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Original Article

Clinicopathological Spectrum, Molecular Subtypes, and Contemporary Treatment Patterns of Breast Cancer in Bangladesh

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Abstract

Introduction: Breast cancer is the most common malignancy among women worldwide and represents an increasing oncological burden in Bangladesh. Delayed presentation, limited screening facilities, and heterogeneity in tumor biology continue to influence treatment outcomes in low- and middle-income countries. This study aimed to evaluate the clinicopathological profile, molecular subtypes, treatment patterns, and short-term outcomes of breast cancer patients treated at a tertiary care teaching hospital in Bangladesh.

Methodology: This retrospective observational study was conducted in the Department of Surgery, Anwar Khan Modern Medical College Hospital, Dhaka, Bangladesh. Histopathological confirmed breast cancer patients treated between January 2022 and June 2023 were included in the analysis.

Results: A total of 43 patients were analyzed. The median tumor size was 3.0 cm (IQR: 2.0–4.0 cm), and the median symptom duration was 4.0 months (IQR: 2.0–6.0 months). ER/PR-positive, HER2-negative tumors constituted the most common molecular subtype. Tumor size greater than 2 cm was significantly associated with nodal positivity (OR 9.14, 95% CI 1.53–54.54; p=0.020). Tumor size demonstrated a significant positive correlation with the number of involved lymph nodes (rho=0.62, p<0.001). Symptom duration was also positively correlated with tumor size (rho=0.60, p<0.001).

Conclusion: Breast cancer patients in Bangladesh continue to present with relatively advanced disease. Longer symptom duration was associated with larger tumor size, and larger tumor size was significantly associated with nodal positivity, highlighting the importance of early diagnosis, timely referral, and breast cancer awareness programs to improve clinical outcomes.

Keywords: Breast cancer, clinicopathological profile, molecular subtype, nodal metastasis, tumor size, Bangladesh.

Introduction

Breast cancer is currently the most common malignancy among women worldwide and remains one of the leading causes of cancer-related mortality [1]. According to GLOBOCAN estimates, the global incidence of breast cancer continues to rise, with increasing burden in low- and middle-income countries, including Bangladesh[1]. Improvements in diagnostic facilities and awareness programs have contributed to increasing detection rates; however, delayed presentation remains a major challenge in developing countries[2].

In Bangladesh, breast cancer patients frequently present at relatively advanced stages because of multiple socioeconomic and healthcare-related barriers, including lack of organized screening programs, limited awareness, social stigma, financial constraints, and delayed referral systems[2,3]. Advanced stage at presentation significantly influences

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treatment options, increases the need for aggressive multimodal therapy, and adversely affects prognosis [4].

The biological behavior of breast cancer varies according to histopathological subtype and molecular receptor profile. Estrogen receptor (ER), progesterone receptor (PR), and HER2 receptor status are now integral components of breast cancer classification because of their prognostic and therapeutic significance[5]. Hormone receptor-positive tumors generally demonstrate favorable response to endocrine therapy, whereas triple-negative breast cancer (TNBC) is associated with aggressive biological behavior and limited targeted treatment options [5,6].

Previous studies from Bangladesh have shown that ER/PR-positive HER2-negative tumors represent the commonest molecular subtype, although substantial variation exists across institutions[3]. Younger age at presentation has also been observed in South Asian populations compared with Western countries, suggesting possible biological and epidemiological differences [2,7].

Surgical management of breast cancer has evolved substantially over recent decades. Modern breast cancer treatment increasingly incorporates breast-conserving surgery, sentinel lymph node dissection, oncoplastic reconstruction, neoadjuvant systemic therapy, and multidisciplinary treatment planning [8]. Nevertheless, mastectomy remains common in many developing countries because of late-stage presentation, large tumor size, patient preference, and limited access to radiotherapy facilities [4,8].

Institutional clinicopathological data from Bangladesh remain relatively limited. Evaluation of local demographic characteristics, receptor profile distribution, treatment patterns, and outcomes is essential for understanding regional disease behavior and optimizing evidence-based management strategies. Therefore, this study aimed to evaluate the clinicopathological spectrum, molecular subtypes, treatment patterns, and short-term outcomes of breast cancer patients managed at a tertiary care teaching hospital in Bangladesh.

