International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

STUDY ON HISTOPATHOLOGICAL CORRELATION WITH RECEPTOR STATUS IN BREAST CARCINOMA IN A TERTIARY CARE HOSPITAL

Dr. Pooja K[1], Dr. Sumathi S[2]

[1] Assistant Professor, Department of Pathology, Melmaruvathur Adhiparasakthi Institute of Medical Sciences, Melmaruvathur - 603319

[2] Professor and head of the department, Department of Pathology, Melmaruvathur Adhiparasakthi Institute of Medical Sciences, Melmaruvathur – 603319

OPEN ACCESS

Corresponding Author:

Dr. Pooja K
Assistant Professor, Department of Pathology, Melmaruvathur Adhiparasakthi Institute of Medical Sciences, Melmaruvathur - 603319.

Received: 10-11-2025
Accepted: 04-12-2025
Available online: 15-12-2025

ABSTRACT

Background: Breast carcinoma is the most common malignant tumour and the leading cause of carcinoma death in women worldwide. Patient management depends on the prognostic markers like age, tumour size, histological type, histological grade, nodal metastasis and also the receptor expression. This study aimed to assess the prognostic and predictive usefulness of receptorexpression and histological grading in malignant breast tumors.

Materials and Methods: The present study was carried out in Department of Pathology at Tertiary care hospital for the period of 1 year & 6 months. All mastectomy specimen were included in the study. Tissues were processed routinely using conventional Haematoxylin & Eosin stain and Immunohistochemical stains for Estrogen receptor(ER), Progesterone receptor(PR) and HER2/neu expression .All Demographic data, Tumor morphology, tumor type, grade, nodal status ,and receptor expression status were statistically analysed using P value for significance.

Results: A total of 40 cases were studied and Infiltrating ductal carcinoma, no special type [IDC NST] was the common histological type (87.5%) and 57.5% cases were Grade II followed by grade III (42.5%) lesions. Necrosis, desmoplasia, lymphovascular invasion (LVI) were significantly more in high grade tumours with a P value of <0.05.ER ,PR ,HER2/neu positivity were observed in 55% ,52.5% , 40% cases respectively.55% of ER/ PR positive cases were of grade II whereas 35% of HER2+ cases were of grade III . All the triple negative tumours (7.5%)were Grade III.Lymph node involvement was seen in 17.5% of ER and PR positive cases and 37.5% of HER2/neu positive cases. 42.5% of the grade III tumours showed nodal metastasis. Histological grade and lymph node involvement in correlation with ER, PR ,HER2/neu were statistically significant (P value <0.05.)

Conclusion: This study concluded that combining histopathology with immunohistochemistry in breast cancer aids in diagnosis and prognostication of disease.

Keywords: *Breast cancer, Hormone receptor, Immunohistochemistry.*

INTRODUCTION

Breast carcinoma is the most common malignant tumour and the second leading cause of carcinoma death in women.[1] It is a heterogeneous disease characterized by various histological and molecular subtypes, which influence prognosis and treatment strategies.[2] Factors like age, tumour size, node metastasis, tumour grade, histological type, hormone receptor & Her2/neu status guides in prognostic and therapeutic management. ER, PR and HER2neu plays crucial role in predicting the response to targeted therapy.[3]

The expression of ER and PR indicates hormone dependent patients with positive receptor status are typically treated with endocrine therapies. HER2/neu expression or amplification is associated with aggressive tumourbehaviour but can

be targeted with specific therapies like trastuzumab monoclonal antibodies [3]. Triple negative breast cancer (TNBC), which lacks ER, PR HER2/neu expression, is associated with a poorer prognosis and limited treatment options.[4]

This study was attempted to analyse the association between ER, PR and HER2/neu status and tumour differentiation in malignant breast lesions for forecasting prognosis and to support evidence based therapeutic guidance.

MATERIAL AND METHODS

The present study was carried out in Department of Pathology at Tertiary care Hospital for a period of 1 year and 6 months after getting clearance from the institutional ethical committee. Patients with histological proven malignant lesion who has undergone mastectomy have been included in the study. Excision and trucut biopsy have been excluded. All fixed specimen in 10% formalin were grossed in detail as per CAP protocol and processed for routine Haematoxylin& Eosin stain. Morphological evaluation of tumour type was done and graded as per the Modified Bloom Richardson's Grading system in which tubule formation, nuclear pleomorphism and mitosis were scored.[5]. Tumour size and grade in relation to the lymph nodal metastasis were also noted.Then Proper sections were selected for IHC (ER, PR and HER2/neu status) analysis.

