

Hormone Receptors and HER2 Status of Patients with Breast Cancer in a Tertiary Center of Nepal: A Descriptive Cross-Sectional Study

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ABSTRACT

Introduction

The second most prevalent cancer among women in Nepal is breast cancer. The assessment of human epidermal growth factor receptor-2 (HER2), progesterone receptor (PR), and estrogen receptor (ER) status in patients with breast cancer is currently regarded as standard practice because of its prognostic and predictive value. This study aims to find the incidence of Hormone receptor and HER2 status in patients with breast cancer.

Methods

This was a descriptive observational cross-sectional study that assessed the immunohistochemistry markers of different histological types of breast cancer patients who visited a tertiary center in Nepal. Retrospective data from August 1, 2022, to July 30, 2023, were gathered from computer records of all the patients diagnosed with breast cancer who visited the Tribhuvan University Teaching Hospital (TUTH). SPSS version 26.0 was used for statistical analysis.

Results

A total of 102 patients with breast cancer were included. The mean age of the patients was 50.51 ± 12.08 years. Only one patient was male. The analysis showed that 62 (60.78%) of total patients had ER/PR positive breast cancer and 40 (39.2%) were HER2 positive with a higher number among Janajati and the age group 41-60 years. Similarly, the incidence of triple-negative breast cancer was 21 (20.59%) of all patients.

Conclusion

The majority of breast cancer patients in our study were ER/PR positive, followed by HER2-positive and triple-negative cases. A higher prevalence was observed among the Janajati ethnic group and those aged 41-60 years.

Keywords

Breast cancer, immunohistochemistry, triple-negative breast cancer

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INTRODUCTION

Breast cancer is the second most common cancer among women in Nepal in terms of prevalence.¹ The healthcare system in Nepal is heavily burdened by breast cancer, although data on the number of women affected by the disease is not adequately documented. Breast cancer is often detected at a later stage in developing nations like Nepal, and the patients may only receive palliative care, insufficient therapy, or neither.¹

The assessment of human epidermal growth factor receptor-2 (HER2), progesterone receptor (PR), and estrogen receptor (ER) status in patients with breast cancer is currently regarded as a standard practice for management because of its prognostic and predictive value.² The absence of well-established receptors limits the range of possible treatments and makes specific therapies more difficult.³ Few studies have been conducted in Nepal about the immunohistochemistry (IHC) markers and their differences as per ethnicity and age groups.⁴⁻⁶ So, the study aimed to find the incidence of hormone receptor and HER2 status in patients with breast cancer.

METHODS

Retrospective data were gathered from computer records of all the patients diagnosed with breast cancer who visited the Department of Internal Medicine (Medical Oncology), Tribhuvan University Teaching Hospital (TUTH) from August 1, 2022, to July 30, 2023.

Age, ethnicity of the patients, histological diagnosis, and immunohistochemistry findings were studied. Data collection was done after obtaining ethical approval.

The raw data were collected in Microsoft Excel version 2016 and analyzed using IBM SPSS

Table 2. Histological diagnosis of the patients

| Diagnosis | Frequency (%) |
|----------------------------------|---------------|
| Intraductal papilloma | 1 (0.98) |
| Invasive ductal breast carcinoma | 6 (5.88) |
| Invasive mucinous carcinoma | 3 (2.94) |
| Metastatic breast carcinoma | 1 (0.98) |
| No special type (NST) | 91 (89.22) |
| Total | 102 (100) |

Statistics version 26.0. Continuous data were reported as mean and standard deviation.

RESULTS

Data from 102 patients with breast cancer were analyzed. The majority of them i.e. 61 (59.89%), belonged to the age group 41 to 60, and the least number 20 (19.61%) were the younger ones. The mean age of the patients was 50.51 years, (standard deviation of 12.08). Only one patient was male. Janajati contributed 71 (69.61%) of total patients followed by Brahmin/Chettri 22 (21.75%). (Table 1)

Most of the patients in our study 91 (89.22%) had breast cancer of no special type (NST) and only one patient had intraductal papilloma and metastatic breast cancer (Table 2).

