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Original research article

A Study on Histopathological spectrum of Breast carcinomas in a tertiary care center

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Abstract

The classification of breast tumours continues to evolve, with the integration of new knowledge from research rapidly being translated into clinical practice. In this volume of the World Health Organization (WHO) classification of tumours series' fifth edition, which is an update of the fourth-edition breast tumours volume published in 2012, the descriptions of breast tumours follow the familiar systematic approach of previous volumes, with the content now organised in sequence from benign epithelial proliferations and precursors, through benign neoplasms, to in-situ and invasive breast cancer, followed by mesenchymal and haematolymphoid neoplasms, tumours of the male breast, and genetic tumour syndromes. A study of 70 breast carcinoma patients carried out in the Dept. of Pathology in our institute during January 2022 to june 2022 for a duration of 6 months. Among the 70 cases studied, 5 histological subtypes of breast carcinoma were encountered with invasive carcinoma (IDC- NOS type) being the most common (88.5%). This was followed by two cases (2.85%) of mucinous carcinoma and two cases (2.85%) each of lobular carcinoma, osseous and cartilaginous producing metaplastic carcinoma and invasive papillary carcinoma.

Keywords: Breast lesions, histopathological spectrum, breast tumours

Introduction

Breast cancer is the most common female cancer worldwide representing nearly a quarter (25%) of all cancers with an estimated 1.67 million new cancer cases diagnosed in 2012. One of the most common cause of carcinoma deaths among women is breast cancer (BC) [1]. Asia has 44% of the world's BC deaths with 39% of overall new BC cases diagnosed [2]. Approximately 25% of the female cancer cases in India are BC [3, 4]. The rate of incidence was found to be 25.8 in 100,000 women and the mortality rate is 12.7 per 100,000 women (2017) [3].

Risk factors for breast cancer include Age [5, 6], Age at menarche [7], First live birth [8], Family history [9], Genetic predisposition [9, 10, 11], Radiation exposure [12], Estrogen exposure [13], Breastdensity [14], Carcinoma of contralateral breast or endometrium [14] Precancerous breast disease [5] Diet [16, 17, 18], Obesity [19, 20].

The classification of breast tumours continues to evolve, with the integration of new knowledge from research rapidly being translated into clinical practice. In this volume of the World Health Organization (WHO) classification of tumours series' fifth edition, which is an update of the fourth-edition breast tumours volume published in 2012, the descriptions of breast tumours follow the familiar systematic approach of previous volumes, with the content now organised in sequence from benign epithelial proliferations and precursors, through benign neoplasms, to in-situ and invasive breast cancer, followed by mesenchymal and haematolymphoid neoplasms, tumours of the male breast, and genetic tumour syndromes [21].

These include Infiltrating duct carcinoma NOS, Oncocytic carcinoma, Lipid rich carcinoma, Glycogen rich carcinoma, Sebaceous carcinoma, Lobular carcinoma NOS, Tubular carcinoma, Cribriform carcinoma NOS, Mucinous adenocarcinoma, Mucinous cystadenocarcinoma NOS, Invasive micropapillary carcinoma of breast, Apocrine adenocarcinoma, Metaplastic carcinoma NOS.

Invasive breast carcinoma include a plethora of variants which vary in macroscopic, microscopic appearance and also in prognosis. Thus, Thisstudy aims to study the histopathological spectrum of breast carcinomas.

Materials and methods

A study of 70 breast carcinoma patients carried out in the Dept. of Pathology in our institute during January 2022 to june 2022 for a duration of 6 months.

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Inclusion criteria: All cases biopsied and diagnosed as breast carcinoma.
All types of biopsies, ranging from needle core to Mastectomy specimens were studied.

Exclusion criteria: Biopsy samples of recurrent cases.

- Inadequate biopsies.
- Poorly processed biopsies
- History of any hormonal or chemotherapy prior to biopsy
- Specimen was fixed in 10% formalin followed by paraffin embedding and staining with haematoxylin and eosin.
- For histopathological examination of the tissue with breast carcinoma, paraffin blocks of the suitable representative section were retrieved from the department of pathology and were cut to a thickness of 4 microns with the help of semiautomated microtome.
- The sections were then stained with Hematoxylin and Eosin manually. These slides were used for assessing the grade of the tumor.
- Histopathological grade was assessed using Bloom and Richardson's method, modified by Elston and Ellis.
- Histopathological features were studied and classified according to recent 2019 WHO Classification of Tumours of the Breast.
- TNM staging was assessed in all the mastectomy specimens.