Immunohistochemistry was done using polymer kit. Deparaffinised sections were heated in warmer followed by antigen retrieval using pressure cooker for 8-10 minutes. Sections were treated with 3% hydrogen peroxide, followed by primary antibody and secondary antibody. Then sections were counterstained with Harris haematoxylin and screened for receptor expression status by Allred scoring system.

Both proportion and intensity were included for ER / PR expression in nucleus and was scored between 0 and 8, 0: (negative) no nuclei staining; 1: (borderline) 1 % of nuclei staining; 2: (positive) 1-10 % of nuclei staining; 3: (positive) 11-33 %; 4: (positive) 34-66 %; 5, 6 & 7: (positive) 100 % of nuclei staining.[5].Expression of HER2/neu in cell membrane was scored between 0 to 3 : 0 (negative): no membranous staining identified, 1 (negative): faint ,incomplete membrane staining involving 10% of positive cells; 2 (positive): weak to moderate but staining of the complete membrane over at least 10% of positive cells; 3(positive): strong positive staining of the complete membrane in more than 20 % of cells.[6]

RESULTS

The study included 40 breast cancer cases and the age of the patients ranged from 32-78 years with the mean age of 52.4. The predominant age group was between 50-60 years (32.5%) followed by 40-50years (27.5%) and 60-70years (22.5%). Only 12.5% cases were between 30-40 years. All cases were females and Postmenopausal status were common (67.5%) with left sided preponderance (65%).

Out of 40 cases, five (12.5%) cases showed tumor size less than 2cm , 24 cases (60%) had size of 2-5cm and 11 cases (27.5%) were more than 5cm tumor size. Among histological tumor typing, 35 cases (87.5%) showed Infiltrating ductal carcinoma, no special type (IDC-NST)and 5% cases were diagnosed as Medullary carcinoma..Only 2.5% cases showed IDC features with focal medullary, mucinous and neuroendocrine morphology each respectively.Grade II Tumour cases were more predominant attributing about 57.5% (23 cases) followed by grade III comprising 42.5% (17 cases) and none of the case showed grade I tumour.**(Figure - 1)**Morphological changes like desmoplasia were evident in ` necrosis in 24 (60%), lymphovascular invasion(LVI) were observed in 21(52.5%),calcification noted in 15(37.5%) cases. Necrosis (42.5%), desmoplasia (35%), LVI (35%) were significantly more in high grade tumours and found to be statistically significant with a P value of <0.05.

Lymphnode involvement was observed in 24 cases (60%) of which 17 cases (42.5%) were in grade III tumors with significant P value(<0.05). Adjacent breast tissue showed additional findings like Fibrocystic disease in 25 cases (62.5%), Atypical ductal hyperplasia in nine cases(22.5%) . There was no statistical significance of these findings with high grade lesions (P-0.489)**(Table-1)**

ER / PR nuclear positivity was observed in 22 cases(55%) and 21cases(52.5%) respectively and HER2 membranous positivity was seen in 16 cases (40%).**(Figure -2,Graph -1).**Triple negative expression was noted in three cases (7.5%) and only one case (2.5%) showed Triple positive expression. Among grading and receptor expression correlation,100% ER positive and 95% PR positive tumors were grade II tumors whereas 87.5% of HER2 positivity was observed in grade III tumors. All Triple negative cases were in Grade III and one Triple positive case identified belonged to grade II.It showed significant association with P value of <0.005..**(Table- 2).**

Among tumor size, Predominent ER/PR+ HER2neu- expression (30%) and ER/PR- HER2neu+ expression (25%) were observed in tumor size between 2-5cm .There was no statistical significance between tumor size and receptor expression (P-0.732).Out of 24 nodal involvement cases, seven cases (17.5%) only showed ER/PR+ HER2neu- whereas 15 cases (37.5%) showed ER/PR-HER2neu+ expression..Lymphnodal involvement and receptor expression correlation was statistically significant (P <0.005)**(Table -3)**