We also evaluated these patients' estrogen receptor (ER) and progesterone receptor (PR) status. This immunohistochemical evaluation showed that 62 (60.78%) of total patients had ER/PR positive breast cancer (Figure 1). Similarly, 40 (39.2%) were HER2 positive (Figure 2).

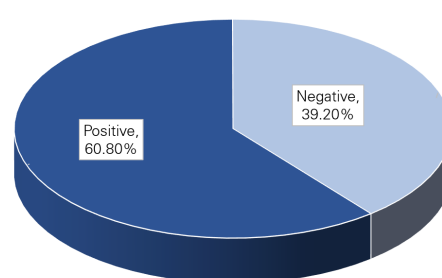


Figure 1. Pie-chart of distribution of ER/PR status

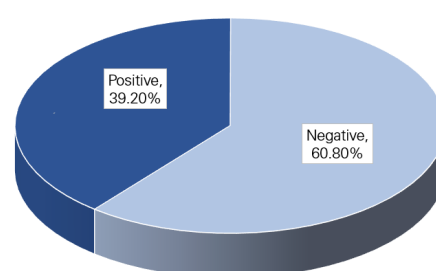


Figure 2. Pie-chart of distribution of HER2 status

Table 1. Demographic characteristics of patients (n=102)

| Variables | Frequency (%) |
|-----------------|---------------|
| Age group | |
| <40 | 20 (19.61) |
| 41-60 | 61 (59.80) |
| >61 | 21 (20.59) |
| Sex | |
| Female | 101 (99.02) |
| Male | 1 (0.98) |
| Caste | |
| Brahmin/Chettri | 22 (21.57) |
| Dalit | 5 (4.90) |
| Janajati | 71 (69.61) |
| Others | 4 (3.92) |

Table 3. Analysis of ER/PR status of breast cancer with caste

| ER/PR status | Caste | | | | Total |
|----------------|-----------------|----------|------------|----------|------------|
| | Brahmin/Chettri | Dalit | Janjati | Others | |
| Equivocal (PR) | 1 (0.98) | 0 | 0 | 0 | 1 (0.98) |
| Negative | 8 (7.84) | 1 (0.98) | 27 (26.47) | 3 (2.94) | 39 (38.24) |
| Positive | 13 (12.75) | 4 (3.92) | 44 (43.14) | 1 (0.98) | 62 (60.78) |
| Grand total | 22 (21.57) | 5 (4.90) | 71 (69.61) | 4 (3.92) | 102 (100) |

Table 4. Analysis of ER/PR status of breast cancer with age group

| Age groups | ER/PR status | | |
|-------------|--------------|------------|------------|
| | Negative | Positive | Total |
| <40 | 7 (6.86) | 16 (15.69) | 23 (22.55) |
| 41-60 | 23 (22.55) | 35 (34.31) | 58 (56.87) |
| >61 | 10 (9.80) | 11 (10.78) | 21 (20.59) |
| Grand total | 40 (39.33) | 62 (60.78) | 102 (100) |

The subgroup evaluation of the patients based on the immunohistochemical diagnosis and caste group displayed that Janajati with ER/PR positive breast cancer outnumbered the other subgroups (Table 3).

Similarly, the analysis of ER/PR status of breast cancer with age group revealed that 35 (34.31%) of total patients belonged to age group 41-60 years and had ER/PR positive breast cancer (Table 4).

The analysis of ER/PR status with HER2 status showed that 41 (40.20%) had HER2 status negative and ER/PR positive. Similarly, 21 (20.59%) had both ER/PR status and HER2 status positive. (Table 5) The incidence of triple-negative was 21 (20.59%) of all patients.

