

# Epidemiology and prevalence of breast cancer: A retrospective study in a tertiary health care center in Kolkata over one decade

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## ABSTRACT

**Background:** Breast cancer is a major public health problem for women throughout the world. According to GLOBOCAN 2012, India along with the United States and China is responsible for almost one-third of global breast cancer burden. There has been 11.54% increase in incidence and 13.82% increase in mortality due to breast cancer in India from 2008 to 2012. According to GLOBOCAN 2018, for both sexes, breast cancer second most common cancer after lung cancer accounting for 11.6% of total cases. Most of the cases diagnosis at an advanced stage because of inadequate screening, lack of appropriate medical facilities thereby increasing breast cancer mortality. It is the second most common malignancy among Indian women accounting for 7% of global burden of breast cancer. Incidence of breast carcinoma varied in the different regions of the world with lowest incidence in Africa, Asia and highest incidence in North America and Europe. This geographic variability is not only to environmental factors but also to lifestyle. There is a paucity of epidemiological data regarding carcinoma of breast.

**Objectives:** The aims of our study were to evaluate the prevalence and epidemiology of breast cancer in our institution, N.R.S. Medical College Kolkata. **Materials and Methods:** We have analyzed 4172 newly diagnosed breast carcinoma cases, registered at N.R.S. Medical College and Hospital, Kolkata, West Bengal, India, over one decade, in between January 2008 and December 2017 retrospectively. A total of 4172 cases confirmed by pathological examination were included for analysis. Demographic and clinicopathological profile and management offered to the breast cancer patients were recorded from the medical records file. The staging was performed using American Joint Committee on Cancer tumor, node, and metastasis classification staging system. **Results:** In our study, about 63% of the patients came from urban areas and 37% from rural areas. The mean age at diagnosis was  $52 \pm 9.5$  years, with a range from 26 to 82 years. The age at menarche in this study ranged from 10 to 16 years, mean being  $12 \pm 1.5$  years. Age at the time of first pregnancy ranged from 19 to 32 years, with the mean age being  $22 \pm 6.2$  years. Family history of breast carcinoma in first and second degree relatives was found in 92 (2.2%) patients in this study. Approximately 5% (216) patients were nulliparous. About 63% of the patients were postmenopausal while 36% were premenopausal. Common presenting symptoms include breast lump (100%) and axillary swelling (33%). Histologically, 99.5% cases were infiltrating ductal carcinoma, and it was most common histology. Most patients were diagnosed with Grade II tumors (45%) followed by Grades I and III, and approximately 75% of the patients were in Stages II and III and 10% patients in Stage IV. The most common site of metastasis was lung (33%), bone (26%), liver (23%), and brain (14%). **Conclusions:** The majority of the breast carcinoma patients presented with Stages II and III disease, approximately 99% cases were infiltrating ductal carcinoma, not otherwise specified and were mainly Grade II followed by Grade III disease. The prevalence of estrogen receptor, progesterone receptor hormone receptor status and Her2/neu status in

the population needs further investigation in the future. The government needs to urgently strengthen and augment the existing facilities including screening, which is inadequate at present to handle the current breast cancer load in India.

