ORIGINAL ARTICLE

RISING INCIDENCE OF BREAST CANCER IN PAPUA NEW GUINEA

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Background: Three previous reports have shown the incidence of breast cancer in Papua New Guinea (PNG) to have risen in the 30 years between 1958 and 1987. In the present report the incidence and pathology of breast cancer in the decade 1989–1998 are described.

Methods: This was a retrospective review of all histopathology specimens in PNG from 1989 to 1998. During this period the female population grew from 1,640,000 to more than 2,000,000.

Results: There were 790 cases of breast cancer. The age of the patient was not known in 221 cases (26%). The age-standardized incidence was 6.9 per 100,000. The incidence of breast cancer has been steadily rising in the 40 years since cancers were recorded in PNG. The incidence has risen in all four regions, most notably in the islands. The peak incidence was in the 45–54-year-old age group (18.4/100,000); 83.9% of women with breast cancer were aged 54 or less. Fifteen per cent were under 35 years old and 55.7% were under 45. The incidence fell in the elderly. The tumours tended to be advanced. The actual size was recorded in only 163 cases (20.7%) but there were only three T3 tumours in this group. Clinical signs of advanced breast cancer were recorded in 206 cases: ulceration of skin (91 cases), peau d’orange (69 cases), nipple retraction (43 cases) and lymphoedema of the upper extremity (3 cases). Axillary nodes were positive in 185 of 247 patients (75%) in whom they were sampled.

Conclusions: The incidence of breast cancer in PNG women has steadily risen over the past 40 years and the highest age-specific incidence occurs in the 35–54 age group. Tumours present late at an advanced stage. Clinical information on pathology request forms is poor and a prospective clinical audit is needed. Strategies need to be developed to detect breast cancer earlier in this population of women.

Key words: breast cancer, Papua New Guinea.

INTRODUCTION

Breast cancer in the tropics has a different pattern from that in Western countries. The incidence is lower but when the disease presents it frequently does so at an earlier age and in a more advanced stage.

The tumour registry in Papua New Guinea (PNG) began in 1958. The registry is based on a central pathology service based in Port Moresby General Hospital, the National referral hospital. Four national censuses have been carried out, the last in 1990, and a fifth commenced in the year 2000. Three previous reports have shown the incidence of breast cancer in PNG to have risen in the 30 years between 1958 and 1987. In the present report the incidence and pathology of breast cancer in the decade 1989–1998 are described.

METHODS

During the years 1989–1997 all histopathology specimens were sent to the Central Pathology Service in Port Moresby. From 1997 a second histopathology service was opened in Lae. The present report is a retrospective review of 790 pathology records for all breast cancers which were histopathologically proven in either Port Moresby or Lae.

The data on incidence are reported as crude and age-standardized rates. Age-standardized rates are calculated using the standard world population for eight age groups as described by Parkin et al. Age-adjusted rates must also be calculated because in developing countries the age is not always known or recorded. The age was known for 569 of our 790 breast cancer patients. The number of cases in each age group is then multiplied by a correction factor of 790/569 on the assumption that the proportion of missing cases would be evenly distributed across the age groups.

The 1990 census recorded the female population of PNG as being 1,694,466. The population growth rate was approximately 2.6% in the subsequent decade. This means the female population grew from 1,640,000 in 1988 to over 2,000,000 in 1998.

RESULTS

There were 790 cases of breast cancer submitted for histological examination in the decade 1989–1998. This represented 9.2% of all malignancies and 36% of female malignancies. The annual incidence of breast cancer for all ages of women was 4.6/100,000 (Table 1).

The peak incidence was in the 45–54-year-old age group. A total of 83.9% of women with breast cancer were aged 54 or less; 15% were less than 35 and 55.7% were less than 45. The incidence fell in the elderly: there was no plateau.