Methodology

This retrospective observational study was carried out in the Department of Surgery at Anwar Khan Modern Medical College Hospital, Dhaka, Bangladesh. Histopathologically confirmed cases of breast cancer managed between January 2022 and June 2023 were included in the study. Relevant data, including demographic characteristics, menopausal status, tumor features, receptor status, disease stage, treatment modalities, surgical interventions, postoperative complications, and recurrence outcomes, were retrieved from hospital medical records.

Continuous variables were presented as median with interquartile range (IQR), whereas categorical variables were expressed as frequencies and percentages. Associations between categorical variables were assessed using Fisher's exact test. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated when applicable. Correlations between continuous and ordinal variables were evaluated using Spearman's rank correlation coefficient. A two-tailed p-value of less than 0.05 was considered statistically significant.

Results

Table 1 summarizes the clinicodemographic characteristics of the study population. The majority of patients were aged e"40 years (53.5%), while 46.5% were younger than 40 years. The largest proportion of patients belonged to the 36–40-year age group (25.6%). Most patients were premenopausal (55.8%), had at least one child (88.4%), and had a history of breastfeeding (83.7%). Only 7.0% of patients were lactating at presentation, and a positive family history of breast cancer was reported in 7.0% of cases. The median duration of symptoms prior to diagnosis was 4.0 months (IQR: 2.0–6.0 months). [Table-1]

Table I: Clinicodemographic profile

Variable	Category / summary	n (%) or median (IQR)
Age group	< 30	1 (2.3%)
	30 – 35	10 (23.3%)
	36 – 40	11 (25.6%)
	41 – 45	3 (6.98%)
	46 – 50	4 (9.3%)
	51 – 55	8 (18.6%)
	56 – 60	3 (6.98%)
	> 60	3 (6.98%)
Age category	<40 years	20 (46.5%)
	>=40 years	23 (53.5%)
Menopausal status	Pre	24 (55.8%)
	Post	19 (44.2%)
Parity	At least one child	38 (88.4%)
	Nulliparous	5 (11.6%)
Breastfed	Yes	36 (83.7%)
	No	7 (16.3%)
Currently lactating	Yes	3 (7.0%)
	No	40 (93.0%)
Family history	Positive	3 (7.0%)
	Negative	40 (93.0%)
Symptom duration, months, median (IQR)	4.0 (2.0-6.0)	46

Tumor size >2 cm was significantly associated with nodal positivity (OR 9.14, 95% CI 1.53–54.54; p=0.020). Node-positive disease was strongly associated with axillary lymph node dissection (OR 11.38, 95% CI 2.35–55.13; p=0.002).

Tumor size showed a significant positive correlation with involved lymph node count (Spearman's rho 0.62, p<0.001). Symptom duration also showed significant positive correlation with tumor size (rho 0.60, p<0.001).

Table 2 presents the tumor characteristics and treatment patterns of the study cohort. The median tumor size on ultrasonography was 3.0 cm (IQR: 2.0–4.0 cm). Invasive ductal carcinoma was the predominant diagnosis on core biopsy (79.1%), while ductal carcinoma in situ accounted for 14.0% of cases. Nearly half of the tumors were estrogen receptor and progesterone receptor positive with HER2 negativity (48.8%), followed by triple-positive tumors (41.5%) and triple-negative tumors (9.8%). Grade II tumors constituted the majority (53.5%). Clinical Stage II disease was the most common presentation (39.5%). Neoadjuvant therapy was administered in 13.2% of patients. Mastectomy was the most frequently performed breast surgery (55.8%), whereas breast-conserving surgery and oncoplastic procedures were performed in 25.6% and 7.0% of cases, respectively. Axillary lymph node dissection and sentinel lymph node dissection were performed in 41.9% and 39.5% of patients, respectively. Adjuvant therapy was administered to 63.2% of patients.

