International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

An Observational Study to Assess Hormone Receptor Status and its Correlation with Age at Diagnosis, Tumor Size, Histological Grade and Lymph Node Metastasis in Breast Cancer

Dr. Saurabh Gupta[1], Dr. Jeevan Kankaria[2]

Department of General Surgery, SMS Hospital, Jaipur, India

Abstract: ***Introduction: The breast has always been the symbol of womanhood and feminity. Breast cancer is the most common female cancer worldwide representing early a quarter (25%) of all cancers with an estimated 1.67 million new cancer cases diagnosed in 2012. After lung cancer, breast cancer is the second leading cause of cancer-related death in women. Aim and Objective: To assess hormone receptor status and its correlation with age at diagnosis, tumor size, histological grade and lymph node Metastasis in Breast Cancer. Material and Methods: This was a Hospital based validational type of observational study conducted during May 2020 to JAN 2022 or till sample size is reached, whichever is earlier at Department of Oncosurgery and General Surgery, SMS Hospital Jaipur. The study included the sample size to be 55 subjects at alfa error 0.05 and study power 80% assuming a proportion of lymph node involved by ER/PR status as ER+/PR+, ER+/PR-, ER-/PR+, ER-/PR-TO BE 53, 94.1, 94.1, 58.4, respectively hence for the study purpose 60 subject will be taken, who went through inclusion and exclusion criteria are included in this study. Result: In this study we analysed Sample size at 55 subjects at alfa error 0.05 and study power 80% assuming a proportion of lymph node involved by ER/PR status as ER+/PR+, ER+/PR-, ER-/PR+, ER-/PR-TO BE 53, 94.1, 94.1, 58.4, respectively hence for the study purpose 60 subject will be taken. Maximum numbers of patients are (45 out of 115) from 41-50 years of Age group. We compared Hormonal receptor status with age at diagnosis, we found that younger patient were less likely to be ER/PR positive as compared to older patients. In less than 40 years old cases 33.3% are ER/PR positive and 56.67% ER/PR negative compared to > 50 years old in which 75.0% cases are ER/PR positive and 17.50% ER/PR negative. Conclusion: The study shows that in palpable lesion the sensitivity and accuracy of CNB is more than FNAC and CNB provide additional information to correctly diagnosis nearly all cancer. Maximum numbers were in the age group of41-50 years. The left sided breast is more commonly involved (60.0%) than right (40.0%) in our study. The upper outer quadrant was most. Commonly involved (69.5%). We compared ER/PR positivity with age at diagnosis and found that younger patient were less likely to be ER/PR positive as compared to older patients.***

Keywords: hormone receptor, lymph node metastasis

1. Introduction

The breast has always been the symbol of womanhood and feminity. The breast is man's insignia of membership in the class Mammalia. It on one hand is capable of producing the most precious gift of life to the young one, milk and on the other hand it is notorious of giving rise to multitude of pathological conditions causing significant morbidity and mortality and the epitome of all the diseases related to breast is the cancer of breast which is responsible for most of it.

Breast cancer is the most common female cancer worldwide representing early a quarter (25%) of all cancers with an estimated 1.67 million new cancer cases diagnosed in 2012. Women from less developed regions (883 000 cases) have slightly more number of cases compared to more developed (794 000) regions

After lung cancer, breast cancer is the second leading cause of cancer-related death in women, accounting for 12% of cancer-related deaths. (CA Cancer J Clin.2017; 67) [1]

Malignancies of the breast form the sixth most common site of carcinoma in both sexes combined (i. e., 8.47% of all malignancies). In females, it is the most common site of malignancy (20.44%), whereas in males it constitutes only 0.19%. (Sharma R G et al 2009) [2]