**KEY WORDS:** Breast Carcinoma; Epidemiology; Risk Factors; Age

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## INTRODUCTION

Worldwide non-communicable disease (NCD) responsible for 63% death in the year 2008, and in India, NCD accounts for 53% deaths. Among NCD, cancer one of the leading causes of death in India and accounts for 6% mortality in the year 2008.<sup>[1]</sup> Breast cancer is a major public health problem for women throughout the world. According to GLOBOCAN 2012, India along with United States and China is responsible for almost one-third of global breast cancer burden. There has been 11.54% increase in incidence and 13.82% increase in mortality due to breast cancer in India from 2008 to 2012.<sup>[1,2]</sup> According to GLOBOCAN 2018, for both sex, breast cancer second most common cancer after lung cancer accounting for 11.6% of total cases.<sup>[3]</sup> Most of the cases diagnosis at an advanced stage because of inadequate screening, lack of appropriate medical facilities thereby increasing breast cancer mortality. It is the second most common malignancy among Indian women accounting for 7% of global burden of breast cancer.<sup>[2]</sup> Developed countries have slightly less incidence of breast cancer cases (794,000 cases) than developing countries like India (883,000 cases).<sup>[2]</sup> Age-adjusted incidence rate of breast cancer in India (25.8/100,000 population) is lower than that of United Kingdom (95/100,000 population), but mortality rate is almost the same (12.7 vs. 17.1/100,000).<sup>[3]</sup> The incidence of breast carcinoma varied in the different regions of the world with lowest incidence in Africa, Asia and highest incidence in North America and Europe. This geographic variability is not only to environmental factors but also to lifestyle. This is supported by the observation that incidence of breast cancer in second-generation Asian migrants is higher in United States. Breast cancer mortality has been stable for 50 years until 1990. However since 1990 mortality rate was decrease because of adoption of mammographic screening, which resulting in diagnosis at earlier stage and availability of newer effective chemotherapeutics. Previously, carcinoma cervix was the leading cause of cancer among Indian women, but now the incidence of breast carcinoma has transcended cervical cancer and is the leading cause of cancer death, although cervical cancer remains the most common cause in Rural India.<sup>[4,5]</sup> Non-modifiable risk factors include gender, age, family history, age at menarche, age at menopause, and modifiable risk factors are parity, age at first childbirth, obesity, exogenous hormone, and prior history of radiotherapy. Various studies have reported the clinicopathological profiles of breast cancer patients in India. However, limited data have been presented in literature from Eastern India. The present study aimed to evaluate demographic profile, risk factors, clinical presentation, and pathological features of breast cancer patients, diagnosed, and managed at our tertiary care hospital.

## MATERIALS AND METHODS

We have analyzed 4172 newly diagnosed breast carcinoma cases registered at N.R.S. Medical College and Hospital,

Kolkata, West Bengal, India, over one decade, in between January 2008 and December 2017 retrospectively. A total of 4172 cases confirmed by pathological examination were included for analysis. Demographic and clinicopathological profile and management offered to the breast cancer patients were recorded from the medical records file. The staging was performed using American Joint Committee on Cancer tumor, node, and metastasis classification staging system. Complete blood count, liver function test, urea, creatinine, serum electrolytes, sugar (fasting and postprandial), serology (HIV I and II, HBsAg, Anti-HCV), electrocardiogram, Echocardiography, Chest X-ray posteroanterior view, and ultrasonography of whole abdomen and pelvis, immunohistochemistry for estrogen receptor (ER), progesterone receptor (PR), and HER2/neu were performed along with thorough clinical examination. In case of locally advanced breast carcinoma on clinical examination, contrast enhanced computed tomography scan of chest, whole abdomen, and pelvis along with bone scan were performed or simply a positron emission tomography -CT scan was performed as a part of staging workup. Data compilation was done in Microsoft Excel, and descriptive analysis was done, of the baseline demographic, clinical and pathological characteristics. Despite the fact that the study is a retrospective one and all the epidemiological data have been collected from our own old records section of the Department of Radiotherapy of NRS Medical College and Hospital only, we have received formal permission from our Institutional Ethics Committee stating the nature of the study and that no harm and no financial burden would occur to the patients and that the further management of the patients will also not be effected by this retrospective analysis.

## RESULTS

From 2008 to 2017, 4172 patients of breast cancer were registered in our department and were included for analysis. Out of 4172 patients, 4160 patients were female, while there were 12 patients of male breast carcinoma. Disease characteristics and demographic profile depicted in Table 1. About 63% of the patients came from urban areas and 37% from rural areas. The mean age at diagnosis was  $52 \pm 9.5$  years and the age of the patients ranged from 26 to 82 years. The age at menarche in this study, ranged from 10 to 16 years, mean being  $12 \pm 1.5$  years. Age at the time of first pregnancy ranged from 19 to 32 years, with the mean age being  $22 \pm 6.2$  years. Family history of breast carcinoma in first and second degree relatives was found in 92 (2.2%) patients in this study. Approximately 5% (216) patients were nulliparous. About 63% of the patients were postmenopausal while 36% were premenopausal. The mean body mass index was  $30 \pm 2.9$  kg/m<sup>2</sup>. Regarding addiction, none of the patients gave history of alcohol intake, but about 62 patients had smoking history while 256 patients were tobacco chewers. About 21.8% of the patients had a history of oral