Statistical Analysis

- Data was entered in MS Excel.
- Tables and charts were generated using MS Excel.
- Quantitative data was presented as mean ±SD.
- Qualitative data was presented with the help of frequency and percentage table.
- A P value <0.05 was considered as statistically significant

Results

In this study, 70 breast carcinoma cases were included and majority of them belonged to 40th decade of their life, with youngest age of incidence being 34 years young female and oldest is 77 years of age. (Table 1) Increased genetic and modifiable risk factors may be the cause of early incidence in young females. Of the 70 cases analyzed, 48 (68.5%) cases belonged to modified radical mastectomy specimens, 20 (28.5%) cases of core biopsy and 1(1.4%) case of wedge biopsy. Thus Modified radical mastectomy is the major specimen included in the study (Figure 1).

Among the 70 cases studied, 5 histological subtypes of breast carcinoma were encountered with invasive carcinoma (IDC- NOS type) being the most common (88.5%) (Figure 2). This was followed by two cases (2.85%) of mucinous carcinoma (Figure 3) and two cases (2.85%) each of lobular carcinoma (Figure 4), osseous and cartilaginous producing metaplastic carcinoma (Figure 5) and invasive papillary carcinoma (Figure 6)

Table 1: Age-wise distribution of breast carcinoma cases

Age group	Number of cases (N=70)	Percentage (%)
30-40	05	07.1
40-50	30	42.8
50-60	20	28.5
60-70	10	14.3
70-80	05	07.1

Table 2: Distribution of histological subtypes in the study

Sl. No.	Histological subtypes	Number of cases	Percentage
1.	IDC- NOS Type	62	88.5%
2.	Mucinous carcinoma	2	2.85%
3.	Invasive Lobular carcinoma	2	2.85%
4.	Osseous and cartilaginous producing metaplastic carcinoma	1	1.42%
5.	Papillary DCIS, Encapsulated Papillary carcinoma &Invasive Papillary Carcinoma (one case each)	3	4.28%
Total		70	100%

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Fig 1: Gross specimen of left sided modified radical mastectomy

