

## Original Research Article

# Study of ER PR receptors in breast carcinoma: a study of 30 cases

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**Received:** 25 August 2018

**Accepted:** 28 September 2018

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### ABSTRACT

**Background:** Estrogen and Progesterone receptors are found in breast cancer cells that depend on estrogen and related hormones to grow. These are steroidal nuclear type of receptors. The most common method currently used to test a tumor for estrogen and progesterone receptors is immunohistochemistry or IHC. Patients with positive hormone receptor cancer have better survival. They are candidates of anti-hormonal therapy.

**Methods:** This is a retrospective study was carried out in the Department of Surgery of a tertiary care hospital, affiliated to Government Medical College. This is a retrospective study in which 30 randomly selected case records of breast cancer patients, who presented in the period between 2011 to 2016, and who had undergone surgery, were taken and studied in terms of history, examination, investigations, treatment given, histopathology report and development of recurrence, metastasis and survival.

**Results:** In this study out of 30 patients, 25 patients received adjuvant chemotherapy. 2 patients developed recurrence at local site. 1 patient was ER/PR both negative and 1 patient was ER +/PR-. 3 patients developed metastasis. Among these, 2 patients were ER/PR both negative and 1 patient was having ER/PR both positive.

**Conclusions:** Hormone receptors play a significant role in breast carcinoma. Breast cancer is more common in postmenopausal group as compared to premenopausal group. Mean age at diagnosis of breast cancer in western countries is 61 years and in India it is 50 years.

**Keywords:** Carcinoma breast, Estrogen receptor, Progesterone receptor

## INTRODUCTION

Breast cancer is the most common female cancer in the world with an estimated 1.67 million new cancer cases diagnosed in 2012. With an annual incidence of approximately 1,44,000 new cases of breast cancers in India, it has now become the most common female cancer in urban India. In India, the incidence of breast cancer is significantly lower than western countries. Breast cancer in India varies from as low as 5 per 100,000 female populations per year in rural areas to 30 per 100,000 female populations per year in urban areas.<sup>1</sup> A cancer is called estrogen-receptor-positive (or ER+) if it has receptors for estrogen. This suggests that the cancer

cells, like normal breast cells, may receive signals from estrogen that could promote their growth. The cancer is progesterone-receptor-positive (PR+) if it has progesterone receptors. Again, this means that the cancer cells may receive signals from progesterone that could promote their growth. Roughly two out of every three breast cancers test positive for hormone receptors.<sup>2</sup>

## METHODS

This study was carried out in the Department of Surgery of a tertiary care hospital, affiliated to Government Medical College. This is a retrospective study in which 30 randomly selected case records of breast cancer

patients, who presented in the period between 2011 to 2016, and who had undergone surgery, were taken and studied in terms of history, examination, investigations, treatment given, histopathology report and development of recurrence, metastasis and survival. These 30 patients were divided according to ER/PR status in 4 groups that is ER+PR+ / ER+PR- / ER-PR+ / ER-PR-.

These 4 groups were compared in terms of breast cancer epidemiology, clinical features, stage, histopathology report, treatment given, and development of recurrence, metastasis and survival duration.

### Inclusion Criteria

All females having carcinoma breast who underwent surgery at least 1 year before, with known hormonal receptor status and who had taken chemotherapy/radiotherapy / hormonal therapy or combined therapy.

### Exclusion criteria

- Females age less than 20 years.
- Females with breast cancer but unknown hormonal receptor status.
- Females with breast cancer with metastasis.

## RESULTS

In this study on ER PR receptor in breast carcinoma, 30 cases records of breast cancer patients were taken. In this study 6 patients were < 40-year age, 14 patient in between 41 to 50 year and 10 patient having more than 51 years, so that the maximum number of patients of breast cancer were in age group of 41-49 years and next, more than 49 years in this study.

**Table 1: Stage of breast cancer and number of patients.**

Stage of carcinoma	Number of patient	Percentage
Early invasive	24	80
Loco-regionally advanced	6	20
Metastasis	0	0
Total	30	100

11 patients were pre-menopausal, and 19 patients were post-menopausal. In this study breast carcinoma was more in Postmenopausal female as compared to Premenopausal females.