In India, although age adjusted incidence rate of breast cancer is lower (25.8 per 100 000) than United Kingdom (95 per 100 000) but mortality is at par (12.7 vs 17.1 per 100 000) with United Kingdom. (Gupta A et al 2015) [3]. According to Globocan 2012, India along with United States and China collectively accounts for almost one third of the global breast cancer burden. India is facing challenging situation due to 11.54% increases in incidence and 13.82% increase in mortality due to breast cancer during 2008-2012. (Ferlay J et al 2010). Breast cancer in India varies from as low as 5 per 100, 000 female population per year in rural areas to 30 per 100, 000 female population per year in urban areas. (National Cancer Registry Programme, ICMR: Consolidated report of Hospital Based Registries 2004-2006) [4]

For Indian women with operable breast cancer who received standard multimodal treatment in the control arm of a recently published large randomized clinical trial from Tata Memorial Hospital (TMH), the 5 year disease free survival (DFS) rate of 70% and overall survival rate of 78% was reported. (Badwe R et al 2011) [5].

The aim of this study was to determine the correlation of expression of these receptors with various pathological parameters like tumor size, tumor grade, lymph node status, age of the patient at the time of presentation of disease.

2. Material and Method

This was an Hospital based validational type of observational study conducted during May 2020 to JAN 2022 or till sample size is reached, whichever is earlier at Department of Oncosurgery and General Surgery, SMS Hospital Jaipur. The study included Sample size at 55 subject at alfa error 0.05 and study power 80% assuming a proportion of lymph node involved by ER/PR status as ER+/PR+, ER+/PR-, ER-/PR+, ER-/PR-TO BE 53, 94.1, 94.1, 58.4, respectively hence for the study purpose 60 subject will be taken, who went through inclusion and exclusion criteria are included in this study.

Inclusion criteria:-Histopathologically proven operable breast carcinoma undergoing MRM / BCS. Those patients who have given consent for the study.

Exclusion criteria:-1. Post chemotherapy and radiotherapy breast carcinoma**2.** Metastatic Breast Carcinoma.

3. Results

In this study we analysed Sample size at 55 subject at alfa error 0.05 and study power 80% assuming a proportion of lymph node involved by ER/PR status as ER+/PR+, ER+/PR-, ER-/PR+, ER-/PR-TO BE 53, 94.1, 94.1, 58.4, respectively hence for the study purpose 60 subject will be taken. Maximum number of patients are (45 out of 115) from 41-50 years of Age group. We compared Hormonal receptor status with age at diagnosis, we found that younger patient were less likely to be ER/PR positive as compared to older patients.

Table 1: Relation of Hormonal Receptor status to Age in Breast cancer

Age	No. of Cases	ER+/PR+	ER+/PR-	ER-/PR+	ER-/PR-
<40	30	10 (33.3)	2 (6.7)	1 (3.33)	17 (56.67)
41-50	45	26 (57.7)	2 (4.4)	1 (2.22)	16 (35.56)
>50	40	30 (75.0)	3 (7.5)	0 (0)	7 (17.50)
	115	65 (56.5)	7 (6.1)	2 (1.74.)	40 (34.78)

P value = 0.02

In less than 40 years old cases 33.3% are ER/PR positive and 56.67% ER/PR negative compared to > 50 years old in which 75.0% cases are ER/PR positive and 17.50% ER/PR negative.

Table 2: Relation of Hormonal Receptor status to Size of Tumor in Breast cancer

Size of Tumour	No. of Cases	ER+/PR+	ER+/PR-	ER-/PR+	ER-/PR-
1-19mm	25	20 (80.0)	0 (0)	0 (0)	5 (20.0)
20-50mm	71	37 (52.1)	7 (9.86)	2 (2.8)	25 (35.2)
>50 mm	19	8 (42.1)	0 (0)	0 (0)	10 (57.8)
	115	66	7	2	40

P value = 0.038

Table shows that patient with smaller tumor size were more likely to be ER/PR positive as compared to patient with larger tumor size.80% cases were ER/PR positive in group of patients having tumor size less than 2 cm compared to 42.11 % in tumor size more than 5 cm.20% cases were ER/PR negative in group of patients having tumor size less than 2 cm compared to 57.89% in tumor size more than 5cm. Hormonal receptor positivity is inversely proportional to increasing age which is statistically significant.

