

Original Research Article

Analytic study of hormone receptor status of breast cancer patients visiting in a tertiary care hospital of North-West India

Vikas Kakkar, Arvind Kaushal*, Swaraj Hanspal, Karanvir Singh,
Anmol Randhawa, Harpreet Kaur

Department of Surgery, SGRD Institute of Medical Sciences and Research, Vallah, Sri Amritsar, Punjab, India

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*Correspondence:

Dr. Arvind Kaushal,

E-mail: dr.arvindkaushal@gmail.com

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ABSTRACT

Background: Increasing evidence shows the importance of young age, estrogen receptor (ER), progesterone receptor (PR) status, and HER-2 expression in patients with breast cancers. Breast tumors in younger age groups were more likely to be of higher grade, hormone receptor– negative, poorly differentiated, and aneuploid, and to have high S-phase fraction, abnormal expression of P53, greater extent of lymphovascular invasion, and over-expression of human epidermal growth factor receptor 2 (HER-2) than breast tumors in older age groups.

Methods: We organised a retrospective study of 600 women diagnosed with breast cancer, who have been operated from 2016 to 2020. We evaluated age, size, hormone receptor status, HER-2 receptor status. Estrogen receptor and progesterone receptor status were evaluated by immunohistochemistry.

Results: Total 600 patient data was evaluated in this study. Rate of hormone positivity is more in older patients than in younger patients.

Conclusions: In this study we conclude that the hormone positivity in younger patient is less as compared to older patients.

Keywords: Hormone receptor, HER2/neu, Breast cancer, Tumor, Immunohistochemistry, ER, PR

INTRODUCTION

One of the most common cancer worldwide and the second main cause of cancer death among women in India is breast cancer. To know the hormone receptor status of each and every patient is standard treatment protocol and also it must be done to guide the post-operative management. Our study aims to know the variation in hormone receptor status expression in different age groups of the patients.

Studies have shown that the breast cancer in younger women is unique and needs a different treatment strategy than what is used for the older women with breast cancer. As breast cancer in older women is more common, they have been the centre of attention mostly therefore most of

the breast cancer studies are found and focused on older women. Increasing evidence shows the importance of young age, estrogen receptor (ER), progesterone receptor (PR) status, and HER-2 expression in patients with breast cancers.¹

According to many studies breast cancer in younger age groups tends to be more advanced and more aggressive than older age groups. Also breast tumors in younger age groups were more likely to be of higher grade, hormone receptor–negative, poorly differentiated, aneuploid, to have high S-phase fraction, abnormal expression of P53, greater extent of lymphovascular invasion, and overexpression of human epidermal growth factor receptor 2 (HER-2) than breast tumors in older age groups.²⁻⁸

Local recurrence in women younger than 45 was found to be four times more frequent than in women older than 65.⁹ In another retrospective study, local recurrence rate was 38% at 10 years, and relative risk of locoregional recurrence increased by 7% for every decreasing year of age in women younger than 40 who were treated with a primary breast conserving operation followed by adjuvant radiation with or without chemotherapy.¹⁰ In that study, the only prognostic factor for locoregional recurrence was young age.

The reason of poor local recurrence in women younger than 40 in comparison with women older than 40 is still unclear and not fully understood.

Clinically, breast cancer in younger women that are diagnosed with a palpable mass have larger tumor sizes, more lymph node metastasis and are more invasive cancers than those in older women. Metastasis to the lymph nodes is an important prognostic factor, which is indicative of advanced disease status with the probability that cancer cells have spread to distant sites. At diagnosis, 30% to 50% of all breast cancers have spread to the sentinel lymph node.¹¹⁻¹³

METHODS

Study design

The data for this retrospective study were obtained from Sri Guru Ram Das Institute of Health Sciences institute database records. As the study was a retrospective, the

ethical code was not needed; the data came from a database that is available and follow the protocol of our department. A total of 600 primary breast cancer patients admitted over a 5-year period from June 2015 to June 2020 in different surgical and onco-surgical wards of a tertiary care centre in North-West India were included in the study. Those patients whose receptor status was not known were excluded from study. Details were collected on side, demography, tumor stage, surgical procedures, lymph node count, ER, PR and HER2/neu status, metastatic lymph nodes, intra- and post-operative complications, and hospital stay. But our main focus remains on the hormone receptor status.

Technique

Estrogen receptor and progesterone receptor status was evaluated by immunohistochemistry.

Hormone receptors were considered negative when concentration was below 10%. P53 was considered positive when nuclear staining was positive in more than 10% of tumoral cells. HER-2u over-expression was considered positive when complete and intense membrane staining was observed in more than 10% of tumoral cells.

