



CLINICOPATHOLOGIC CORRELATION OF ER, PR AND HER2 NEU STATUS OF BREAST CARCINOMA IN PREMENOPAUSAL AND POSTMENOPAUSAL WOMEN: A RETROSPECTIVE OBSERVATIONAL STUDY IN A TERTIARY CARE HOSPITAL IN MANGALURU

Dr. Nirupama M	Associate Professor, Dept Of Pathology, KMC Mangaluru
Dr. Sathkar U Shetty*	Junior Resident, KMC Mangaluru *Corresponding Author
Dr. Ankitha Prem	Junior Resident, KMC Mangaluru
Dr. Keerthi B Vishwanath	Junior Resident, MIMS Mandya

ABSTRACT **Background:** Breast cancer is the most prevalent malignancy among Indian women and is the primary cause of cancer-related mortality in the country. Breast cancer express various receptors like Estrogen receptor (ER), progesterone receptor (PR) and HER2 neu receptor which have both diagnostic and therapeutic importance. The extent to which these receptors are expressed is based on its morphological type and age of the women. **Objective:** A hospital-based prospective study was conducted on 180 breast cancer patients treated at Kasturba Medical College, Mangalore, between November 2021 and January 2022. Data was collected retrospectively from medical records and analyzed for receptor expression and tumor characteristics. Receptor status was assessed using immunohistochemistry, with positivity defined by established scoring criteria. **Results:** The mean age of patients was 54.2 years, with 63% aged over 45. The most common tumor site was the left outer quadrant. Among the cohort, ER positivity was observed in 44.4% and HER2 neu positivity in 37.8%. ER-positive tumors were predominantly found in patients aged over 45 years (77.5%), while HER2 neu positivity was less age-dependent (68% in older vs. 32.4% in younger patients). Tumors lacking HER2 neu expression exhibited lower lymph node metastasis rates (17.1%) compared to HER2 neu-positive tumors (50.9%). The majority (68.3%) had infiltrating ductal carcinoma, followed by infiltrating lobular carcinoma (6.9%) and ductal carcinoma in situ (6.7%). **Conclusion:** The findings emphasize the role of receptor status and histological subtype in the metastatic behavior of breast cancer. HER2 neu positivity correlates strongly with lymph node metastasis, while ER-positive tumors are more prevalent in older patients. Understanding these patterns can inform tailored treatment strategies and improve patient outcomes.

KEYWORDS : Breast cancer; Estrogen Receptors; Invasive Ductal Carcinoma; Progesterone Receptor; HER2 neu receptor

INTRODUCTION

Breast cancer is one of the most common cancer seen in women of both premenopausal and post-menopausal age affecting almost 2.1 million women worldwide each year.¹ Breast cancer is the leading cause of cancer mortality among women in India and the second most common cause of cancer death globally, surpassed only by lung cancer.² In 2018, death due to breast cancer amounted to approximately 15% of cancer death in women globally.¹

Almost all the cancers of breast are adenocarcinoma and on the basis of expression of various cell membrane and intracellular receptors these are sub divided into various groups. These receptors include Estrogen receptor (ER), progesterone receptor (PR) and HER2 receptor and their corresponding three major biologic subtypes which include luminal subtype (ER-positive, HER2-negative and constitutes 50% to 65% of cases); HER2 enriched subtype (ER-negative, HER2-positive and constitutes 10% to 20% of cases); and basal-like subtype (ER-negative, HER2-negative and is also known as triple negative breast carcinoma and constitutes almost 10% to 20% of the cases). Each of these group have their own characteristic morphology, response to therapy and 5-year survival rates.³ In women of less than 25 years breast carcinomas are rarely seen. After 30, Incidence of ER-positive breast cancers increase with age whereas the incidence of HER2-positive are independent of age.²

Research in the USA has shown that luminal-type breast cancer tends to be detected at an early stage, often with lobular characteristics, and is typically associated with small tumor size and minimal cellular abnormality.³ In contrast to other breast cancer subtypes, basal-like breast cancer typically presents in younger women, but is often diagnosed at a more advanced stage, with tumors exhibiting high levels of anaplasia.⁴ In general all ER-positive carcinoma has better survival than ER-negative, and triple negative has the worst survival.⁵

This study was conducted to assess the possible correlation between expression of ER, PR and HER-2/neu with other factors like tumor size, morphology, lymph node metastasis and age.

