs was I 408 during the years 1987 to 1989 (6, 7). The data from Egypt were taken from a single medical centre in Cairo, renowned for its treatment of bladder and head and neck cancers, but limited in services for lung and brain cancers. The resulting patient-selection
### Table 2
Relative site distribution in percent and ranking of cancers by organ system: both sexes

<table>
<thead>
<tr>
<th>Site</th>
<th>Gaza</th>
<th>Egypt</th>
<th>SEER</th>
<th>Israel Jews</th>
<th>Israel Non-Jews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral cavity and pharynx:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tongue</td>
<td>8.3 (4)</td>
<td>16.7 (3)</td>
<td>20.4 (1)</td>
<td>14.1 (3)</td>
<td>9.3 (3)</td>
</tr>
<tr>
<td>Gum &amp; other oral cavity</td>
<td>20.8 (2)</td>
<td>18.5 (2)</td>
<td>18.5 (2)</td>
<td>32.4 (2)</td>
<td>16.3 (3)</td>
</tr>
<tr>
<td>Lip</td>
<td>12.5 (3)</td>
<td>9.8 (4)</td>
<td>11.1 (3)</td>
<td>35.5 (1)</td>
<td>44.2 (1)</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>25.0 (1)</td>
<td>33.3 (1)</td>
<td>10.2 (4)</td>
<td>2.8 (4)</td>
<td>7.0 (4)</td>
</tr>
<tr>
<td>Other</td>
<td>33.4</td>
<td>21.7</td>
<td>39.8</td>
<td>14.7</td>
<td>23.2</td>
</tr>
<tr>
<td>Respiratory system:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>82.1 (1)</td>
<td>29.0 (2)</td>
<td>90.5 (1)</td>
<td>84.4 (1)</td>
<td>88.3 (1)</td>
</tr>
<tr>
<td>Larynx</td>
<td>17.0 (2)</td>
<td>66.1 (1)</td>
<td>7.0 (2)</td>
<td>11.9 (2)</td>
<td>10.7 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>0.9</td>
<td>4.9</td>
<td>2.5</td>
<td>3.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Digestive organs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colon</td>
<td>15.5 (3)</td>
<td>13.0 (3)</td>
<td>44.7 (1)</td>
<td>35.3 (1)</td>
<td>30.9 (1)</td>
</tr>
<tr>
<td>Rectum</td>
<td>12.9 (4)</td>
<td>34.3 (1)</td>
<td>17.9 (2)</td>
<td>23.6 (2)</td>
<td>17.9 (2)</td>
</tr>
<tr>
<td>Pancreas</td>
<td>12.9 (5)</td>
<td>4.8 (6)</td>
<td>11.7 (3)</td>
<td>12.7 (4)</td>
<td>15.0 (4)</td>
</tr>
<tr>
<td>Stomach</td>
<td>21.5 (2)</td>
<td>11.3 (4)</td>
<td>10.1 (4)</td>
<td>16.5 (3)</td>
<td>17.2 (3)</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>3.5 (7)</td>
<td>30.8 (2)</td>
<td>5.0 (5)</td>
<td>2.3 (7)</td>
<td>2.02 (7)</td>
</tr>
<tr>
<td>Liver</td>
<td>26.1 (1)</td>
<td>5.8 (5)</td>
<td>3.9 (6)</td>
<td>4.2 (5)</td>
<td>10.3 (6)</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>7.0 (6)</td>
<td>1.2 (7)</td>
<td>1.4 (7)</td>
<td>3.8 (5)</td>
<td>12.5 (5)</td>
</tr>
<tr>
<td>Other</td>
<td>0.6</td>
<td>0.5</td>
<td>5.4</td>
<td>1.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Lymphomas:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin's</td>
<td>64.8 (1)</td>
<td>60.4 (1)</td>
<td>82.9 (1)</td>
<td>80.8 (1)</td>
<td>80.8 (1)</td>
</tr>
<tr>
<td>Hodgkin's</td>
<td>35.2 (2)</td>
<td>39.6 (2)</td>
<td>17.1 (2)</td>
<td>19.2 (2)</td>
<td>30.0 (2)</td>
</tr>
<tr>
<td>Leukaemias:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-lymphaticb</td>
<td>38.2 (2)</td>
<td>50.3 (1)</td>
<td>54.0 (1)</td>
<td>57.8 (1)</td>
<td>63.3 (1)</td>
</tr>
<tr>
<td>Lymphatic</td>
<td>61.8 (1)</td>
<td>49.7 (2)</td>
<td>46.0 (2)</td>
<td>42.2 (2)</td>
<td>36.7 (2)</td>
</tr>
</tbody>
</table>

a See footnotes for Table 1a. Data for US SEER areas provided for comparison.

bias can be observed in the higher relative frequency of bladder cancer in this series (40% for males and 14% for females) than in the pathological series conducted from private hospitals in Cairo (32% for males and 5% for females) (8). Nevertheless, although the frequency of bladder cancer may vary, depending on the data source, it still remains by far the major cancer in Egypt.

