Correlation of morphological profile and receptor status in breast carcinoma: An institutional study in tertiary care hospital

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Abstract
Background: *Receptor status assessment is not routinely carried out in patients of breast cancer in the Indian subcontinent. Limited data is available on histological and receptor status in Indian patients. In this study receptor status has been correlated with morphological prognostic parameters.*

Objective: *To analyze receptor status and its correlation with morphological prognostic parameters in Indian females.*

Methods: *50 mastectomy specimens of breast carcinoma were received in the department of pathology at Geetanjali medical college and hospital, Udaipur, Rajasthan, India. All the 50 cases were subjected for ER, PR, HER 2 Neu receptor study.*

Result: *64% patients diagnosed with breast cancer were 50 years or younger in age. 94% patients were diagnosed as Invasive ductal carcinoma whereas 6 % patients were diagnosed with tubular and tubulobular carcinoma. Only 4% cases were ER/ PR/ HER 2 Neu positive and 16% cases were triple negative indicating poor prognosis.*

Keywords: *Breast cancer, Invasive ductal carcinoma (IDC), Estrogen Receptor, Progesterone Receptor, Her 2 Neu Receptor.*

Introduction

Breast cancer is a heterogeneous entity constituting a varied spectrum of clinico-pathological and molecular features associated with different therapeutic and prognostic outcomes[1]. Breast carcinoma is the most common malignant tumor being the leading cause of death amongst women resulting in more than 1,000,000 cases worldwide annually[2] . According to WHO, India has a cancer mortality rate of 79 per 100,000 deaths and accounts for over 6 percent of total deaths[3]. The management and prognosis of breast cancer is influenced by various parameters such as histological grading and type, stage, tumor size, lymph node status, lymphovascular invasion and receptor status of estrogen (ER), progesterone (PR) and HER2 Neu over expression[4]. There has been realization that the presence of ER/PR receptor in tumor tissue has a strong correlation with response to hormonal therapy [5]. In recent times, hormonal status determination on biopsy specimen has been advocated as a standard practice[6]. The hormone receptors play an essential role in the development, therapeutic and progression of the disease along with identification of patients with lower risk of relapse[7]. Breast cancer survival rate is closely related to early detection, appropriate management, genetic predisposition and hormone receptor status.

Material & Methods

A cross sectional study was conducted in the department of Pathology from 2016 to 2019 at Geetanjali Medical College & Hospital, Udaipur, Rajasthan, India. A total of 50 patients were included in the study. Relevant clinical details were obtained. All the specimens received were subjected to routine histopathological as well as immunohistochemical analysis.

The specimens were routinely fixed overnight in 10% neutral buffered formalin. The representative sections were submitted the next day according to the standard grossing protocol and subsequently processed. The sections were then stained with routine hematoxylin and eosin (H & E) stain. The sections were first diagnosed on the basis of WHO classification and histological grading was done according to Modified Bloom Richardson grading system. The suitable blocks were selected for Immunohistochemistry and were subjected to ER, PR, HER 2 Neu receptor study.

Results

A total of 50 cases were included in the present study. Of all the female patients, the youngest patient was 26 years old and the oldest patient was 82 years old. Majority of the cases were in the age group of 41-60 years with the mean age at 52.18 years. (Table-1)

Table 1 Age distribution of cases

Age in years	Frequency	Percent
21-40	12	24%
41-60	24	48%
61-80	13	26%
81 & Above	01	02%
TOTAL	50	100 %

In terms of side of involvement, left side of the breast was affected more i.e.26 (52 %) as compared to the right side which consisted of 24 (48 %) cases. All the 50 patients had undergone MRM. (Table -2)

Table 2 Sidewise distribution of breast carcinoma.

Side	Frequency	Percent
Right	24	48%
Left	26	52%

Majority of the cases had tumor size more than 2 cm comprising of 34 cases (68 %) and the remaining 16 cases (32 %) had tumor size less than 2 cm. (Table - 3)

Table 3 Size of Tumor

Tumor Size	Frequency	Percentage
≤ 2 cm	16	32%
>2 cm	34	68%

Infiltrating ductal carcinoma (IDC) was the predominant morphological category with IDC NOS (Not otherwise specified) in 46 (92%) cases. 2 cases had Tubulobular carcinoma (4 %), one cases (2%) invasive lobular carcinoma and 1 case of Tubular carcinoma (2%). (Table – 4)

Table 4 Histological subtypes of breast carcinoma

Histological subtypes	Frequency	Percentage
IDC(NOS)	46	92%
Tubulobular carcinoma	02	04%
Invasive lobular carcinoma	01	02 %
Tubular carcinoma	01	02%

Lymph node metastasis was found to be positive in 32 cases (64 %) and negative in 18 cases (36 %). Out of 32 cases of positive lymph node metastasis, involvement of more than 4 lymph nodes was observed in 9 cases only (39.1 %) whereas involvement of less than 4 lymph nodes was seen in majority of cases i.e. 23 cases accounting for 71.8 % and only one case showed perineural invasion.