MATERIALS AND METHODS

This prospective, hospital-based study enrolled 180 patients with breast carcinoma, all of whom underwent surgery at the hospital

affiliated with KMC Mangalore, with comprehensive data available for analysis. The study was conducted for a duration of 3 months from November 2021 to January 2022. The sample size was calculated using the equation $n = \frac{z^2 \cdot p \cdot q}{d^2}$, where p (prevalence) = 68.4% (ref from previous studies), $q = 1 - p$, d = level of precision. With 95% confidence level & 90% power, the sample size comes up to 180. Ethical approval from the ethical committee was taken. Inclusion criteria: Women with breast carcinoma with clinical history, histopathology and immunohistochemistry report and follow up. Pre-menopausal women are the ones whose age is above 18 and up to 45 years and post-menopausal women are the ones whose age is above 45 years. Exclusion criteria: Cases with inadequate history and clinical detail and Inadequate biopsies and improper fixation. Following convenience sampling data was recruited from patients' medical records. A total of 180 patients was evaluated for demographic, morphological and clinical variable, and for ER, PR and HER2 neu expression. Attempts were made to obtain slides from all known surgeries, including earlier and subsequent resections at the institution. After retrieving the data, the expression of ER, PR and HER2 neu expression and the morphology of the breast carcinoma were compared in pre-menopausal and post-menopausal women.

ER/PR & HER2 neu: IHC staining helps in identification of ER/PR and HER2 neu in the resected specimen. Scoring is based on Allred score. If >10% of carcinoma cells are stained, then it is considered as ER-positive and ER-negative carcinoma have 1% - 9% cells stained.

RESULT

The study was conducted with the records of 180 patients with breast cancer. Mean age of the study population was 54.2 (± 8.2) years and age ranged from 22 to 78 years. Patients aged more than 45 years were the most frequent age group, 114 cases (63%). The most common tumor site was left side outer quadrant. Among the 180 patients, ER was positive in 80 patients (44.4%) and HER2 neu was positive in 68 patients (37.8%). The majority of ER-positive cases (77.5%) are found in patients older than 45 years, while only 22.5% are in patients aged 45 years or younger. HER2 neu positivity is higher in patients older than 45 years (68%) compared to those aged 45 years or younger (32.4%). HER2 Neu positivity is observed more commonly in older patients, although the age distribution is more skewed compared to ER positivity

Relation between the receptor expression and lymph node metastasis was studied, and it was observed that the tumors which did not express HER2 neu receptor on their surface showed lower potential to metastasis to local lymph nodes. Of the 180 patients, 123 patients (68.3%) were diagnosed to have infiltrating ductal carcinoma, 17 patients (6.9%) with infiltrating lobular carcinoma, 12 patients with ductal carcinoma in-situ and 28 patients with other type.

CONCLUSIONS

Breast cancer is a common and significant health concern, especially for women, and puts a substantial strain on healthcare resources. With lots of development in the field of cancer management, it becomes very important to diagnose the cancer early so that appropriate treatment is started before its spread. The mean age at presentation was 6th decade, with the left outer quadrant being the most common tumor site. Both ER and HER2 Neu Positivity is more common in older patients but less skewed compared to ER positivity. The analysis revealed a significant relationship between HER2 neu expression and the likelihood of lymph node metastasis, with tumors negative for HER2 neu showing a lower propensity for local lymphatic spread. The most prevalent histological type was infiltrating ductal carcinoma, further supporting its dominance in breast cancer presentations. These findings underscore the importance of receptor status and histological type in understanding the metastatic behavior of breast cancer, which can guide treatment strategies and improve patient outcomes.

Table 1: Relation between histological parameter with the age of the patient

	ER positive		HER 2 neu positive	
	Number	Percentage	Positive	Percentage
AGE				
≤ 45 years	18	22.5	22	32.4
> 45 years	62	77.5	46	68
Total	80	100	68	100

Table 2: Relation between ER status and lymph node metastasis.

	Lymph Node		
	Positive	Negetive	Total
ER status			
Positive	48(43.6%)	32 (45.7%)	80 (44.4%)
Negative	62 (56.4%)	38 (54.3%)	100 (55.6%)
HER2 neu status			
Positive	56 (50.9%)	12 (17.1%)	68 (37.8%)
Negative	54 (49.1%)	58 (82.9%)	112 (62.2%)

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