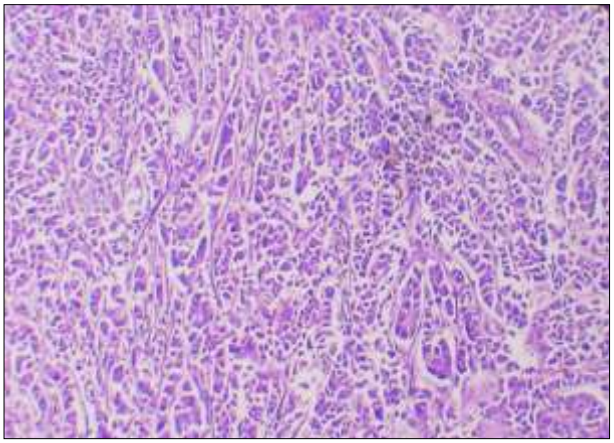

Fig 2: Grade 2 IDC-NOS type. H&E; 400x

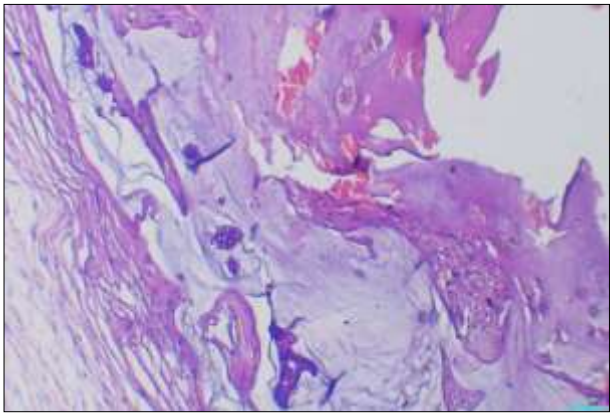

Fig 3: Low grade Mucinous carcinoma; H&E; 100x

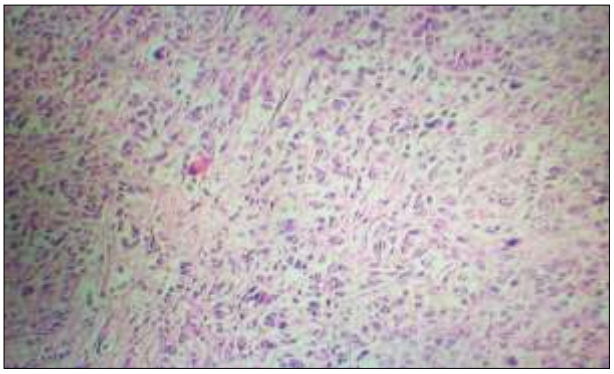

Fig 4: Invasive lobular carcinoma: H&E; 400x

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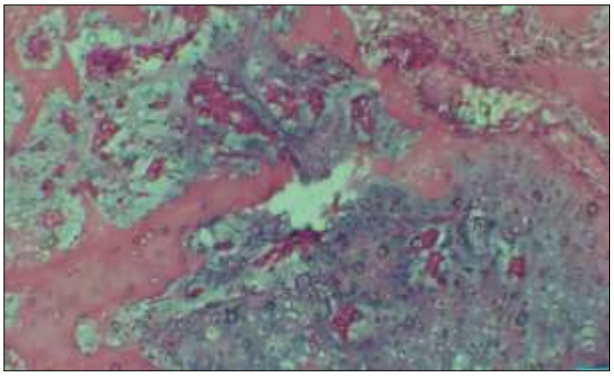

Fig 5: Osseous and cartilagenous producing metaplastic carcinoma; H&E; 400x

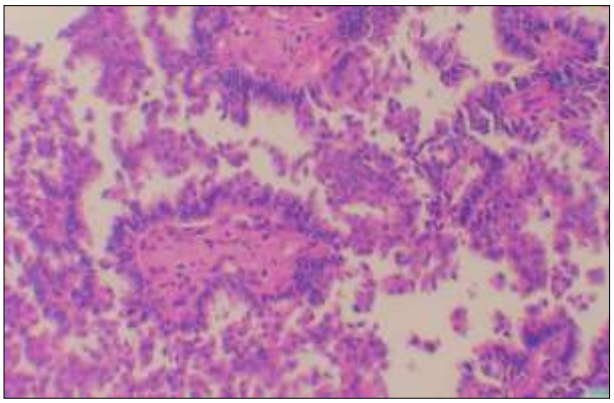

Fig 6: Invasive papillary carcinoma; H&E; 400x

Discussion

Breast cancer is the common cause of cancer deaths in women worldwide, accounting for 23% of prevalence of cancer and 14% of all cancer related deaths [22]. Breast cancer can be broadly categorized into in situ carcinoma and invasive (infiltrating) carcinoma. Breast carcinoma in situ is further sub-classified as DCIS and LCIS depending on the architecture, growth patterns and cytological features. Invasive carcinomas are a heterogeneous group of tumors differentiated into various histological subtypes. The major invasive tumor types include infiltrating ductal, invasive lobular, ductal/lobular, mucinous (colloid), tubular, medullary and papillary carcinomas. Of these, infiltrating ductal carcinoma (IDC) is, by far, the most common subtype accounting for 70-80% of all invasive lesions [23]. Like most studies in literature, IDC – NOS type was the most frequent histologic type encountered accounting to 88.5%. The second most common histologic type was mucinous carcinoma (2.85%). Both the cases of mucinous carcinoma were postmenopausal women with hormonal receptor positivity. We encountered two cases (2.85%) of classic invasive lobular carcinoma which was confirmed by the loss of E-cadherin as demonstrated by IHC. This case again was a hormonal positive tumor with Her 2 neu negativity. One case (1.42%) of metaplastic carcinoma studied was a 65-year-old women presenting with large tumor mass m/s17x10x5cm and clinically and grossly mimicking malignant phyllodes. Microscopically, large areas of osseous and cartilaginous areas with malignant ductal epithelial cells were noted. We also encountered one case (1.42%) of invasive papillary carcinoma and 1 case each of encapsulated papillary carcinoma and Papillary DCIS. Since ours is a tertiary referral set up situated in rural part, there was a slightly higher incidence of papillary neoplasms encountered in the study. It could also be attributed to the limitations and challenges in diagnosing papillary lesions accurately on FNAC in the peripheral areas. Variation observed (table 3) in the prevalence of various histologic subtypes across studies can be attributed to the demographic changes, ethnicity and the genetic makeup of the individuals.