On the correlation of grade with hormonal receptor status, In case of Grade I tumors, 2 (50%) cases exhibited triple negative expression while 1 (25%) case showed triple positivity and only 1 (25%) case with ER-/PR+/HER2- expression was reported. Amongst the Grade II tumors, Majority of the grade II tumors showed ER-/PR-/HER2+ expression which was noted in 18(41.86%) cases. 9(20.93%) cases showed ER-/PR+/HER2- expression followed by 5 (11.62%) cases showing triple negative expression. ER-/PR+/HER2- expression was also seen in five (11.62%) cases whereas ER+/PR-/HER2- expression was noted in 3(6.97%) cases. ER-/PR+/HER2+ expression was observed in 2 (4.65%) cases along with 1(2.32%) case showing triple positivity In case of Grade III tumors, ER/PR+/HER2- expression was noted in 2(66.6%)

cases while triple negativity was observed in only 1(33.3%) case. Table -5

Table 5 Correlation of grade with hormonal receptor status

Hormone Receptors	N	Grade I	Grade II	Grade III
ER+/PR+/HER 2+	2	01(25%)	01(2.32%)	NIL
ER+/PR-/HER2-	3	NIL	03 (6.97%)	NIL
ER-/PR+/HER2-	6	01(25%)	05(11.62%)	NIL
ER-/PR+/HER2+	2	NIL	02(4.65%)	NIL
ER-/PR+/HER2-	11	NIL	09(20.93%)	02(66.6%)
ER-/PR-/HER2+	18	NIL	18(41.86%)	NIL
ER-/PR-/HER 2-	8	02(50%)	05(11.62%)	01(33.3%)
Total		04	43	03

Discussion

It is well known that breast cancer prognosis depends on various clinicopathological factors including tumor size, tumor grade, hormone receptor status, HER-2 status and metastatic status of lymph nodes [6,8].

Age range among Indian breast cancer patients is found to be lower when compared to the Western countries with an average difference of one decade. This is likely to be due to the different age distribution of the Indian population, where only 7% of the population is above the age of 60 years [9-16].

In the present study 48% of women were in the age group of 41-60 years, in contrast a study by Pakseresht et al[9] had age range lower than 40 years (34.8%), whereas Ambroise et al[13] (46.4%) Suvarchala et al[11] (45.31%), and Rhodes et al[17] (36.42%) had higher age range between 51-60years. Literature search reveals breast carcinomas are more common in the left breast than the right. The possible explanations are that, the left breast being more bulky and having larger volume of breast tissue comparatively. However side of breast involved has no clinical significance[10,18]. In the present study left breast were marginally more affected than right.

In terms of size of the tumor, majority of the cases had tumor size more than 2 cm constituting 68 % cases and the remaining 32 % cases had tumor size less than 2 cm. Similarly, Lokuhetty et al reported 58 % cases with tumor size more than 2cm [19]. The study conducted by Lakmini KB. Mudduwa et al reported 85.5 % cases having tumor size greater than

2 cm while only 14.5 % of tumors measured less than 2 cm [20].

Invasive Ductal carcinoma was the most common histological type with Invasive Ductal carcinoma (NOS) comprising of 76 % of all the cases of breast carcinoma. Puvitha et al[21] reported 79 % cases of IDC (NOS) which is similar to our study. Sofi et al [22] findings consisted of 80.30 % cases of IDC (NOS).

Lymph node metastasis was found to be positive in 64 % of all the cases and negative in 36 % in our study. Lobna Ayadi et al [23] reported 65 % cases to be positive for lymph node metastasis which is in concordance to our findings. Zubair Ahmed et al [24] also reported 74.77 % cases to be positive for lymph node metastasis.

In our study, most of the tumors were mostly Grade II tumors accounting for 86 % of cases followed by grade III (08%) tumor and grade II (04%) tumor. In study conducted by Pathak TB et al [25] grade II (59%) tumor was the commonest. Zubair Ahmed et al[24] reported grade II (75.83%) as the commonest followed by grade III (20%) and grade I (4.17%).

The hormone receptor status is a prognostic marker of outmost importance. It is also helpful in determination of the appropriate treatment modality in the treatment of breast cancer.

In our study, IHC for ER, PR and HER2 Neu status was performed on appropriate tissue sections. The findings revealed that 36 % patients were ER positive while 64 % were negative. Desai SB et al [26] conducted a similar study in which ER positivity was observed in 32.6 % cases which is similar to our findings in context of ER positive breast carcinoma patients. Priti lal et al[27] observed that 71.6 % cases were positive for ER. In case of PR receptor status, 42 % cases were PR positive and 58 % were reported to be negative. Rao et al[28] observed that 31.7 % cases showed PR positivity. HER 2 Neu expression was seen in 44 % of cases which is in correlation with the study conducted by Puvitha et al[21] where HER 2 Neu expression was observed in 48.4 % cases. Dutta V et al[29] also conducted a similar study in which HER 2 Neu overexpression was seen in 57.2 % cases. In our study, only 2 cases

(04 %) were triple positive whereas only 8 (16%) cases exhibited triple negativity. Aye Thike et al[30] reported 13 % cases as triple negative breast cancer which is similar to our findings.

Puvitha et al showed triple positive breast cancer in 6 % of patients in their study which is also similar to our findings.

Conclusion

In the study conducted above, majority of the cases (48%) were in the age group of 41-60 years.

Infiltrating Ductal Carcinoma (NOS) was the most common breast cancer encountered in our institute with majority of the tumors falling in the category of Grade II tumors. Lymph node metastasis, tumor size more than 2 cm were seen in majority of the tumors. Only 4 % cases were ER/PR and HER 2 Neu positive while 16 % cases were triple negative breast carcinoma indicating poor prognosis.

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