**Table 1:** Disease characteristics and demographic profile

Patient characteristics	Number of patients (%)
Sex	
Male	12 (0.28)
Female	4160 (99.7)
Age at diagnosis	
Mean	52±9.5 years
Range	26–82 years
Age at menarche	
Mean	12±1.5 years
Range	10–16 years
Age at first childbirth	
Mean	22±6.2 years
Range	19–32 years
Positive family history	92 (2.2)
Parity	
0	216 (5.2)
1–2	2304 (55.4)
≥3	1640 (39.4)
Residential area	
Urban	2628 (63)
Rural	1544 (37)
Menopausal status	
Premenopausal age group	1514 (36.4)
Postmenopausal age group	2646 (63.6)
Body mass index (mean in kg/m <sup>2</sup> )	30±2.9
Tobacco chewers	256 (6.1)
Smoking	62 (1.5)
Alcohol	None
Past h/o HRT or OCP	910 (21.8)

contraception or some form of hormone replacement therapy. Patients presented (clinical features depicted in Table 2) with a breast lump in almost 100% of the cases, axillary swelling (33%), nipple discharge (0.3%), and pain (8%). Breast carcinoma was found to be equally common in left (52%) and right (48%) breast. Histologically, 99.5% cases were infiltrating ductal carcinoma, not otherwise specified (NOS), 19 patients had diagnosis of medullary carcinoma (0.45%), while 2 (0.05%) cases were diagnosed as ductal carcinoma *in situ* (DCIS) of the breast (depicted in Table 3). Most patients were diagnosed with Grade II tumors (45%) followed by Grades I and III. Approximately 15% of the patients were Stage I, 45% were Stage II, 30% Stage III, and 10% Stage IV (depicted in Table 4). The most common site of metastasis was lung (33%), bone (26%), liver (23%), and brain (14%).

## DISCUSSION

In our study, about 63% of the patients came from urban areas and 37% from rural areas. The mean age at diagnosis was 52 ± 9.5 years with a range from 26 to 82 years. The

**Table 2:** Clinical features at presentation

Clinical features	Number of patients (%)
Breast lump	4172 (100)
Axillary swelling	1385 (33.2)
Nipple discharge	12 (0.3)
Pain	333 (8)
Site of breast lump	
Right breast	2003 (48)
Left breast	2169 (5)

**Table 3:** Histopathological characteristics

Histology	Number of patients (%)
Invasive ductal carcinoma, NOS	4151 (99.5)
Medullary carcinoma	19 (0.45)
DCIS	2 (0.05)
Grade I	1093 (26)
Grade II	1870 (45)
Grade III	1209 (29)

DCIS: Ductal Carcinoma *in situ*

**Table 4:** Stage of disease at diagnosis (tumor, node, and metastasis staging)

Stage	Number of patients (%)
Stage I	625 (15)
Stage II	1877 (45)
Stage III	1250 (30)
Stage IV	420 (10)

age at menarche in this study, ranged from 10 to 16 years, mean being 12 ± 1.5 years. Age at the time of first pregnancy ranged from 19 to 32 years, with the mean age being 22 ± 6.2 years. Family history of breast carcinoma in first and second degree relatives was found in 92 (2.2%) patients in this study. Approximately 5% (216) patients were nulliparous. About 63% of the patients were postmenopausal while 36% were premenopausal. The common presenting symptoms include breast lump (100%) and axillary swelling (33%). Histologically, 99.5% cases were infiltrating ductal carcinoma, and it was most common histology. Most patients were diagnosed with Grade II tumors (45%) followed by Grades I and III and approximately 75% of the patients were in Stages II and III.