Table II: Tumor biology and treatment profile

Variable	Category / summary	n (%) or median (IQR)
Tumor size on USG, cm, median (IQR)	3.0 (2.0-4.0)	41
Core biopsy	Invasive DCC	34 (79.1%)
	DCIS	6 (14.0%)
	Others	3 (7.0%)
FNAC	Not done	35 (81.4%)
	DCC	5 (11.6%)
	atypical papillary tumor	1 (2.3%)
	fibrocystic change	1 (2.3%)
	Cellular Atypia	1 (2.3%)
FNAC-core discrepancy	Yes	6 (14.0%)
	No	37 (86.0%)
Receptor status	ER, PR positive Her2 Negative	20 (48.8%)
	Triple Positive	17 (41.5%)
	Triple Negative	4 (9.8%)
Core biopsy grade	Grade I	8 (18.6%)
	Grade II	23 (53.5%)
	Grade III	7 (16.3%)
	Others	5 (11.6%)
Clinical stage	I	9 (20.9%)
	II	17 (39.5%)
	III	5 (11.6%)
	IV	5 (11.6%)
	Others	7 (16.3%)
Neoadjuvant therapy	Yes	5 (13.2%)
	No	33 (86.8%)
Breast surgery	BCS	11 (25.6%)
	Oncoplasty	3 (7.0%)
	Mastectomy	24 (55.8%)
	No Surgical treatment	5 (11.6%)
Axillary surgery	SLND	17 (39.5%)
	ALND	18 (41.9%)
	No Surgical treatment to Axilla	8 (18.6%)
Adjuvant therapy	Yes	24 (63.2%)
	No	14 (36.8%)

Note. BCS = breast-conserving surgery; ALND = axillary lymph node dissection; SLND = sentinel lymph node dissection; DCC = ductal carcinoma.

Table 3 shows the pathological findings and postoperative outcomes. Final histopathological examination confirmed invasive ductal carcinoma in 80.6% of patients. The median number of lymph nodes examined was 6.0 (IQR: 4.0–8.0), with a median of 1.0 involved lymph node (IQR: 0.0–2.5). Nodal metastasis was identified in 51.4% of patients. Pathological Stage II disease was the most common final stage (57.9%). Clinical and pathological staging were concordant in the majority of cases (83.9%), while 12.9% were upstaged and 3.2% were down staged following surgery. Most patients (76.3%) experienced no postoperative complications. Seroma was the most frequent complication (13.2%), followed by wound dehiscence (7.9%) and lymphedema (2.6%). No disease recurrence was observed during the one-year follow-up period.

Table 4 demonstrates the associations between selected clinicopathological variables. Tumor size greater than 2 cm was significantly associated with nodal positivity, with affected patients having more than nine fold increased odds of lymph node involvement compared with those having smaller tumors (OR 9.14, 95% CI 1.53–54.54; p=0.020). Similarly, node-positive disease was strongly associated with the performance of axillary lymph node dissection (OR 11.38, 95% CI 2.35–55.13; p=0.002). No statistically significant associations were observed between age and triple-negative breast cancer subtype, menopausal status and advanced stage disease, advanced stage and mastectomy, mastectomy and postoperative complications, or neoadjuvant therapy and pathological down staging (all p>0.05).

Table III: Pathological and postoperative outcomes

Variable	Category / summary	n (%) or median (IQR)
Final histopathology	Invasive DCC	29 (80.6%)
	DCIS	5 (13.9%)
	Others	2 (5.6%)
Lymph nodes examined, median (IQR)	6.0 (4.0-8.0)	35
Involved lymph nodes, median (IQR)	1.0 (0.0-2.5)	35
Nodal status	Node-positive	18 (51.4%)
	Node-negative	17 (48.6%)
Final stage	Stage I	8 (21.1%)
	Stage II	22 (57.9%)
	Stage III	3 (7.9%)
	Stage IV	1 (2.6%)
	Not Applicable	4 (10.5%)
Stage migration	Down staged	1 (3.2%)
	Same	26 (83.9%)
	Upstaged	4 (12.9%)
Complications	No Complications	29 (76.3%)
	Seroma	5 (13.2%)
	Wound dehiscence	3 (7.9%)
	Lymphedema	1 (2.6%)
One-year recurrence	No	38 (100.0%)
	Yes	0 (0.0%)

Note. Stage migration was calculated only where both clinical and final pathological stage were available.