Table 1: Morphological pattern correlation with MBR grading

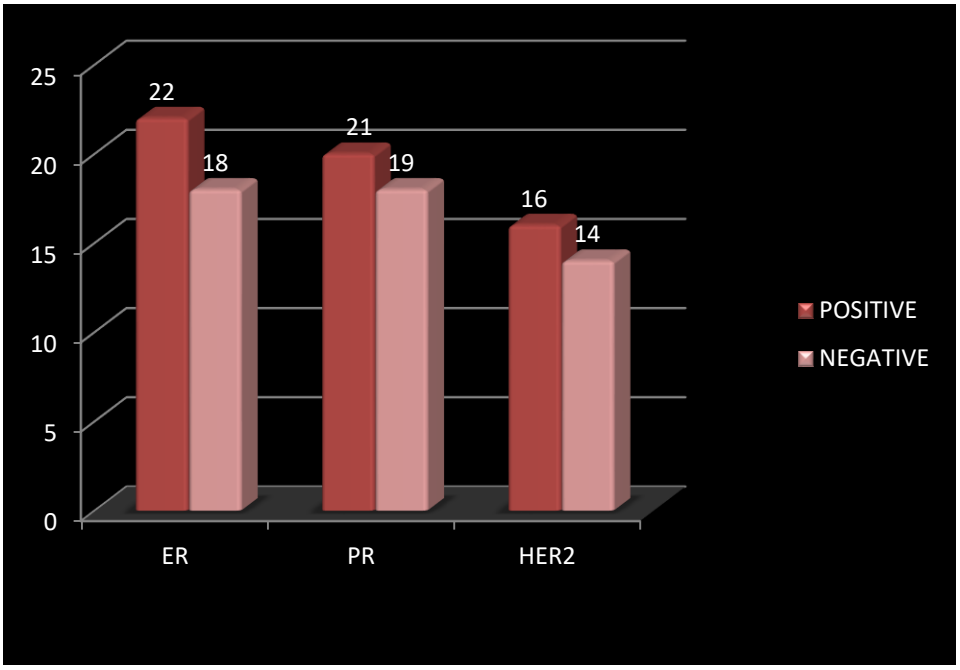
Morphological pattern **Total=40 cases**	**Modified Blood Richardson**			**P Value**
	I	**II** **n=23 cases**	**III** **N=17 cases**	
Histologic type				
IDC NST	0	21 (52.5%)	14(35%)	0.226
IDC+Medullary features	0	0	1(2.5%)	
Medullary Carcinoma	0	0	2(5%)	
IDC+Neuroendocrine features	0	1 (2.5%)	0	
IDC+Mucinous changes	0	1 (2.5%)	0	
Desmoplasia		*12 (30%)* *11(27.5%)*	*14(35%)* *3(7.5%)*	*0.048*
Necrosis	0	*7 (17.5%)* *16 (40%)*	*17(42.5%)* *0*	*<0.05*
Nodal involvement				
Present	0	7(17.5%)	17(42.5%)	<0.05
Absent	0	16 (40%)		
Lymphovascular invasion				
Present	0	7(17.5%)	14(35%)	<0.05
Absent	0	16 (40%)	3(7.5%)	
Adjacent changes				
Fibrocystic change	0	16 (40%)	9(22.5%)	0.489
Atypical ductal hyperplasia	0	5 (12.5%)	4(10%)	

Table 2: Tumour Grade correlation with Receptor expression

Grade	**ER** **n =22**		**PR** **n =22**		**HER2** **n =16**		**ER/PR+ & HER2neu+** **n =1**	**ER/PR- HER2neu-** **n =3**	**P value**
	+	-	+	-	+	-	+	+	
I	0	0	0		0	0	0	0	<0.005
II	22 (100%)	1	21 (95%)	2	2	21	1 (2.5%)	0	
III	0	17	1	16	14 (87.5%)	3	0	3 (7.5%)	

Table 3: Tumor size and lymphnode involvement correlation with Receptor expression

Size & Lymphnode	**ER/PR+ HER2neu-**	**ER/PR+ & HER2neu+**	**ER/PR- HER2neu-**	**ER/PR-& HER2neu+**	**p value**
Tumor Size					
<2	3(7.5%)	-	-	1(2.5%)	
2 – 5	12 (30%)	1(2.5%)	397.5%)	10 (25%)	0.732
>5	7 (17.5%)	-	-	4(10%)	
Lymphnode					
Positive	7 (17.5%)	1(2.5%)	3(7.5%)	15 (37.5%)	<0.005
Negative	15(37.5%)	0	0	1(2.5%)	