Survey done in the metropolitan cities by the Indian council of medical research (ICMR) from 1982 to 2015 has shown that breast cancer incidence has almost doubled and breast cancer is found a decade younger in Indian women compared to western women, i.e., breast cancer occurs at a younger premenopausal age in India and Indian Subcontinent.<sup>[6-12]</sup> Age is single most important risk factor for breast cancer development. In our present retrospective study, most patients were in the age group of 40–59 years. This is incomparable



to the study by Ghosh *et al.* on hormone receptor expression, where the mean age of the patients was 49 years.<sup>[13]</sup> The number of male breast cancer in this study was 12 patients, which is equivalent to 0.2% of all breast malignancies that attended the Outpatient Department of Radiotherapy in NRS Medical College and Hospital, in the said span of time. Usually, the incidence of male breast cancer is  $\leq 1\%$ , with a reported incidence of 1.34% in a study by Samantara *et al.*<sup>[14]</sup> In our study, 216 patients were nulliparous, 63% patients were in the postmenopausal age group while 36% were in the premenopausal group. This indicates that nulliparity and increasing age with menopause are risk factors for breast cancer because prolonged exposure of unopposed endogenous estrogen. Early breast carcinoma may go unnoticed by the patient due to lack of symptoms. However, as the tumor grows in size and becomes locally advanced, patients present with lump or swelling of breast with pain, skin dimpling, skin ulceration, redness of skin and/or nipple, retraction of nipple, nipple discharge, and changed contour, and consistency of breast. In our study, most common presentation was breast lump. In about 30% of the patients, breast lump was associated with axillary swelling (lymphadenopathy). Right and left breast involvement was almost equal (48% rights breast vs. 52% left breast). The stage distribution of breast cancer in our study correlates with the study of Raina *et al.*<sup>[15]</sup> Unlike Western countries, Indian population presents with breast cancer mostly in locally advanced stage, and this has been established by various studies from different parts of India.<sup>[16-20]</sup> Such a scenario in India can be attributed to lack of nationwide organized screening programs, illiteracy, lack of awareness regarding breast cancer and self-breast examination, and general indifference toward the health of females in the patriarchal society of India.<sup>[21-23]</sup> The incidence of breast cancer is rising rapidly, and the cancer projection data show that the number of cases will become almost double by 2020.<sup>[24]</sup> This is mainly due to adoption of western lifestyle. High caloric diet with lack of physical activity in the form of low household activities, low parity, and higher age at first pregnancy, early age at menarche (<12 years), and late menopause (>55 years) is highly prevalent risk factors for breast cancer. Postmenopausal obesity associated with increased risk of breast cancer, most likely due to increased conversion of androgen to estrogens by aromatase enzyme in the adipose tissue.<sup>[25,26]</sup> Multiple meta-analysis suggests that the prevalence of triple-negative breast cancer is higher in India in comparison to Western countries.<sup>[13,27]</sup> In India, exposure to environmental compounds like polycyclic aromatic hydrocarbons (PAH) also increases the risk of breast cancer. PAH compounds are fat-seeking and, as a result, are stored in the breast fat tissue.<sup>[28-30]</sup> Family history of breast cancer is present in approximately 5% of the cases and is mainly related to BRCA1 and BRCA2 gene mutations, frequency of which has been reported to range from 2.9% to 24% among the familial breast cancers in India.<sup>[30]</sup> This is incomparable to our study where the incidence of familial breast cancer was approximately 2%. In India, there is difference in incidence

of breast cancer among urban and rural areas. In a study by Mistry *et al.*,<sup>[31]</sup> the histopathological variation of breast cancer in India was in the range of invasive ductal carcinoma, NOS – 85.2%, the most common type, 1.1% was DCIS, 1.1% each of mucinous carcinoma, invasive papillary carcinoma, and acinic cell carcinoma. The metaplastic carcinoma and tubulolobular variants are rare. The results of our study are somewhat comparable to reported literature.<sup>[32]</sup> In Western countries, 3–6% patients present with metastatic disease at the time of diagnosis. However, in our study, somehow higher up to 10% patients presents with Stage IV at the time of diagnosis. This may be due to ignorance about disease symptoms, unavailability of screening and health-care facility.<sup>[21-23,33]</sup>

However, the major limitation of our study is that the results may not be true representative of the entire community, as our study is a single institutional retrospective study and showed the analysis of the last 10 years only.

## CONCLUSIONS

The majority of the breast carcinoma patients presented with Stages II and III disease, approximately 99% cases were infiltrating ductal carcinoma, not otherwise specified, and were mainly Grade II followed by Grade III disease. The prevalence of ER/PR hormone receptor status and Her2/neu status in the population needs further investigation in the future. The government needs to urgently strengthen and augment the existing facilities including screening, which is inadequate at present to handle the current breast cancer load in India.

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