RESULTS

In this study we evaluate the data of 600 patients. The subject data and outcomes are summarized in Table 1.

Table 1: Clinical data

Age groups (years)	HER/Neu positive			HER/Neu negative
	ER+ve/PR-ve	ER-ve/PR+ve	ER+/PR+ (TRIPLE+ve)	
<20			5	6
21-30	5	8	8	22
31-40	17	14	18	42
41-50	27	8	55	55
51-60	28	36	41	50
>60	26	46	52	42
Total	103	112	174	211

We found that incidence of carcinoma breast is more in older patient than younger in accordance with data in literature. We had 11 patients of age below 20 years presented with ca breast, of which were Her2/Neu negative while 5 were triple positive. Also in women between 21-30 years of age more have Her2/neu negative disease approximately 51% of the patients. While percentage of Her2/neu negative disease in older patient is less as in patients above 60 years of age is approximately 25.3%. Also the rate of triple positive disease increase with increasing age. It is 18.6% in 21-30 age group while it is 31.3% in patients above 60 years.

It was seen that the younger women had positive lymph nodes, as compared to of the older women.

DISCUSSION

Due to differences in genetics, environment, lifestyle, socio-demographic structure and ethnicity, the presentation and behaviour of breast cancer in India may be different.¹⁴ Young patients have high levels of circulating estrogens and a correspondingly low expression of steroid receptors which is reflected in their tumors. While studying the relationship of menstrual status with hormone receptor status in our patients, we

observed higher positivity of ER and PR in postmenopausal patients.

Our finding of an overall positivity rate for ER and PR is lower than that reported in western literature but consistent with studies on Indian patients.

The determination of estrogen receptor(ER) and progesterone receptor (PR) activity in breast cancer is a standard medical practice nowadays. It is an important predictor of response to hormonal therapy and overall prognosis of the patient.¹⁵

The tumors that are estrogen receptor (ER) positive and/or progesterone receptor (PR) positive have lower risks of mortality after their diagnosis compared to women with ER and/or PR- negative disease. Clinical trials have also shown that the survival advantage for women with hormone receptor-positive tumors is enhanced by treatment with adjuvant hormonal and/or chemotherapeutic regimens.¹⁶

In our study we found that the rate of hormone receptor positive disease is more in older patients than the younger patients. Thus owing to receptor negative disease in younger patients they ought to have more aggressive disease.

Breast cancer is a heterogeneous disease that may recur soon after initial diagnosis or after a follow-up period of 10 years. The recurrence risk varies over time according to molecular and clinical risk factors (Jatoi et al). ER-negative tumours and HER2 positive tumours display an increased annual rate of recurrences and deaths after a short period of time (1–3 years). In contrast, ER-positive (ER+)/HER2-negative (HER2-) patients have a considerably lower annual rate in the first years, but the annual recurrence rates persist after the first 5 years (Jatoi et al).

A first step to an individualised extended endocrine treatment of late metastases is therefore to identify women at risk and to understand the underlying biology. Clinical factors such as increased tumour size and nodal positivity have been shown to be associated with late relapse therefore we can say it is important to assess the molecular status.

Breast cancer in younger age groups is more aggressive than in older age groups. Although negative progesterone receptor tumors were more likely to have HER-2 overexpression, different biologic behaviour of breast cancer in younger age groups may be due to progesterone receptor positive status.

Additional studies should focus on association between hormone receptor status, HER-2 expression, and lymph nodes metastasis.

The risk factor profile in young women is worse than older women. Young women had a tendency to have larger tumor sizes, more positive lymph nodes, more negative hormone receptors, higher tumor grades than older women.¹⁷ This issue remains controversial, as in a retrospective study of breast cancer patients from Singapore Chia et al suggested that young women with breast cancer had a better survival than older females.^{18,19}

The majority of breast cancers present with estrogen receptor (ER)-positive and human epidermal growth factor receptor (HER2)-negative features and might benefit from endocrine therapy. Although endocrine therapy has notably evolved during the last decades, the invariable appearance of endocrine resistance, either primary or secondary, remains an important issue in this type of tumor. The improvement of our understanding of the cancer genome has identified some promising targets i.e. for targeted therapies.

Limitations

The study is retrospective study, focussing only on hormone status and further studies should be done to know the different management strategy required to treat patients in different age groups.

CONCLUSION

In this study we conclude that the hormone positivity in younger patient is less as compared to older patients. We think this knowledge of knowing differential expression of hormone receptor in different age groups will help in better planning of management protocols and also in better prognostication of the disease.

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

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