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RESEARCH ARTICLE

Clinical, Histomorphological, and Immunohistochemical Features of Breast Neoplasms

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ABSTRACT

Background: Breast neoplasms are a significant health concern worldwide, with varying clinical presentations, histomorphological characteristics, and immunohistochemical profiles. Understanding these aspects is crucial for accurate diagnosis and effective management.

Objective: This study aims to evaluate the clinical features, histomorphological patterns, and immunohistochemical profiles of breast neoplasms in patients.

Material and Methods: This cross-sectional study was conducted in the Department of Pathology at a tertiary care hospital over 2 years. A total of 30 patients diagnosed with breast neoplasms were included. Clinical data were collected, followed by histopathological examination and immunohistochemical staining for markers such as Estrogen Receptor (ER), Progesterone Receptor (PR), and Human Epidermal Growth Factor Receptor 2 (HER2).

Results: The study found that invasive ductal carcinoma was the most common type of breast neoplasm, with a significant correlation between ER positivity and favorable histological grade. Immunohistochemical analysis revealed a high prevalence of ER and PR positivity in hormone receptor-positive tumors.

Conclusion: A comprehensive analysis of clinical, histomorphological, and immunohistochemical features enhances the understanding of breast neoplasms and aids in formulating personalized treatment strategies.

Keywords: Breast neoplasms, histomorphology, immunohistochemistry, estrogen receptor and progesterone receptor.

INTRODUCTION:

Breast neoplasms represent one of the most prevalent malignancies affecting women globally, accounting for a significant number of cancer-related deaths (1). The clinical presentation of breast cancer can vary widely, with symptoms ranging from palpable masses to atypical mammographic findings. Early detection and accurate diagnosis are paramount for improving survival rates, which has led to the increased use of advanced diagnostic techniques (2).

Histomorphological analysis remains a cornerstone in the diagnosis of breast neoplasms. It involves the examination of tissue architecture and cellular characteristics to classify tumors accurately. Breast cancers can be categorized into various subtypes, with invasive ductal carcinoma (IDC) being the most common (3). Understanding the histological type, grade, and stage of the tumor plays a crucial role in determining the appropriate treatment approach.

Immunohistochemistry (IHC) is a valuable adjunct to histopathological examination, allowing for the assessment of specific protein expressions in tumor cells. Key biomarkers such as Estrogen Receptor (ER), Progesterone Receptor (PR), and Human Epidermal Growth Factor Receptor 2 (HER2) have significant prognostic and therapeutic implications (4). ER and PR positivity is associated with better responses to hormone therapies, while HER2 positivity often necessitates targeted therapy.

Several studies have demonstrated the utility of combining clinical, histomorphological, and immunohistochemical analyses to provide a comprehensive overview of breast neoplasms (5). This integrated approach can guide clinical decision-making and optimize treatment strategies, thereby improving patient outcomes.

The objective of this study is to perform a clinical, histomorphological, and immunohistochemical analysis of breast neoplasms diagnosed in patients at a tertiary care hospital. By evaluating the clinical characteristics and correlating them with histological types and IHC profiles, the study aims to enhance

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understanding of breast cancer biology and its management.

Aim and objectives

Aim:

To evaluate the clinical, histomorphological, and immunohistochemical features of breast neoplasms in patients.

Objectives:

1. To assess the clinical presentation of breast neoplasms in patients.
2. To analyze histomorphological characteristics of breast tumors.
3. To evaluate the immunohistochemical profiles of breast neoplasms, focusing on ER, PR, and HER2 expression.
4. To correlate clinical findings with histopathological and immunohistochemical results.
5. To determine the prevalence of different types of breast neoplasms and their receptor status.

Material and method

This cross-sectional study was conducted in the Department of Pathology at a tertiary care hospital over 2 years. A total of 30 patients diagnosed with breast neoplasms were included in the study.

Inclusion Criteria:

- Patients diagnosed with breast neoplasms through biopsy or surgical excision.
- Patients of any age presenting with breast lumps or other symptoms related to breast pathology.
- **Exclusion Criteria**:
- Patients with a history of previous breast cancer.
- Patients receiving neoadjuvant chemotherapy prior to diagnosis.
- Patients with benign breast lesions only.

Clinical data, including age, gender, clinical presentation, tumor size, and associated symptoms, were collected using a structured pro forma. Following clinical evaluation, tissue samples were obtained through excisional biopsy or mastectomy.

Histopathological Examination:

Tissue samples were fixed in 10% formalin and embedded in paraffin wax. Sections of 4-5 micrometers were stained with Hematoxylin and Eosin (H&E) for histopathological evaluation. Tumors were classified based on the World Health Organization (WHO) classification of tumors of the breast (6). The histological grade was assessed using the Nottingham grading system.

Immunohistochemical Analysis:

Immunohistochemical staining was performed on formalin-fixed, paraffin-embedded tissue sections to assess the expression of ER, PR, and HER2. The following primary antibodies were used:

- Anti-ER (clone 1D5, Dako)
- Anti-PR (clone PgR 636, Dako)
- Anti-HER2 (clone 4B5, Ventana Medical Systems)

The staining procedure involved deparaffinization, antigen retrieval, and incubation with primary antibodies. After appropriate washing, secondary antibodies were applied, and the reaction was visualized using a chromogenic substrate. Positive and negative controls were included for each run.