Out of 30 patients 25 patients having breast lump size 2-5 cm, 1 patient <2 cm in size and 4 patients had >5 cm size. Among the studied patient of breast carcinoma, majority of the patient were having breast lump of size in between 2-5cm.

In this study, 25 patients were having breast lump located in upper outer quadrant of the breast followed by 4 patients having lower inner quadrant. Among the patient presenting with breast lump, majority of the patients were diagnosed to have early invasive breast carcinoma, followed by loco regionally advanced breast carcinoma in this study (Table 1).

**Table 2: Type of breast carcinoma and number of patients.**

Type of carcinoma	No. of patients	Percentage
Infiltrating ductal carcinoma	30	100
Other type	0	0
Total	30	100

Table 2 shows all the patients of breast cancer in this study were having infiltrating ductal carcinoma.

**Table 3: Histological grade of breast cancer and number of patients.**

Histological grade	No. of patients	Percentage
1	2	7
2	26	86
3	2	7
Total	30	100

This Table 3 reveals that among the studied group of breast carcinoma, majority of patients were having histological grade 2 carcinoma.

**Table 4: Hormonal status and number of patients of breast cancer.**

Hormonal status	No. of patients	Percentage
ER/PR (+/+)	15	50
ER/PR (+/-)	1	3
ER/PR (-/+)	1	3
ER/PR (-/-)	13	44
Total	30	100

In this study most patients were having either hormone receptor positive or both negative (Table 4).

**Table 5: Herceptin-2neu and number of patients of breast cancer.**

Herceptin-2neu	No. of patients	Percentage
Her-2neu (+)	14	53
Her-2neu (-)	16	47
Total	30	100

Table 5 shows Herceptin-2neu receptor positivity was slightly more in this study.

**Table 6: Type of treatment given and number of patients of breast cancer.**

Treatment	No. of patients
Chemotherapy	29
Radiotherapy	30
Hormonal therapy	16
Neoadjuvant	5

In this study almost all patients received chemo and radiotherapy after surgery and some patients received hormonal therapy according to ER/PR status and few patients also received neoadjuvant therapy for down staging (Table 6).

**Table 7: Metastasis and number of patients of breast cancer.**

Metastasis	Number of patient	Percentage
Present	3	10
Absent	27	90
Total	30	100

Table 7 shows most of the patients did not develop metastasis after treatment in this study.

**Table 8: Survival duration and number of patients of breast cancer.**

Survival duration	No. of patients	Percentage
Survival >12 months	27	90
Survival <12 months	3	10
Total	30	100

Table 8 shows that most patients were having survival more than 12 months in this study. At the time of completion of study all remaining 27 patients were surviving and the duration ranged from 1 year to 5 years depending on the date of enrolment of study.

## DISCUSSION

Breast cancer is one of the most common malignancies among women in most developed and developing countries of the world with nearly a million new cases reported each year. It accounts for nearly 21% of all cancers among women worldwide. As in the rest of the world, India too has been witnessing a surge in the incidence of female breast cancer, and it is now the most common cancer of women in many parts of India<sup>3</sup>.

In this study all the data of 30 patients of breast cancer has been tabulated and compared with similar type of study done in other institutions. Various studies which have been compared with this study are as follows:

The mean age at presentation of female breast carcinoma in the present study is 46.8 years which is a decade earlier

compared to patients from West. The average age at diagnosis of breast carcinoma in the US is 61 years.<sup>4,5</sup>

Most of patients in the study population are post-menopausal age group and they are also more, hormone receptor positive. Most patients in this study presented with painless breast lump in upper outer quadrant followed by painful lump followed by nipple discharge. In various studies conducted on carcinoma breast, cases were divided according to size of the lesion as cases with lesion size less than 2 cm, cases with lesion size between 2 to 5 cm and those with lesion size more than 5 cm. In the present study most, patients were having lump size between 2 to 5cm. Study shows upper outer quadrant was most common quadrant involved in breast cancer. According to Bailey and Loves, Short practice of surgery, Upper outer quadrant is involved in 60%, upper inner 12%, lower outer 10%, lower inner 6% and central 12%.<sup>6</sup>

Most patients presented in this study were stage II cancer followed by stage III. The reason for late presentation may possibly be due to low socioeconomic status and lack of awareness regarding the disease. There was no significant difference between patients having any stage of cancer according to hormone receptor status. Most of the patients in various studies were having stage 2 and 3 breast cancer (Table 9).