Table 3: Comparison of distribution of histologic types with other studies

Studies	Histologic types	Number (%)
Gayathri Gogoi *et al* [24] at Assam in 2016 at Assam (n=123)	Invasive duct carcinoma - NOS	82.11%
	Invasive lobular carcinoma	8.13%
	Invasive papillary carcinoma	3.25%
	Mucinous carcinoma	1.62%
	Micropapillary carcinoma	2.43%
	Others	2.46%
Siraj A k *et al* [25] at Saudi Arabia in 2021 (n= 1006)	IDC- NOS type	910 (90.5%)

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	Invasive lobular carcinoma	44(4.4%)
	Mucinous Carcinoma	16(1.6%)
	Others	36(3.5%)
Lavanya *et al* At Chennai in 2016 [26] (n=165)	Invasive duct carcinoma - NOS	155(93.9%)
	Metaplastic Ca	3(1.8%)
	IDC with mucinous Ca	5(3.0%)
	Apocrine Ca	1(0.6%)
	Intracystic papillary Ca	1(0.6%)
Present study (n=70)	IDC (NOS type) = 62	88.5%
	Mucinous carcinoma = 2	2.85%
	Invasive Lobular carcinoma= 2	2.85%
	Metaplastic carcinoma = 1	1.14%
	Invasive Papillary Carcinoma =1	1.14%
	Encapsulated papillary carcinoma=1	1.14%
	Papillary DCIS=1	1.14%

Histologic grade which is a combination of tubular differentiation, nuclear features and mitotic activity, is an important factor in the evaluation of breast cancers and of utmost importance in pathological reporting of the same. It is assumed that the tumor grade plays a vital role in early-stage cancers with few or no metastatically involved axillary nodes and is an independent prognostic marker [27]. Apart from being an important prognostic factor, tumor grade provides useful information regarding response to chemotherapy, thereby serving as a predictive factor in the treatment response. Histologic grade, however has not been integrated into the TNM classification although it is an impeccable and reliable prognostic factor [28]. Comparison of Bloom Richardson grade in 62 infiltrating breast carcinoma, NOS with other studies has been shown in Table 4.

Table 4: Comparison of distribution of histological grades with other studies

Studies	Total no of cases	Grade I	Grade II	Grade III
Sarkar *et al* (2015) [29]	110	29 (26.4%)	48 (43.6%)	33 (30%)
Jindal *et al* (2020) [30]	50	16 (32%)	21 (42%)	13 (26%)
Lengare *et al* (2020) [31]	50	2 (4%)	24 (48%)	24 (48%)
Singh *et al* (2020) [32]	21	7 (33.3%)	12 (57%)	4 (19%)
Present study	62	16 (25.8%)	36 (58.1%)	10 (16.12%)

The present study lymphnode status was compared with the tumor. The presence or absence of tumor deposits in the axillary lymph nodes in patients with breast carcinoma remains inevitably central for its staging and prognosis as well as in the guidance of treatment decisions [28].

Various studies have described that high grade tumors have more propensity for metastasis to the regional lymph nodes, frequent systemic recurrence and a high mortality rate compared to those of low-grade tumors [33].

In the present study, lymph nodes were analyzed in 35 IDC, NOS cases. 45% of the cases were node negative with positive nodes seen in 42.5% of cases. Peurala *et al* [34] in his study also observed higher node negative cases. However, high lymph node positivity was observed in various other studies [28, 29, 30, 31].

Thus, a thorough knowledge of the histopathological appearance of invasive breast cancers is significant in diagnosing the breast lesions and in accurate risk assessment.

Conclusion

The present study highlights the pivotal role of histopathological examination in diagnosing the breast carcinomas. Grading and staging helps in prognostification and risk assessment of breast cancers, which further plays a significant role in disease management and patient care.

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