Table IV: Clinically relevant bivariate associations

Relationship	Exposure	Outcome	Event fraction	OR (95% CI)	p value
Age and triple-negative subtype	<40 years vs other	TNBC vs other	1/22 vs 3/24	0.33 (0.03-3.47)	0.609
Premenopausal status and advanced clinical stage	Pre vs other	Stage III/IV vs other	4/19 vs 6/17	0.49 (0.11-2.16)	0.463
Tumor size and nodal positivity	>2 cm vs other	Node-positive vs other	16/23 vs 2/10	9.14 (1.53-54.54)	0.020
Advanced clinical stage and mastectomy	Stage III/IV vs other	Mastectomy vs other	4/10 vs 15/26	0.49 (0.11-2.16)	0.463
Nodal positivity and ALND	Node-positive vs other	ALND vs other	14/18 vs 4/17	11.38 (2.35-55.13)	0.002
Mastectomy and complications	Mastectomy vs other	Any complication vs other	7/24 vs 10/22	0.49 (0.15-1.67)	0.361
Neoadjuvant therapy and downstaging	Yes vs other	Down staged vs other	0/4 vs 1/27	1.96 (0.07-56.12)	1.000

Note. All p-values are from Fisher's exact test. Event fraction is shown as exposure-positive event/total vs reference event/total.

Table V: Spearman's correlation analysis

Relationship	Valid n	Rho	p value	Interpretation
Tumor size vs involved lymph nodes	33	0.62	<0.001	Positive monotonic relationship
Symptom duration vs tumor size	41	0.60	<0.001	Positive monotonic relationship
Age vs tumor size	41	0.04	0.821	No statistically significant correlation

Table V presents the results of Spearman correlation analysis. Tumor size showed a strong positive correlation with the number of involved lymph nodes (rho=0.62, p<0.001), indicating that larger tumors were associated with a greater nodal burden. Symptom duration was also positively correlated with tumor size (rho=0.60, p<0.001), suggesting that delayed presentation was associated with larger tumors at diagnosis. In contrast, age was not significantly correlated with tumor size (rho=0.04, p=0.821). These findings indicate that tumor progression is more closely related to symptom duration than to patient age.

Discussion

This study provides important insight into the clinicopathological characteristics, molecular subtype distribution, treatment patterns, and short-term outcomes of breast cancer patients treated in a tertiary care setting in Bangladesh. The findings highlight several important regional trends, including relatively young age at presentation, predominance of hormone receptor-positive disease, substantial nodal burden, delayed presentation, and continued preference for mastectomy-based surgical management.

One of the most notable observations in the present study was the relatively young age distribution of breast cancer patients. Nearly half of the patients were younger than 40 years of age. Similar findings have been repeatedly reported in South Asian populations, where breast cancer tends to occur approximately one decade earlier compared with Western populations [9,10]. A recent Bangladeshi study evaluating young breast cancer patients also demonstrated a high burden of disease among women under 35 years, emphasizing the growing importance of young-onset

breast cancer in Bangladesh[9]. Younger breast cancer patients are known to demonstrate more aggressive tumor biology, higher histological grade, increased nodal involvement, and poorer survival outcomes compared with older patients [11,12].

Premenopausal women represented the majority of patients in this study. This observation is consistent with recent Asian studies reporting increasing incidence of premenopausal breast cancer [13]. Several biological and reproductive factors may contribute to this pattern, including hormonal exposure, reproductive behavior, genetic predisposition, and lifestyle transition associated with urbanization [6,13].

Invasive ductal carcinoma was the predominant histopathological subtype in our cohort, accounting for more than 80% of cases. This finding is comparable with both regional and international studies where invasive ductal carcinoma remains the most common pathological subtype of breast cancer [7,14]. Similar institutional studies from Bangladesh and neighboring countries have also demonstrated predominance of invasive ductal carcinoma in breast cancer patients [10,14].

Regarding molecular subtype distribution, ER/PR-positive HER2-negative tumors represented the commonest subtype in our study. Roshed et al. from Bangladesh reported hormone receptor-positive tumors in approximately two-thirds of patients, which closely resembles the findings of the present study [3]. Hormone receptor-positive disease remains clinically important because of its responsiveness to endocrine therapy and relatively favorable prognosis compared with HER2-enriched and triple-negative tumors [5].