DISCUSSION

Breast cancer is a complex disease, and prognosis prediction and therapy selection have historically been based on clinicopathologic factors and immunohistochemistry (IHC) markers.^{7,8} Human epidermal growth factor receptor 2 (HER2), progesterone receptor (PR), and estrogen receptor

(ER) are among the frequently utilized IHC markers. More than 70% of breast cancer cases are ER-positive tumors. These tumors respond well to aromatase inhibitors and anti-estrogenic agents and have a slower clinical progression.⁹ Hormones have little effect on ER-negative tumors, and they exhibit more aggressive behavior. Estrogen induces PR, which is a positive prognostic indicator.^{7,10} The epidermal growth factor receptor family's most well-known prognostic member is the HER2 receptor. Its overexpression or amplification is indicative of poor survival.⁷ HER2 status can also be used to subclassify [ER-/PR-] tumors into different subgroups: [ER-/PR-] HER2+ (breast tumors with positive HER2 status and negative ER and PR status) and [ER-/PR-] HER2- (breast tumors with negative ER, PR, and HER2 status). [ER-/PR-] HER2-, also known as triple negative phenotypic tumors (TNP) due to their negative status of all three receptors, form a clinically challenging group with poor prognosis and difficult to treat.¹¹

Our study showed that the mean age of the patients is 50.51 years. A study was conducted by Shakya S, which showed the mean age of the patients to be 40-49 years, which is similar to our study.⁶

In this study, we detected that 60.78% of patients were ER/PR status positive, 20.59% were triple positive, and 20.59% were triple negative. A study conducted in Eastern Nepal found that that 21.9% of patients with breast cancer were progesterone receptor (PR) negative and the majority (64.0%) were estrogen receptor (ER) negative. The immunohistochemistry evaluation of Her-2 status revealed that 64.0% of premenopausal women and 45.0% of postmenopausal women were Her-2 negative. Triple-negative disease was present in 41.3% of the cases.⁴

Table 5. Analysis of ER/PR with HER2 status

| ER/PR status | HER2 status | | |
|--------------|-------------|------------|------------|
| | Negative | Positive | Total |
| Negative | 21 (20.59) | 19 (18.63) | 40 (39.22) |
| Positive | 41 (40.20) | 21 (20.59) | 62 (60.78) |
| Grand Total | 62 (60.78) | 40 (39.22) | 102 (100) |

Another study conducted in Nepal showed a significant positive correlation ($P < .005$) between the ER-ve/PR-ve and Her-2/Neu +ve receptor status and the younger age group of the patients. Of the total patients, 32.87% had triple-negative breast cancer. Cancer with a her2/neu +ve receptor status was 39.72%.⁶ Comparably, a study conducted at our institute revealed that 46.9%, 48.9%, and 28.9% of patients had ER, PR, or HER2-positive breast cancer, respectively. Younger women showed significantly lower ER or PR expression (34.5%). The proportion of younger patients with triple-negative tumors was substantially greater (23%).⁵

The findings in these studies along with that of our study suggest that there is a wide range of distribution in the ER, PR, and Her-2 receptor status of breast cancer in Nepal. As these studies included a limited number of patients from one or two health centers, the findings on immuno-histological status are not generalizable and vary from each other.

A study done in India among 5436 patients with a median age of 48 years found that triple-negative breast cancer (TNBC) accounted for 37% of cases, HER2 positive for 15%, and hormone receptor (HR) positive for 48% of patients overall. The same study also detected that the incidence of TNBC was high in Asian women in comparison to the Western population.¹² The higher percentage of cases with TNBC in Asians including Nepalese females suggest that there might be a strong genetic association among them. The treatment and the prognostic outcome of breast cancer are based on the IHC status of the cancer.

In this study, we tried to evaluate the IHC status of breast cancer in Nepal through single-center-based research. This study will aid in identifying the incidence of breast cancers with better prognosis (those with ER/PR positive) and those with worse outcomes (TNBC) in Nepal. In addition, IHC evaluation is required for all breast cancers to choose the appropriate therapy and to predict the likely outcome of the treatment. However, there are certain limitations of our study. As the data were collected retrospectively, many patients were excluded from the study for having incomplete reports. We could not incorporate the data of TNM staging of the cancers and could not follow up on the cases to assess the overall survival of the patients. In addition, being a single-centered study, the findings are not generalizable to the whole Nepalese population.

CONCLUSION

Majority of breast cancer patients in our study were ER/PR positive, followed by HER2-positive and triple-negative cases. A higher prevalence was seen among the Janajati ethnic group and 41-60 years age group.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

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