Trends of breast tumour laterality and age-wise incidence rates in North Indian population

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ABSTRACT

Background: The breast is a paired organ. The two breasts share many of the risk factors known to contribute to the development of cancer genetics, environmental exposure, diet, and estrogen exposure, etc. By studying differences in the occurrence of breast cancer between the left and right breast, we can control for these common risk factors. Previous studies of breast cancer asymmetry have established that the laterality ratio is greater than 1.0 in women.

Methods: We have taken 420 total cases to study the breast tumour laterality in women and age wise incidence of carcinoma breast in northern India. The study included all consecutive adult patients with histologically confirmed breast cancer, either invasive or carcinoma in situ. Multiple cancers were defined as two or more primary cancers occurring in an individual that were not an extension, recurrence, or metastasis. Based on the chronology of presentation, they were categorized as synchronous or metachronous primaries.

Results: Out of 420 cases of breast cancer it was seen that 193 patients i.e. 45.95% of women under observation had left sided breast tumour, 225 patients i.e. 53.57% of women had right sided breast tumour and only 2 patients i.e. 0.48% patients had bilateral lesions in the breast.

Conclusions: This result suggests the possible role of estrogen hormone in the reversed lateralization of breast cancer in comparison to other paired organ cancers in post-menopausal women suggesting that North Indian population has higher incidence of right sided breast cancer.

Keywords: Breast cancer, Laterality, North Indian, Tumor

INTRODUCTION

The World cancer report issued by the International Agency for Research on Cancer (IARC), tells us that cancer rates are set to increase at an alarming rate globally. Cancer rates could increase by 50% to 15 million new cases in the year 2020.1

Breast cancer is the most common female malignancy accounting for 22.9% of all female cancer’s World-wide. Breast cancer was reported to afflict the left breast more than the right one. Despite the causes for left-sided pre-dominance (LSP) being unclear, it may reflect etiologic factors not yet well recognised.

However, the minimal increase in size does not explain the magnitude of increased cancer risk in the left compared to the right breast. In a large study of a UK cohort involving over a quarter of a million cancer patients, right-sided lateralisation was reported for lung, testis, ovarian and kidney cancers while breast cancer demonstrated left-side lateralisation.2

Despite extensive study of breast cancer incidence, including specific studies of the relationship between age
and breast cancer incidence, the picture remains confusing. This article examines not only the relationship between 
age and breast cancer, but also trends over time related to 
this relationship to discern the underlying true age- 
incidence pattern. The age-incidence curve changes 
around the menopausal period, most likely due to 
hormonal changes 10 to 15 years earlier, flattens out in the 
40 to 50 years old age range, and then increases as age 
increases.

METHODS

A total of 420 primary breast cancer patients admitted over 
a 5 years period from June 2015 to 2020 in different 
surgical and onco-surgical wards of Sri Guru Ram Das 
Institute of Medical Science and Research, a tertiary care 
centre in North India. Details were collected on side, 
demography, tumor stage, surgical procedures, lymph 
ode count, metastatic lymph nodes, intra- and post-
operative complications, and hospital stay. The association 
between laterality and treatments and their outcomes was 
assessed in these patients.

The medical records of breast cancer patients previously 
seen and closely followed by the author were 
retrospectively reviewed, with special emphasis on clinical 
presentation, tumor characteristics, family history, and 
subsequent survival. The study included all consecutive 
adult patients with histologically confirmed breast cancer, 
either invasive or carcinoma in situ. All data collected 
were identified to comply with the Health Information 
Protection Act.