The incidence of breast cancer has been steadily rising in the 40 years since cancers were recorded in PNG (Table 2). The incidence has risen in all four regions, most notably the islands (Table 3).
Table 1. Age standardized rates of breast cancer in Papua New Guinea

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. PNG cases</th>
<th>Size of PNG female population</th>
<th>Observed age-adjusted incidence per 100 000 population per year</th>
<th>Standard world population</th>
<th>Expected world no. cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–14</td>
<td>03</td>
<td>697 222</td>
<td>0.05</td>
<td>31 000</td>
<td>0.01</td>
</tr>
<tr>
<td>15–24</td>
<td>06</td>
<td>343 453</td>
<td>0.23</td>
<td>17 000</td>
<td>0.03</td>
</tr>
<tr>
<td>25–34</td>
<td>92</td>
<td>269 506</td>
<td>4.7</td>
<td>14 000</td>
<td>0.65</td>
</tr>
<tr>
<td>35–44</td>
<td>220</td>
<td>172 077</td>
<td>17.7</td>
<td>12 000</td>
<td>2.1</td>
</tr>
<tr>
<td>45–54</td>
<td>148</td>
<td>111 640</td>
<td>18.4</td>
<td>11 000</td>
<td>2</td>
</tr>
<tr>
<td>55–64</td>
<td>82</td>
<td>65 005</td>
<td>17.5</td>
<td>8 000</td>
<td>1.4</td>
</tr>
<tr>
<td>65–74</td>
<td>15</td>
<td>27 088</td>
<td>7.6</td>
<td>5 000</td>
<td>0.3</td>
</tr>
<tr>
<td>75+</td>
<td>03</td>
<td>8 475</td>
<td>4.8</td>
<td>2 000</td>
<td>0.09</td>
</tr>
<tr>
<td>All ages&lt;sup&gt;4&lt;/sup&gt;</td>
<td>569</td>
<td>1694 466</td>
<td>4.6</td>
<td>100 000</td>
<td>6.9</td>
</tr>
</tbody>
</table>

<sup>4</sup>Age of the patient was not known in 221 or 26% cases.

Table 2. The rising incidence of breast cancer in Papua New Guinea 1958–98

<table>
<thead>
<tr>
<th>Year</th>
<th>Female population</th>
<th>Incidence</th>
<th>Authors</th>
<th>Age standardized</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>856 909</td>
<td>1.75</td>
<td>Farago&lt;sup&gt;2&lt;/sup&gt;</td>
<td>2.3</td>
</tr>
<tr>
<td>1979</td>
<td>1 364 200</td>
<td>3.5</td>
<td>Misch &lt;i&gt;et al.&lt;/i&gt;&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1978–1987</td>
<td>1 364 200</td>
<td>2.8</td>
<td>Sengupta &lt;i&gt;et al.&lt;/i&gt;&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>1 642 238</td>
<td>4.5</td>
<td>Current paper</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>2 070 404</td>
<td>4.8</td>
<td>Current paper</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Table 3. The incidence of breast cancer in the four main regions of Papua New Guinea

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highland</td>
<td>1.2</td>
<td>2.5</td>
<td>2.9</td>
<td>2.7</td>
<td>4.0</td>
</tr>
<tr>
<td>Momase</td>
<td>1.5</td>
<td>2.5</td>
<td>2.4</td>
<td>2.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Papua/Southern</td>
<td>1.1</td>
<td>2.4</td>
<td>2.4</td>
<td>2.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Islands</td>
<td>1.5</td>
<td>2.8</td>
<td>2.9</td>
<td>3.0</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Table 4. Size of breast lumps in 163 cases where size was recorded

<table>
<thead>
<tr>
<th>Size</th>
<th>Lumpectomy</th>
<th>Mastectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 cm</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1–2 cm</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3–5 cm</td>
<td>22</td>
<td>52</td>
</tr>
<tr>
<td>6–10 cm</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td>&gt; 10 cm</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Specimen type

Four hundred and nine (51.7%) were biopsies (excision biopsy, 317 cases; trucut biopsy, 34 cases; incision biopsy, 28 cases; and wedge biopsy, 30 cases) followed by 266 mastectomy specimens (33.6%) and 115 lumpectomy/wide local excisions (14.6%).

Histology

The predominant histological finding was invasive ductal carcinoma in 85.4% of cases.

Spread

Axillary nodes were sampled in 247 (31%) cases; 185 (75%) of these were positive for metastatic deposits, and more than five nodes were involved in 26 (14%) cases.

Clinical details

These were recorded inconsistently on the pathology form. Side was recorded in the histopathology form in 589 (74.5%) cases and right-sided neoplasms accounted for 298 (50.5%) of them. Site was specified in only 78 (9%) specimens and 70.5% of these were in the upper outer quadrant of the breast. Size was recorded in only 163 (20.7%) cases (Table 4). Clinical signs of advanced breast cancer were recorded in 206 cases (ulceration of skin, 91 cases; peau d'orange, 69 cases; nipple retraction, 43 cases; and lymphoedema of the upper extremity, three cases).