The finding that figures for Israeli Arabs fall between those for Kuwaitis (8) and those for Israeli Jews suggests the importance of genetic, environmental, and economic factors in cancer occurrence. These must be taken into account in future regional studies as well as in various health programmes.

Factors common to Middle Eastern countries are vast desert areas and heavy solar exposure. In many areas, industrialization and urbanization are occurring rapidly and are often unaccompanied by proper protective legislation, leading to dangerous increases in environmental carcinogens. In addition, there is a high incidence of parasitic, bacterial and viral disease, as well as nutritional problems, which are known to play an important role in the aetiology of some malignant diseases. At the same time, religious practices and customs, economic status, and individual lifestyles often vary widely.

For example, in Egypt more than 50% of bladder cancers are associated with bilharzia eggs in the tissue, whereas the remainder are squamous or transitional carcinoma. This is also true for Iraq, Sudan, Yemen and southern Saudi Arabia (8). Carcinoma of the bilharzial bladder is different clinicopathologically from non-bilharzian carcinoma.

The higher relative frequency of malignant lymphomas in Egypt and in Gaza compared with that in developed countries has been associated with the low socioeconomic status, malnutrition, and prevalence of Epstein-Barr virus (EBV) (8). The age at first infection with EBV in developing countries is in childhood, whereas in the Western world, it is usually in adulthood.

The low relative frequency of cervical cancer observed in Egypt, the Gaza Strip and Israel contrasts with the high frequency reported in Lebanon, Morocco and Tunisia. A possible explanation of these differences might be the different exposure to human papilloma virus, mainly due to different sexual habits.

Although skin cancer is reportedly associated with excessive ultraviolet exposure of solar origin, there are differences in frequency observed between Arab countries and the Israeli population. This may be explained, at least in
Table 3

Frequency (%) of cancer cases and total population by age: both sexes*

<table>
<thead>
<tr>
<th>Country/Area</th>
<th>&lt;20 Cancer cases</th>
<th>Total population</th>
<th>20–64 Cancer cases</th>
<th>Total population</th>
<th>65+ Cancer cases</th>
<th>Total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaza†</td>
<td>13</td>
<td>61</td>
<td>56</td>
<td>37</td>
<td>31</td>
<td>2</td>
</tr>
<tr>
<td>Egypt‡</td>
<td>10</td>
<td>51</td>
<td>78</td>
<td>46</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>SEER†</td>
<td>1</td>
<td>29</td>
<td>40</td>
<td>60</td>
<td>59</td>
<td>11</td>
</tr>
<tr>
<td>Israel, Jews</td>
<td>2</td>
<td>38</td>
<td>41</td>
<td>51</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Israel, non-Jews</td>
<td>11</td>
<td>54</td>
<td>53</td>
<td>43</td>
<td>36</td>
<td>3</td>
</tr>
</tbody>
</table>

* Data for US SEER areas provided for comparison.
† Gaza, cancer data from 1990 to 1994, population data from 1993.
‡ Egypt, cancer data from 1986 to 1994, population data from 1986.
§ All races, cancer data from 1987 to 1991, population data from 1983 to 1987 (2).
¶ Israel, cancer data from 1989, population data from 1993.

part, by genetic differences in pigmentation (related perhaps in intermarriage rates) and dress habits (which have been greatly 'Westernized' among Israelis).

Alcohol consumption is very low in the entire region, but smoking (tobacco) is very common in Israelis of both sexes and in male Egyptians and Gazans. In Egypt, despite the widespread anti-smoking campaign of the past ten years, the proportion of male smokers decreased by only 9% (from 40% to 31%), whereas smoking in teenagers and women actually increased (9). Likewise, in Israel, which also has a strong anti-smoking campaign and where smoking is banned in public places, the proportion of male smokers aged 20 years or more decreased only from 44% in 1983 to 38% in 1992, and in females, from 30% in 1983 to 25% in 1992 (10).

The relative lack of public information on cancer in many countries in the region causes some patients to seek medical attention and treatment only at a late stage, resulting in higher cancer mortality rates. In light of the many differences among these populations, the kind of comparison performed here can provide the basis for improved screening and preventive programmes.

One of the objectives of the MECS is to upgrade the collection of comprehensive incidence data. It has recently established a subcommittee on cancer epidemiology and registration that will focus on cancer registration in the

Table 4

Median age of cancer patients at diagnosis: both sexes*

<table>
<thead>
<tr>
<th>Site</th>
<th>Gaza†</th>
<th>Egypt‡</th>
<th>SEER§</th>
<th>Israel¶</th>
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* Data for US SEER areas provided for comparison.
† Cancers diagnosed in Gaza between 1990 and 1994.
§ Based on the estimated number of cancers for 1994. (Ries et al., 1994).

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Middle East and Egypt and is expected to establish the first population-based cancer registry in the Delta region in the near future. More countries in the Middle East and North Africa are being encouraged to join the MECS to allow for better international cooperation and attainment of a more complete picture of cancer patterns in the area.

REFERENCES