**Table 9: Comparison of stages in different studies.**

Studies	Alsaed <sup>7</sup>	Dhafir al azawi <sup>8</sup>	Hiba <sup>9</sup>	Present study
Stage	% of cases	% of cases	% of cases	% of cases
1	18.75	-	16.67	0
2	41.96	15	66.67	83.33
3	39.2	82.1	16.67	16.66

In this study all patients were having invasive ductal carcinoma-not otherwise specified (NOS) type. Various studies like Alsaed, Daniele, Dhafir Al-Azawi, Gion also showed that majority of cases of carcinoma breast were Invasive ductal carcinoma-NOS type (Table 10).

**Table 10: Comparison of the histological types of carcinoma breast patients.**

Studies	Invasive ductal carcinoma	Invasive lobular carcinoma	Other
Alsaed <sup>7</sup>	84.8%	5.4%	10.8%
DhafirAl-Azawi <sup>8</sup>	83.5%	10.9%	5.6%
Daniele <sup>9</sup>	86.3%	4.9%	8.8%
Gion <sup>10</sup>	88.3%	6.6%	5.1%
Present study	100%	0	0

These various studies show that maximum number of patients were having grade 2 and they were also hormone receptor positive (Table 11).

**Table 11: Comparison of histopathological grade and ER/PR positivity with other studies.**

Studies		Histopathological grade		
		Well (1)	Moderate (2)	Poor (3)
Dutta et al <sup>11</sup>	Total	8	57	10
	Er/pr +ve	04 (50%)	08 (4.03%)	
Bhagat et al <sup>12</sup>	Total	16	25	17
	Er/pr +ve	08 (50%)	04 (16%)	
Azizun et al <sup>13</sup>	Total	10	83	57
	Er/pr +ve	07 (70%)	40 (48.2%)	
Swati sharma <sup>14</sup>	Total	22	62	16
	Er/pr +ve	21 (95.4%)	42 (67.7%)	
Gulam Nabi <sup>15</sup>	Total	7	45	40
	Er/pr +ve	5 (71.4%)	29 (69.4%)	
Present study	Total	2	26	2
	Er/pr +ve	1 (50.00%)	13 (50.00%)	

In this study receptor status was available in 30 cases of which 56.66% were ER and PR receptor positive and 43.33% were ER and PR negative. These studies show most breast cancers were ER receptor positive (Table 12).

**Table 12: Comparison of Estrogen receptor finding with other studies.**

Study	No of cases	ER positive	ER negative
Dutta et al <sup>11</sup>	75	52 (70%)	23 (30%)
Bhagat et al <sup>12</sup>	58	28 (48.27%)	30 (51.72%)
Azizun et al <sup>13</sup>	150	49 (32.7%)	101 (67.3)
Lal et al <sup>16</sup>	3655	2691 (73.65%)	964 (26.35)
Sheth et al <sup>17</sup>	11780	6349 (53.9%)	5431 (46.1)
Allemani et al <sup>18</sup>	4473	1222 (52%)	1224 (48%)
Naeem et al <sup>19</sup>	24	11 (45.8%)	13 (54.2%)
Present study	30	16 (53.33)	14 (46.6%)

In present study PR positivity was more than all the studies for comparison (Table 13). In present study Herceptin-2 neu positivity was more than almost all the studies for comparison (Table 14).