Table shows that patient with lower tumor grade were more likely to be ER/PR positive as compared to patients with higher tumor grade.87.5 % cases were ER/PR positive in grade I tumor compared to 45.33% cases in grade 111.12.5% cases were ER/PR negative in grade I compared to 45.33% in grade III. This difference is statistically significant.70.6% cases were ER/PR positive in negative axillary lymph node group as compared to 67.7 % in 1-3 lymph nodes positive group, 42.4% in 4-9 lymph nodes positive group and 35.7% in more than 9 lymph nodes positive group.

Table 3: Relation of Hormonal Receptor status to Grade of Tumor in Breast Cancer

Size of Tumour	No. of Cases	ER+/PR+	ER+/PR-	ER-/PR+	ER-/PR-
I	8	7 (87.5)	0 (0)	0 (0)	1 (12.5)
II	32	25 (78.1)	2 (6.2)	0 (0)	5 (15.6)
III	75	34 (45.3)	5 (6.6)	2 (2.6)	34 (45.3)
	115	66 (57.3)	7 (6.0)	2 (2.0)	40 (34.7)

P value = 0.029

Table shows that patient with lower tumor grade were more likely to be ER/PR positive as compared to patients with higher tumor grade.87.5 % cases were ER/PR positive in grade I tumor compared to 45.33% cases in grade 111.12.5% cases were ER/PR negative in grade I compared to 45.33% in grade III. This difference is statistically significant.

Maximum number of women presented with painless lump (80.8%) as their chief complain which is followed by painful lump (19.1%), nipple discharge (12.1%) and ulcer (0.89%).

Painless lump was most common presentation in all ER/PR +ve (77.2%), ER+/PR-ve (71.4%), ER-/PR+ve (50%), ER-/PR —ve (90.0%) groups. [eft sided breast is more commonly involved (60.0%) as compared to right (40.0%). Left breast is more common in all hormonal receptors er+/pr +ve,, er+/pr-ve, er-ve/pr+ve groups which is 59.09%, 50.0%, 65.0% respectively.

Table3: Relation of Hormonal Receptor status to No of Positive Lymph Node in Breast Cancer

No. of Lymp Nodes	No. of Cases	ER+/PR+	ER+/PR-	ER-/PR+	ER-/PR-
0	37	26 (70.2)	3 (8.1)	0 (0)	1 (12.5)
1 to 3	31	21 (67.7)	1 (3.2)	0 (0)	5 (15.6)
3 to 9	33	14 (42.4)	3 (9.0)	2 (2.6)	34 (45.3)
>9	14	5 (35.7)	0 (0)	0 (0)	9 (64.2)
	115	66 (57.3)	7 (6.0)	2 (2.0)	40 (34.7)

P value = 0.045

Table shows that patient with less number of positive lymph nodes were more likely to be ER/PR positive as compared to patient with more number of positive lymph nodes.70.6% cases were ER/PR positive in negative axillary lymph node group as compared to 67.7 % in 1-3 lymph nodes positive group, 42.4% in 4-9 lymph nodes positive group and 35.7% in more than 9 lymph nodes positive group. Hormonal

receptor positivity is inversely proportional to number of positive lymph nodes which is statistically significant.

Infiltrating duct carcinoma (IDC) is the predominant morphological category. IDC NOS (Not otherwise specified) subtype was found in 80.2% cases followed by IDC comedo subtype in 19.8% cases.25.7% cases are PNI positive in ER/PR positive tumor as compared with 57.50% in ER/PR negative tumor. Hormonal receptor positivity is inversely proportional to PNI which is statistically significant

Table 4: Relation of Hormonal Receptor status to pre of histopathological diagnosis

Pre op histopathological diagnosis			
Harmonal Status	No. of Cases	FNAC	CORE Needle
ER+/PR+	66	53 (80.3)	65 (98.4)
ER+/PR-	7	5 (71.4)	7 (100.0)
ER+/PR+	2	1 (50.0)	2 (100.0)
ER+/PR-	40	34 (85.0)	38 (95.0)

Table shows that 80.25% cases were diagnosed by fine needle aspiration cytology (FNAC), whereas 97.3% cases were confirmed on core needle biopsy (CNB). In all groups ER/PR +ve, ER+/PR-ve, ER-/PR+ve, ER-/PR —ye the accuracy of FNAC vs CNB were (80.3 vs 98.4), (71.3vs 100), (50vs100) and (85vs 95) respectively. So that in palpable lesion the sensitivity and accuracy of CNB is more than FNAC.