Graph I: ER, PR, HER 2neu expression in tumour

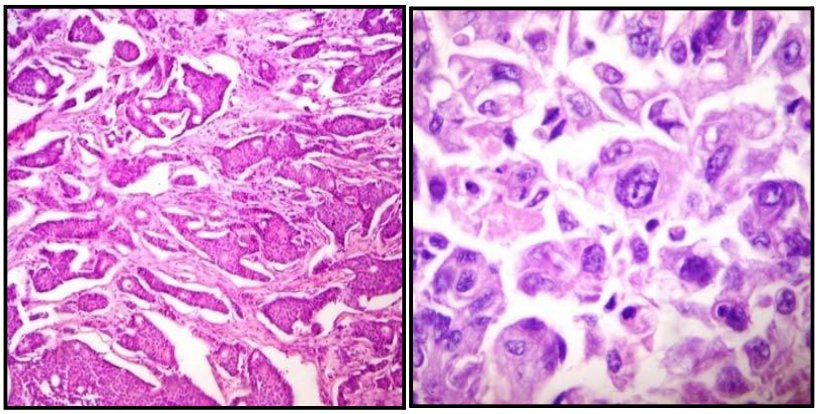


Fig 1: Histological grades based on MRM grading system GradeII, GradeIII (400 H&E)

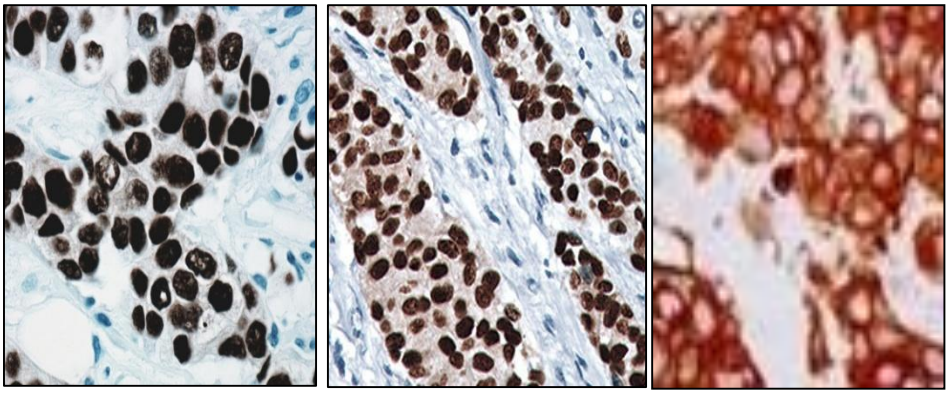


Fig 2: ER, PR, HER2 positivity (400 IHC))

DISCUSSION

The age of patients included in our study ranged from 32 to 78 years, with a mean age of 52.4 years. This was similar to the study done by Thigarajan M et al in which mean age was 51.2.[7] In the present study 60% of the tumour size ranged from 2 -5cm this finding was similar to the study done by Thiygarajan M et al., Azizun-Nisa et al. [7,8] which stated that ER , PR positivity decreases and HER2 positivity increases with tumour size .But in the present study there was no significant changes demonstrated with ER/PR and HER2/neu to size of the tumour which was supported by R. Molina Barrios et al.[9]

The most common histological type was infiltrating ductal carcinoma no special type, constituting 35 cases (87.5%) followed by two cases (5%) of medullary carcinoma. Similar findings were observed by Thiygarajan M et al. (87.5%) and Mushood et al. (90.6%) in their study.

In the present study most of the cases were of grade II (57%) followed by grade III (42.5%)which was similar to the study done by Thiygarajan M et al. In which 51.6% were grade II and 36.8% were grade III. Most of the grade II tumors were ER,PR positive while grade III tumours were HER2 positive. This study revealed that when the grade of the tumour increases the ER,PR positivity decreases and HER2 expression was significantly increased with statistical significance. Similar observations was seen in studies done by Ayadi L et al and Thiygarajan M et al.[7,10] This shows that well differentiated tumours express hormone receptors with decreased expression of HER-2.

Regarding combined receptor expression statusER+,PR+,HER2- was common (50%) followed by ER-PR-,HER2+ (37.5%) which was concordant with the study done by Onitilo AA et al and Rao et al.[11-12].Most of the cases positive for lymph node metastasis in our study (37.5%) were of ER-PR-HER2+ which was statistically significant and similar to other studies as in Daniel N et al.[13].

This explained the association of higher incidence of metastasis and aggressive biologic behaviour with HER-2 over expression.