**Table 13: Comparison of PR hormone receptor status with other studies.**

Studies	No. of cases	PR positive	PR negative
Dutta et al <sup>11</sup>	75	41 (55%)	34 (45%)
Bhagat et al <sup>12</sup>	58	22 (37.93%)	36 (62.06%)
Azizun et al <sup>13</sup>	150	40 (25.3%)	110 (74.7)
Lal et al <sup>16</sup>	3655	1777 (48.62%)	1878 (51.38%)
Sheth et al <sup>17</sup>	11780	6349 (53.9%)	5431 (46.1%)
Allemani et al <sup>18</sup>	4473	1091 (47%)	1255 (53%)
Naeem et al <sup>19</sup>	24	12 (50%)	12 (50%)
Present study	30	16 (53.3%)	14 (46.6%)

### Chemotherapy

In this study out of 30 patients, 5 patients received neoadjuvant chemotherapy, 25 patients received adjuvant chemotherapy. Most patients received either CAF or AC followed by TAXANES (paclitaxel/docitaxel). Chemotherapy was not related with hormone receptor status.

### Metastasis

In this study of 30 patients, 3 patients developed metastasis. Among these, 2 patients were ER/PR both negative and 1 patient was having ER/PR both positive. There is no relation among hormone receptor status and development of metastasis.

**Table 14: Comparison of HER-2/neu findings with other studies.**

Study	No. of cases	HER-2 positive	HER-2 negative
Dutta et al <sup>11</sup>	75	43 (57.33%)	32 (43.77%)
Bhagat et al <sup>12</sup>	58	16 (27.58%)	42 (72.42%)
Azizun et al <sup>13</sup>	150	37 (24.7%)	113 (75.3)
Lal et al <sup>16</sup>	3655	572 (15.65%)	3083 (84.35%)
Allemanu et al <sup>18</sup>	4473	1091 (47%)	1255 (53%)
Naeem et al <sup>19</sup>	24	11 (45.9%)	13 (54.1%)
Present study	30	16 (53.33%)	14 (46.66%)

### Hormone receptor and survival

Survival was less in hormonal receptor negative patients as compared to hormone receptor positive patient in present study.

Similar was seen in study of 'Hormone receptor status, tumor characteristics, and prognosis: a prospective cohort of breast cancer patients' done by Department of Epidemiology, University of Washington, USA and Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, USA, in which women with ER+/PR-, ER-/PR+, or ER-/PR- tumors experienced higher risks of mortality as compared to women with ER+/PR+ tumors, which were largely independent of the various demographic and clinical tumor characteristics.<sup>20</sup>

In one more study by Williams MR, et al, the contribution of ER status to survival has been examined in those patients responding to therapy and compared to those progressing despite treatment. It was seen that in the latter group no significant difference existed between those patients with ER-positive and those with ER-negative tumours.

However, in patients assessed as responding to therapy a significant difference did occur between these two groups. Patients assessed as responding to therapy with ER-positive tumours had a significant survival advantage over the small number of responding patients with ER-negative Primary tumours.<sup>21</sup>

## CONCLUSION

Most of the patients of breast cancer in India present a decade earlier as compared to western country. Mean age at diagnosis of breast cancer in western countries is 61 years and in India it is 50 years. Breast cancer is more common in postmenopausal group as compared to premenopausal group. Most patients of breast cancer come with complaint of painless breast lump followed by breast pain and nipple discharge. Most of patients in India are diagnosed when patients have early invasive cancer followed by locally advanced cancer.

Most common type of breast carcinoma is infiltrating ductal carcinoma - NOS. Most patients have lymph node positivity and histological grade 2 in histopathological report. About 60-65% all breast cancer are hormone receptor positive and remaining are hormone receptor negative. Postmenopausal women have higher hormone receptor positivity. Proportion of lymph node positivity and histological grade 2 is high in hormone receptor positive group. Most patients receive chemotherapy and radiotherapy after surgery followed by hormonal therapy according to hormone receptor status. Neoadjuvant chemotherapy can be given for down staging of locally-advanced breast cancer. Most common chemotherapy regime is Cyclophosphamide + Adriamycin +5-Fluorouracil or Adriamycin+Cyclophosphamide followed by Paclitaxel/Docetaxel as chemotherapy. Hormone receptor negative patients have high risk of recurrence.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Patel HR, Shrimal A, Trivedi HP. Study of ER PR receptors in breast carcinoma. *Int Surg J* 2018;5:3738-43.