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Original Research Article

Breast cancer laterality and lymph node status

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ABSTRACT

Background: Breast cancer is the commonest cancer in women worldwide. Breast cancer has been reported to be more on the left side compared to the right. No study has been reported on breast cancer laterality in Bangladesh. Development of metastasis is the most important prognostic factor which begins with lymph node involvement. The purpose of this study was to compare differences in axillary lymph node metastases between right and left-sided breast cancer patients in Bangladesh.
Methods: This was a cross-sectional study conducted on admitted breast cancer patients who underwent simple mastectomy with level II axillary clearance surgery between September 2017 and August 2025. Metastatic axillary lymph node involvement and tumor size were compared between right and left-sided breast cancer cases using unpaired t test.
Results: Breast cancer was more common on the left side. Out of 168 patients, 77 (45.8%) were right-sided and 91 (54.2%) were left-sided patients. Left: right ratio was 1.18. Right-sided breast cancer patients presented slightly earlier than the left-sided patients and also had larger tumor size at presentation, but both the differences were not statistically significant. Right-sided breast cancer showed more metastatic lymph nodal involvement than left side. Mean number of metastatic lymph nodes on right-sided breast cancer patients was 8.22±3.46 (95% CI [7.44, 9.01]) and left-sided breast cancer patients was 6.92±3.75 (95% CI [6.14, 7.70]) respectively, ($p<0.05$).
Conclusions: Left-sided breast cancer was more common than the right side. But right breast cancer showed higher axillary lymph nodal involvement suggesting probably a more aggressive behavior and poorer prognosis.

Keywords: Breast cancer, Laterality, Lymph node, Metastasis, Tumor size

INTRODUCTION

Breast cancer is the most common cancer among women. An estimated 2.4 million women were diagnosed with breast cancer globally in 2024 and an estimated 694 000 women died from breast cancer.[1] Epidemiological study has shown that out of every 100,000 women in Bangladesh 22.5 women were affected by breast cancer.[2] In 2022, 12989 new cases were diagnosed accounting for 18% of newly diagnosed cases of cancer in females, with age standardized incidence rate of 15.2%.[3] Breast cancer screening is simple and early diagnosis and treatment can treat the disease effectively. Breast cancer accounted for approximately 15% of all treatable cancer deaths, more than any other cancer in 2022.[4]

Different epidemiological, socio-demographic and clinico-pathological associates have been studied with breast cancer. But no study has been reported on breast cancer laterality in Bangladesh. Laterality of disease in paired organs has been of interest in medical science. Anatomical asymmetry in the body often leads to a right or left laterality in disease which may affect incidence and prognosis. Various studies have shown breast cancer to be more common on the left side compared to the

right. Anatomical asymmetry in arterial, venous or lymphatic system may have an effect on laterality and the course of the disease.

The primary objective of this study was to compare any difference in axillary lymph node metastases between right and left-sided breast cancer patients in Bangladesh. Secondary objectives were to compare differences in incidence and tumor size between the right and left-sided breast cancer patients.

METHODS

Study design

This was a cross-sectional study.

Study place

The study was conducted in the Department of Surgery, Bangladesh Medical College Hospital, Dhanmondi, Dhaka.

Study duration

The study was conducted between September 2017 and August 2025.

Inclusion criteria

Newly diagnosed cases of breast cancer, aged between 25 years and 75 years who consented to participate were included in the study.

Exclusion criteria

Patients who had bilateral cancer, received neo-adjuvant therapy, had breast lumpectomy, prior axillary sampling and did not consent to participate were excluded from the study.

Study population

After excluding ineligible patients' study was conducted on 168 patients.

Procedure

All patients underwent simple mastectomy with level II axillary clearance surgery. Axillary lymph node involvement and tumor size were recorded from post-operative histopathology reports and compared between right and left-sided breast cancer cases.

Ethical approval

Ethical approval was taken from institutional Ethical Committee of Bangladesh Medical College Hospital.

Statistical analysis

Mean±SD with 95% CI was used for age distribution and unpaired t test was used to compare between right and left breast cancer groups for axillary lymph node involvement and tumor size; using software SPSS for Windows version 27.0.1.0.

RESULTS

Out of 168 breast cancer cases 77 (45.8%) were right-sided and 91 (54.2%) were left-sided patients. Left: right ratio was 1.18 (Figure 1).

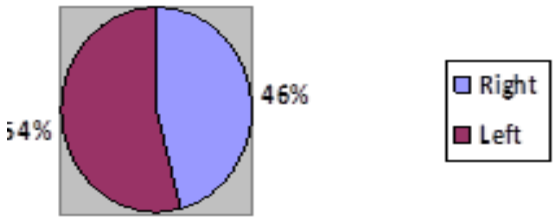

Figure 1: Number of right and left sided breast cancer cases.

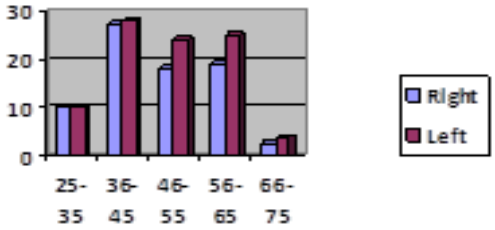

Figure 2: Age (in years) group incidence of right and left sided breast cancer cases.