CONCLUSION

Our study concluded that IDC-NST was the commonest breast malignancy among postmenopausal women and significant correlation was found between the histological changes like desmoplasia, necrosis, lymphnode and vascular involvement with MBR grading .ER, PR expression was predominant in grade II tumours and HER2neu expression was observed in grade III tumours. As the tumour grade progresses HER2neu expression and nodal metastasis were increased.

This study signified the pivotal role of Immunohistochemical marker expression to provide valuable insights for prognostication, treatment guidance, improving outcomes and reducing the burden of breast cancer in the community.

Acknowledgement

I gratefully acknowledge the organization for providing facilities that enabled the successful completion of this study and my sincere thanks to the supporting and technical staff for their invaluable help at every stage of this work.

Source of Funding: None.

Conflict of Interest: None.

REFERENCES

1. Singh M, Kumar J, Omhare A, Mishra V, Kala C. Study on Histopathological Correlation with ER, PR, and HER 2 Neu Receptor Status in Breast Carcinoma and its Prognostic Importance. SSR Inst. Int. J. Life Sci., 2019; 5(1): 2130-2136.
2. Sreeja K. Bhasy, Evelyn Angel, AnishaSaheen, Veer Dinesh, AshwathySenan, Monica Tefilah and Roselin Samuel. Evaluation of ER, PR, HER 2 NEU in Carcinoma Breast at Tertiary Care Centre in Kanyakumari District. Res. J. Med. Sci.,2024. 18: 389-393, doi: 10.36478/makrjms.2024.2.389.393.
3. Tekumalla A, Ragi S, Thota R, Pingle P. Study of Correlation of ER, PR and Her2 neu Status in Breast Carcinomas with Histopathological Grading and other Clinicopathological Prognostic Factors. Ann. Int. Med. Den. Res. 2020; 6(1):PT06-PT12.
4. Wolff, A.C., M.E.H. Hammond, D.G. Hicks, M. Dowsett and L.M. McShane et al.. Recommendations for human epidermal growth factor receptor 2 testing in breast cancer: American society of clinical oncology/college of American pathologists clinical practice guideline update. J. Clin. Oncol.2013. 31: 3997-4013.
5. Rosai J. Breast. In: Rosai and Ackerman's Surgical Pathology. 9th ed. Noida: Reed Elsevier India Private Limited. 2009; vol2 ,pp. 1787-827.
6. Pawan N, Smita P, Dilip T, Shalu C. Study of ER (Estrogen Receptor), PR (Progesterone Receptor) & HER2/NEU (Human Epidermal Growth Factor Receptor) expression by immunohistochemistry in breast carcinoma. Int J Biomed Adv Res. 2014 May;5(6):275-78.
7. Thiygarajan M, Navrathan N, T. M, Kumar A, Singh B. Correlation between estrogen receptor, progesterone receptor, HER-2/neu status and other prognostic factors in carcinoma breast in Indian population. IntSurg J. 2015;2(4):515–22.
8. Azizun-Nisa, Yasmin Bhurgri, Farrukh Raza, Naila Kayani. Comparison of ER, PR & HER-2/neu (C-erb B 2) Reactivity Pattern with Histologic Grade, Tumor Size and Lymph Node Status in Breast Cancer. Asian Pacific J Cancer Prev, 2008;9:553-56.

9. Barrios GRM. HER2/neu incidence in early breast cancer and its correlation with others prognostic factors, Journal of Clinical Oncology 2008;26(15suppl).
10. Ayadi L, Khabir A, Amouri H, Karrays, Dammak A, Guermazi M etal. Correlation of HER-2 over expression with clinicopathological parameters in Tunisian breast carcinoma. World Journal of surgical Oncology 2008;6:112.
11. Onitilo AA, Engel MJ, Greenlee TR, Mukesh NB. Breast Cancer subtypes based on ER/PR and HER-2 expression: Comparison of Clinicopathologic features and survival. Clinical Medicine and Research.2009.7(1/2):4-13.
12. Rao C, Shetty J, Kishan Prasad HL. Morphological profile and receptor status in breast carcinoma: An institutional study. J Can Res Ther 2013;9(1):44-9.
13. Daniel N, Goneppanavar M, Srinivasan S, Vaithy K A. Study of hormone receptor status and HER/2-neu expression in breast malignancies and its implication in molecular subtyping in a tertiary care hospital. Indian J PatholOncol 2020;7(4):537-542.