Patient age was estimated based on that at the time of the 
initial diagnosis of cancer. Elderly patients were defined as 
being aged above 65 years. Body mass index (kg/m²) was 
categorized as underweight (<18.4), normal (18.5-24.9), or 
overweight (>25). Patients were questioned about any 
previous history of thromboembolic events, and closely 
followed for such a possibility. Patients were asked about 
their handedness. Primary tumor laterality was classified 
as left side, right side, or bilateral. Tumor blocks for each 
case were studied using immunohistochemical staining for 
estrogen and progesterone receptors and human epidermal 
growth factor receptor 2 (HER2/neu) scoring or the 
fluorescent in situ hybridization technique, using 
established methods. Because of the small number of 
events, hormone receptor status was classified as a two-
level variable, namely estrogen receptor-positive and/or 
progesterone receptor-positive, and both estrogen 
receptor-negative and progesterone receptor- 
negative. Presence or absence of lympho-vascular invasion was 
determined in some patients. Stage of disease was defined 
according to the American Joint Committee of Cancer 
Staging Classification (eighth edition, 2017).³ Multiple 
cancers were defined as two or more primary cancers 
occurring in an individual that were not an extension, 
recurrence, or metastasis. Based on the chronology of 
presentation, they were categorized as synchronous or 
metachronous primaries. Synchronous primaries were 
defined as malignancies presenting within 6 months of 
diagnosis of the index tumor (initial malignancy). This 
includes simultaneous primaries that were diagnosed at 
the same time during the staging workup of the first 
malignancy. Metachronous primaries were considered to 
be those presenting more than 6 months following the 
diagnosis of the index tumor. All patients with 
simultaneous bilateral breast cancer were considered to 
have a single primary if they shared the same histological 
diagnosis. For patients with multiple malignancies, the 
date of the first primary diagnosis was considered the date 
of initial cancer diagnosis.

Patients were questioned about their family history of 
cancer, and in particular, the occurrence of breast or 
ovarian cancers among their first-degree relatives 
(biological mother, father, sister, brother, son, and 
daughters) and second-degree relatives (paternal or 
maternal uncles, aunts, grandmother, and grandfather). They 
were also asked to provide information regarding the 
type of cancer, age at initial diagnosis, tumor laterality, and 
any other hereditary disorders.

Statistical analysis

All analyses were done using Microsoft Excel® version 16 
and SPSS® version 23. Chi squared test or Fisher’s Exact 
test were used to compare right and left-sided BCs with 
other variables.

RESULTS

Out of 420 cases of breast cancer it was seen that 193 
patients i.e. 45.95% of women under observation had left 
sided breast tumour, 225 patients i.e. 53.57% of women 
had right sided breast tumour and only 2 patients i.e. 0.48% 
had bilateral lesions in the breast.

Table 1: Frequency of carcinoma breast depending on 
laterality.

<table>
<thead>
<tr>
<th>Side</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral</td>
<td>2</td>
<td>0.48</td>
</tr>
<tr>
<td>Left</td>
<td>193</td>
<td>45.95</td>
</tr>
<tr>
<td>Right</td>
<td>225</td>
<td>53.57</td>
</tr>
<tr>
<td>Total</td>
<td>420</td>
<td>100</td>
</tr>
</tbody>
</table>

Out of 420 patients, it has been observed that the age group 
with highest incidence of breast cancer was between 41-50 
years of age accounting for 26.6% of total patients. Whereas 
those above 60 years of age had only 21.6% incidence. This data depicts that age wise incidence of 
breast carcinoma is highest around peri-menopausal age and it falls on both sides of this age group.
Breast or chest wall carcinomas were significantly more in size 
compared with tumors of the left side, and had a significant 
tendency to metastasize in regional lymph nodes.

CONCLUSION

This result suggests the possible role of estrogen hormone in 
the reversed lateralization of breast cancer in comparison to other paired organ cancers in post-
menopausal women.

Possible explanations have included the left breast is 
slightly larger than the right. Breast feeding preferentially 
on the right breast protects from cancer. Although the 
excess of left-sided tumors is not large and does not appear 
to have major clinical implications. Breast or chest wall 
irradiation leads to higher radiation doses to the heart in 
left-sided tumors compared to the right side.

In the most recent data from surveillance, Epidemiology 
and end results program (SEER), the incidence rate for 
female breast cancer rises with advancing age until just before 
45 years of age when there is a levelling off. The curve then rises 
until its peak at 75 years of age and then begins to decline. This is a sharply different pattern than the age-incidence 

Erendeeva et al performed a comparative analysis of right 
and left-sided BC on 45 clinico-morphological 
parameters. Results from this analysis revealed a number 
of statistically significant characteristics, including size of 
the primary centre, histological type of tumor, existence of 
metastasis in regional lymph nodes and background 
pathology. This study established that primary tumors 
localized on the right side were significantly more in size 
compared with tumors of the left side, and had a significant 
tendency to metastasize in regional lymph nodes.

REFERENCES