DISCUSSION

Data collection in the developing world is beset by many problems. The true size of the population is not known and both sexes and all age groups do not have equal access to health services. There are inadequate diagnostic services and a lack of education, while
culture and reliance on traditional healers mean that not all women present for biopsy. Some doctors in peripheral hospitals may make a clinical diagnosis and not submit specimens for histopathology, resulting in an index tumour case not being reported. This is all the more likely if a tumour is advanced and 'obvious' despite the concern that either tuberculosis or filariasis of the breast may masquerade as advanced malignancy.

Nonetheless, despite these problems affecting data collection the incidence of breast cancer in PNG women appears to have genuinely risen over the last 40 years. The age-standardized incidence figures are lower (at 6.9/100,000) than that of many neighbouring countries, as well as that of some countries in sub-Saharan Africa. Elsewhere in the developing world the incidence of breast cancer is also increasing. The age-adjusted incidence of breast cancer in Bombay rose from 17.9 to 24.9 per 100,000 between 1965 and 1987. The age-standardized incidence in Singapore has also risen from 20.2 to 38.8/100,000 women in the last 30 years. Western lifestyle factors seem to be important because the incidence is much higher in oriental women living in the West than in their native land. The incidence in American black people is approaching 100/100,000 and almost equal to that of American white people.

In Australia the incidence of breast cancer rose from 58.3 to 66.0 per 100,000 between 1982 and 1992 and the age incidence increases progressively to more than 250 per 100,000 in Australians over 70 years. Incidence rates are much lower in Aboriginal women (one-third in Northern Territory and one-half in Western Australia) but the completeness of recording in this group of women is unknown.

In PNG as in many other tropical countries breast cancer mainly affects premenopausal women, but the age-specific incidence falls in postmenopausal women. The reason for this fall is unknown. In PNG we are of the opinion that older women with breast cancer usually have the opportunity to seek medical attention and the fall in incidence in older women is not simply that they do not present themselves. In South African black people a similar incidence pattern has been described: the mortality from breast cancer rises until middle age and then levels out. Although it is difficult to separate the many lifestyle changes that are occurring in developing nations it does appear that breast cancer tends to affect the younger, more affluent women in developing countries. Further studies should aim to determine whether older women have been less exposed to risk factors for breast cancer or whether the biology of the cancer is somehow different in developing countries.

In Uruguay, where the incidence of breast cancer has also been increasing in the past 40 years, hospital-based case-control studies showed an increased risk associated with red meat, total meat, beef, fried meat, and heterocyclic amine exposure. At the same time the intake of dietary fibre and total non-starch polysaccharides were associated with a strong reduction in risk of breast cancer. These effects may be mediated via oestrogen. A vegetarian diet containing legumes and other plant foods with phyto-oestrogens may play an important protective role by modulating sex hormones and so reducing the carcinogenic effect of prolonged oestrogen activity. Young Adventist women taking a vegetarian diet with high soy intake have a lower risk of breast cancer. This may be due to higher levels of adrenal androgen (dehydroepiandrosterone sulphate) or alterations in the regulation and binding of ovarian hormones. Japanese women taking a high soy diet also have lower oestriadiol levels.

Other lifestyle factors associated with development and urbanization such as lack of exercise, alcohol and smoking are associated with an increased risk of breast cancer and so may play some role.

A prospective audit of breast cancer in Port Moresby has now recruited 180 cases. This should improve the collection of clinical data so lacking in this pathology-based, tumour registry study. There are currently no reliable data on patient management and outcomes in PNG until the Port Moresby audit reports. A case control study on diet in breast cancer is being conducted at present.

CONCLUSIONS

(1) The incidence of breast cancer in PNG women has steadily risen over the past 40 years.
(2) The age-specific incidence is highest in women aged 35–54.
(3) In PNG 75% of breast cancer cases occur in premenopausal women.
(4) Tumours in PNG present late at an advanced stage.

RECOMMENDATIONS

(1) Clinical information on pathology request forms is poor and a prospective clinical audit is needed.
(2) The different pattern of pathology warrants further epidemiological studies and laboratory research into hormonal and molecular changes associated with the development of breast cancer.
(3) Strategies need to be developed to detect breast cancer earlier in this population of young women.

REFERENCES