Triple-negative breast cancer constituted approximately 10% of cases in the present cohort. This proportion is comparable with recent Asian studies where TNBC frequency ranges between 10% and 20% [15]. Although smaller in proportion, TNBC remains clinically important because of its aggressive biological behavior, higher recurrence rate, poorer prognosis, and limited targeted therapeutic options [15,16]. Recent studies have shown that younger women are more likely to harbor biologically aggressive molecular subtypes, including HER2-enriched and basal-like tumors [11,12].

A major finding of the present study was the significant relationship between tumor size and nodal positivity. Tumors larger than 2 cm demonstrated significantly higher odds of lymph node metastasis (OR 9.14, 95% CI 1.53–54.54; p=0.020). In addition, tumor size showed strong positive correlation with involved lymph node count (rho 0.62, p<0.001). These findings are consistent with established oncological principles and contemporary studies demonstrating tumor size as one of the strongest predictors of nodal metastasis and disease progression [17,18]. Increasing tumor burden biologically reflects prolonged disease progression and greater metastatic potential.

Another clinically important finding was the significant positive correlation between symptom duration and tumor size. Patients with prolonged symptom duration tended to present with larger tumors at diagnosis. This observation strongly supports the hypothesis that delayed healthcare seeking contributes substantially to advanced disease presentation in Bangladesh. Similar studies from low- and middle-income countries have identified delayed presentation, social stigma, fear of diagnosis, financial barriers, and lack of awareness as major contributors to late-stage breast cancer diagnosis [19,20].

Stage II disease represented the majority of pathological staging in this study. Comparable findings have been reported in multiple South Asian series where Stage II and III disease predominate because of absence of structured screening programs [19]. In contrast, Western populations increasingly detect breast cancer at earlier stages because of mammographic screening and organized referral pathways [21].

Modified radical mastectomy remained the most commonly performed surgical procedure in the present cohort. Similar treatment patterns continue to be observed in many developing countries where advanced stage, large tumor size, limited radiotherapy accessibility, and socioeconomic factors influence surgical decision-making [19,22]. However, breast-conserving surgery and oncoplastic procedures accounted for approximately one-third of breast procedures in this study, reflecting gradual adoption of modern breast surgical techniques in Bangladesh. Contemporary evidence suggests that breast-conserving surgery combined with radiotherapy offers oncological outcomes comparable to mastectomy in appropriately selected early-stage patients [23].

Node-positive disease was strongly associated with axillary lymph node dissection in our study, reflecting appropriate escalation of surgical management

according to disease burden. Sentinel lymph node dissection was feasible in a substantial proportion of patients, indicating increasing implementation of less invasive axillary staging techniques. Current international guidelines increasingly favor sentinel node-based management to reduce postoperative morbidity such as lymphedema and shoulder dysfunction [23,24].

Postoperative complications were relatively infrequent in the present study, with seroma being the most common complication. Similar findings have been reported in breast surgery literature where seroma remains the commonest early postoperative complication after mastectomy and axillary surgery [24]. No one-year recurrence was observed in this study; however, this should be interpreted cautiously because of the relatively short follow-up period and small sample size.

Overall, this study highlights several important realities of breast cancer management in Bangladesh: younger age at presentation, delayed diagnosis, substantial nodal involvement, predominance of hormone receptor-positive disease, and evolving surgical practice patterns. The statistically significant relationship between delayed presentation, larger tumor size, and nodal positivity underscores the urgent need for improved awareness programs, early detection initiatives, and organized breast cancer screening strategies in Bangladesh.

This study has several limitations. Being a single-center retrospective study with a relatively small sample size, the findings may not be fully generalizable. In addition, the short follow-up period and missing data in some variables limited long-term outcome and survival analysis.

Conclusion

Breast cancer patients in Bangladesh continue to present predominantly with Stage II disease and a high prevalence of nodal involvement. Delayed presentation was associated with larger tumor size, and larger tumors were significantly associated with nodal positivity, emphasizing the importance of timely diagnosis and early detection strategies. Hormone receptor-positive disease represented the predominant molecular subtype, supporting the central role of endocrine therapy in treatment. The growing adoption of breast-conserving and oncoplastic procedures indicates progressive advancement toward modern multidisciplinary breast cancer care in Bangladesh.

Conflict of Interest

The authors declare no conflict of interest.

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Ethical approval

The study was approved by the Institutional Ethics Review Board of Anwar Khan Modern Medical College. (Ref: IERB-AKMMC/ECC/2021/08)

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