Mean age of total cases in the study was 48.11±10.25 years (95% CI [46.55, 49.67]). Mean age of right-sided breast cancer patients was 47.94±10.30 years (95% CI [45.60, 50.27]) and left-sided breast cancer patients was 48.26±10.27 years (95% CI [46.13, 50.40]) respectively ($p>0.05$) (Figure 2).

Mean number of metastatic lymph nodes harvested on right-sided breast cancer patients was 8.22±3.46 (95% CI [7.44, 9.01]) and left-sided breast cancer patients was 6.92±3.75 (95% CI [6.14, 7.70]) respectively ($p<0.05$) (Table 1).

Mean size of tumor in right-sided breast cancer patients was 3.23±1.39 cm (95% CI [2.92, 3.55]) and left-sided breast cancer patients was 2.98±1.32 years (95% CI [2.71, 3.25]) respectively ($p>0.05$).

Table 1: Summary of results.

Parameters	Right-sided breast cancer	Left-sided breast cancer	Total breast cancer	P value
Mean age (years)	47.94±10.30	48.26±10.27	48.11±10.25	p>0.05
Metastatic axillary lymph nodes	8.22±3.46	6.92±3.75	7.52±3.67	p<0.05
Mean tumor size (cm)	3.23±1.39	2.98±1.32	3.10±1.35	p>0.05

DISCUSSION

The mean age of breast cancer cases in our study was 48.11±10.25 years (95% CI [46.55, 49.67]). Right-sided breast cancer patients presented slightly earlier than the left-sided patients; mean age of right-sided breast cancer patients was 47.94±10.30 years (95% CI [45.60, 50.27]) and left-sided breast cancer patients was 48.26±10.27 years (95% CI [46.13, 50.40]) respectively. This difference in age presentation was not statistically significant (p>0.05). Fatema et al also found a significantly younger age group in right-sided breast cancer patients compared to left-side in their study in Pakistan.[5]

In our study we found prevalence of left sided-breast cancer patients (54.2%) was slightly higher than right-sided breast cancer patients (45.8%). Left to right ratio was 1.18. This difference in prevalence was not statistically significant (p>0.05), but consistent with left to right ratios of 1.16 in Egypt; more than 1.05 in United States and less than 1.44 in Pakistan.[5-7] Though a widely accepted explanation remains elusive some authors have suggested asymmetry in breast size may be a contributing factor for this left-sided predominance in breast cancer laterality.[8] Senie et al suggested this asymmetry may be attributable to differential sensitivity and response to hormonal changes.[9] Dane et al found in their study that left-sided predominance of breast cancer was found only in premenopausal women but not in postmenopausal women; further supporting the role of asymmetrical hormonal influence on breast tissue.[10]

Lymph node metastasis is one of the most important prognostic parameter that determines the course of breast cancer disease. In our study we found statistically significant higher number of right-sided axillary metastatic lymph nodes (8.22±3.46, 95% CI [7.44, 9.01]) compared to the left-side (6.92±3.75, 95% CI [6.14, 7.70]), (p<0.05). The major lymphatic drainage from each breast is in to the axillary group of lymph nodes (80-90%), some in to internal mammary group of lymph nodes (10-20%) and infraclavicular group of lymph nodes (<5%). The axillary group of lymph nodes eventually drain into the right and left thoracic ducts and then into their respective subclavian veins. But there are some gross differences between the right and left thoracic ducts. The left thoracic duct drains a much larger area receiving lymphatic drainage from both lower extremities, left side of abdomen, left hemithorax, left side of the head and neck region, and the left upper extremity whereas the right thoracic duct drains organs above the level of umbilicus, right hemithorax, right side of the head and neck region, and the right upper extremity. The left thoracic duct is much longer and wider than the right duct and drains a much larger volume of lymph. This asymmetry in lymphatic drainage has been attributed as a plausible explanation for the difference in axillary lymph node metastatic involvement in breast cancer.[11,12] Some authors have also suggested a stronger cell-mediated immune response on the left side of the body resulting in more axillary metastatic lymph node involvement on the right side.[13]

Tumor size at presentation is another important factor determining the stage of breast cancer disease and its prognosis. We found larger tumor size at presentation in right-side (3.23±1.39 cm, 95% CI [2.92, 3.55]) compared to left-sided breast cancer patients (2.98±1.32 years, 95% CI [2.71, 3.25]). But the difference was not statistically significant (p>0.05) and contrary to the finding of Fatema et al who in their study found smaller tumor size at presentation in right-sided breast cancer patients.[5]

Breast cancer statistics like most other cancer statistics remain scanty in Bangladesh. A few studies have been carried out on breast cancer in our country, but most are epidemiological studies. To the best of our knowledge this is probably the first study on breast cancer laterality.

Our study is limited by the number of patients studied and also by the variation of parameters included in the study. So, the findings in our study may invoke appetite for further research but would not be strong enough to establish any conclusion with strong statistical evidence.

CONCLUSION

In our study we found left sided-breast cancer incidence to be higher than the right-side. But interestingly we also found right-sided breast cancer patients had a higher number of metastatic axillary lymph nodes and a larger tumor size at presentation. This may suggest a more aggressive behavior and probably poorer prognosis of right-sided breast cancer compared to the left.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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