66.7% cases have hyperechoic lesion boundaries in ER/PR positive tumor as compared to 35% cases in ER/PR negative tumor.33% cases have abrupt lesion boundaries in ER/PR positive tumor compared to 65% in ER/PR negative tumor. So we conclude that most of ER/PR —ye tumor have abrupt lesion boundaries. Relationship between Hormonal receptor status and lesion boundaries had statistically significant value. ER/PR —ve tumor have more commonly oval and round shape in USG.45.0% cases are oval and round shape in ER/PR negative tumor as compared to 10.6 % in ER/PR positive tumor and 84.8% cases have irregular shape in ER/PR positive tumor as compared to 42.5% in ER/PR negative tumor. These differences are statistically significant.

4. Discussion

The study entitled 'comparative study of Estrogen Receptor and Progesterone Receptor in Breast carcinoma in relation to Age, Histological Grade, Size of lesion and Lymph node involvement' was conducted in the Department of General Surgery and Surgical Oncology, SMS Medical College, Jaipur during year 2016-2017.

The aggressive biological behavior of invasive and metastatic cancer is considered to be the most insidious and life threating aspect for breast cancer patients.

ER+/PR— tumors were similar to those for ER+/PR+ tumors. Similarly, the rate of increase in incidence with age for ER—/PR+ tumors were similar to that for ER—/PR— tumors.

Age

The mean age in our study was 49.8 years and median age was 49. Maximum number of patients were in the age group of 41-50. This is compatible with thestudy done by Kulkarni B. B. et al (2012) [6] in which mean age was 49.1 year and median age was 48 and maximum number of patients were in the age group 41-50 years. Average age of occurrence of breast cancer in western female has been reported to be 61 years. (Parkin DM 2002) [7]. The average age of occurrence reveals the disease occurrence in India is a decade earlier, as compared to western countries (Stead et al., 2009) [8]; (Sandhu et al 2010) [9].

Histology

Histology as a prognostic factor has been well documented. Infiltrating duct carcinoma (IDC) was the predominant morphological category with IDC NOS (Not otherwise specified) 80.2% cases, IDC comedo 19.8 % cases in our study. Results are similar with findings reported by the Ellis et al 200398 Louwman et al 2007[10].

Tumor Grade

When ER/PR positivity was compared with tumor grades, we found that patient with lower tumor grade were more likely to be ER/PR positive as compared to patients with higher grade tumor. In our study 87.5 % cases were ER/PR positive in grade I tumor compared to 45.33% cases were grade III.12.5% cases were ER/PR negative in grade I compared to 45.33% in grade III. These results agreed with result of studies done by Sushan SS 2013[11] Javeria Iqbal 2014[12].

Lymph Node

When we compared ER/PR positivity with positive axillary lymph nodes, we found that patient with lesser number of positive nodes were more likely to be ER/PR positive as compared to patient with more number of positive lymph nodes. In our study, 70.6% cases were ER/PR positive in negative axillary lymph node tumor compared to 67.7 % in 1-3 lymph node positive, 42.4% in 4-9 lymph node positive and 35.7% in more than 9 lymph node positive tumor.21.6% cases were ER/PR negative in negative axillary lymph node tumor compared to 29.03% in 1-3 lymph node positive, 42.4% in 4-9 lymph node positive and 64.2% in more than 9 lymph node positive tumor. These results agree with result of the studies conducted by Amrut V. et al 2011[13] Ahmed et a1.2011[14].

5. Summary and Conclusion

The study shows that in palpable lesion the sensitivity and accuracy of CNB is more than FNAC and CNB provide additional information to correctly diagnosis nearly all cancer. The mean age of presentation of breast cancer in our study was 49.8 years and median age was 49. Maximum numbers were in the age group of 41-50 years. The left sided breast is more commonly involved (60.0%) than right (40.0%) in our study. The upper outer quadrant was most. commonly involved (69.5%). We compared ER/PR positivity with age at diagnosis and found that younger patient were less likely to be ER/PR positive as compared to older patients.

References

[1] CA Cancer J Clin.2017; 67 (1): 7-30 (ISSN: 1542-4863) Siegel RL; Miller KD; Jemal A.
[2] RG Sharma, R Kumar, S Jain, S Jhajhria, N Gupta, SK Gupta, S Rawtani, K Kohli, L Prajapati, R Gupta, N Swamy, D Pathak, H Verma, SS Ratnawat Department of Surgery, SMS Medical College Hospital & Rajasthan Cancer Society, Jaipur, India. Distribution of malignant neoplasms reported at different pathology centers and hospitals in Jaipur, Rajasthan
[3] Gupta A, Shridhar K, Dhillon PK. A review of breast cancer awareness among women in India: cancer literate or awareness deficit? Eur J Cancer 2015; 51: 2058-66.
[4] National Cancer Registry Programme, ICMR: Consolidated report of Hospital Based Registries 2004-2006.)
[5] Badwe R et al 2011) '°, Hawaldar R, Parmar V et al. Single-injection depot progesterone before surgery and survival in women with operable breast cancer: a randomized controlled trial. J Clin Oncol 2011; 29: 2845-2851
[6] Kulkarni B. B., Hiremath S. V. et al. Decade of breast cancer-Trends in patients Profile Attending tertiary Cancer Care Center in South India. Asian J of Epidemiology 5 (4): 103-113, 2012
[7] Parkin DM, Bray F, Ferlay J, et al. Estimating the world cancer burden. Globocan international J. Cancer 2001; 94: 153-156.
[8] Stead LA, Lash TL, Sobieraj JE, et al. Triple-negative breast cancers are increased in black women regardless of age or body mass index. Breast Cancer Res 2009; 11: R18.
[9] Sandhu DS, Sandhu S, Karwasra RK, Marwah S. Profile of breast cancer patients at a tertiary care hospital in north India. Indian J Cancer 2010; 47: 16-22.
[10] Louwman M. W., Vriezen M., van Beek M. W., Nolthenius-Puylaert M. C., van der Sangen M. J., Roumen R. M., Kiemeney L. A., Coebergh J. W., 2007. Uncommon breast tumors in perspective: incidence, treatment and survival in the Netherlands. Int. J. Cancer.
[11] Shushan SJ., Kusuma V., Geethamani V. Immunohistochemistry for ER/PR and HER-2/neu in breast carcinoma-their interrelationship and association with histopathological grading and clinical parameters. Inter J of med and applied sci.2013; 2: 107-17
[12] King Fahad Medical City, Riyadh Javeria Iqbal, Mohammad Abukhatir, Alam Ara Shafi, Ghadah M. Alyahya, Bandar N. Alharthi Pak Hormone receptor status of breast cancer in patients of different age groups, lymph node status, histological type and tumor grade, an experience at J Surg 2014; 30 (4): 296-300
[13] Amrut V. Ashturkar, N1 Gayatri S. Pathak, ' Sanjay D. Deshmukh, ' and Harshal T. Pandave Factors Predicting the Axillary Lymph Node Metastasis in Breast Cancer: Is Axillary Node Clearance Indicated in Every Breast Cancer Patient?Factors Predicting the Axillary Lymphnode Metastases in Breast Cancer. Indian J Surg.2011 Oct; 73 (5): 331-335
[14] Women Hussain Gadelkarim Ahmedl, *, Mohammed Ali Al-Adhraei2 and Abdullah Kasim Al-Thobhani3. Correlations of Hormone Receptors (ER and PR), Her2/neu and p53 Expression in Breast Ductal Carcinoma Among Yemeni.