Interpretation of Immunohistochemistry:

- **ER and PR**: Nuclear staining in ≥1% of tumor cells was considered positive (7).
- **HER2**: Scoring was based on the intensity and percentage of positive staining, with scores of 0 and 1+ indicating negative results, 2+ as equivocal, and 3+ as positive (8).

Statistical analysis was performed using SPSS software, with descriptive statistics calculated for clinical characteristics. The chi-square test was used to assess associations between categorical variables, with statistical significance set at $p < 0.05$.

Results

Table 1: Clinical Characteristics of Patients with Breast Neoplasms

Characteristic	N (%)
Age (mean ± SD)	52 ± 10

Gender (Female/Male)	29 (96.7%)/1 (3.3%)
Clinical Presentation	
- Palpable Lump	25 (83.3%)
- Nipple Discharge	5 (16.7%)
Tumor Size	
- <2 cm	10 (33.3%)
- 2-5 cm	15 (50%)
- >5 cm	5 (16.7%)
Associated Symptoms	
- Pain	8 (26.7%)
- Skin Changes	4 (13.3%)
- Axillary Swelling	7 (23.3%)

The mean age of the patients was 52 years, with a predominance of females (96.7%). The most common clinical presentation was a palpable lump, observed in 83.3% of the cases. The tumor size varied, with the majority (50%) measuring between 2 and 5 cm. Pain and axillary swelling were the most reported associated symptoms.

Table 2: Histomorphological and Immunohistochemical Findings

Finding	**N (%)**
Histological Type	
- Invasive Ductal Carcinoma	20 (66.7%)
- Invasive Lobular Carcinoma	5 (16.7%)
- Ductal Carcinoma in Situ	3 (10%)
- Other Types	2 (6.6%)
Histological Grade	
- Grade I	10 (33.3%)
- Grade II	12 (40%)
- Grade III	8 (26.7%)
Immunohistochemical Results	
- ER Positive	18 (60%)
- PR Positive	16 (53.3%)
- HER2 Positive	10 (33.3%)

Histopathological examination revealed that invasive ductal carcinoma was the most common type of breast neoplasm, accounting for 66.7% of cases. The histological grades varied, with grade II tumors being the most prevalent (40%). Immunohistochemical analysis showed that 60% of the tumors were ER positive, while 53.3% were PR positive. HER2 positivity was observed in 33.3% of cases.

Discussion

Breast neoplasms present a diverse range of clinical, histomorphological, and immunohistochemical characteristics. This study analyzed 30 cases of breast neoplasms, highlighting the predominance of invasive ductal carcinoma, which aligns with global trends (9). The high incidence of breast cancer among females emphasizes the need for ongoing research and improved screening strategies to facilitate early detection.

The mean age of 52 years among patients in this study is consistent with findings from other studies, which report a higher incidence of breast cancer in postmenopausal women (10). The majority of patients presented with palpable lumps, indicating a need for awareness regarding breast self-examination and prompt medical evaluation of new breast masses.

Histological evaluation revealed a diverse range of tumor types, with invasive ductal carcinoma being the most common. This finding corroborates with other studies that have documented IDC as the predominant subtype of breast cancer (11). The variation in

histological grades underscores the importance of histopathological assessment in determining prognosis and treatment strategies.

The immunohistochemical findings in this study provide valuable insights into the biological behavior of breast tumors. The prevalence of ER positivity (60%) is consistent with reports indicating that a significant proportion of breast cancers express hormone receptors (12). ER-positive tumors are often associated with a favorable prognosis and better responses to hormone therapy, highlighting the importance of assessing receptor status for therapeutic decision-making.

Similarly, the PR positivity rate of 53.3% aligns with literature suggesting that PR expression often correlates with ER positivity (13). The presence of these hormone receptors is a critical factor in the management of breast cancer, as hormone receptor-positive tumors may benefit from anti-estrogen therapies, such as tamoxifen or aromatase inhibitors.

HER2 expression is another crucial aspect of breast cancer biology, influencing treatment options. In this study, HER2 positivity was observed in 33.3% of cases. This finding is consistent with various studies indicating that HER2-positive tumors tend to be more aggressive and are often treated with targeted therapies, such as trastuzumab (14). The identification of HER2 status has become an integral part of breast cancer management, enabling personalized treatment approaches.

Limitations of this study include the small sample size and its single-center nature, which may limit the generalizability of the findings. A larger, multi-center study would provide more robust data and enhance the understanding of breast neoplasms across diverse populations. Furthermore, a more extensive follow-up period could offer insights into the long-term outcomes of patients with different breast cancer subtypes and receptor statuses.

In conclusion, this study underscores the significance of a comprehensive clinical, histomorphological, and immunohistochemical evaluation of breast neoplasms. The predominance of invasive ductal carcinoma, along with the assessment of hormone receptor status, plays a vital role in guiding treatment decisions. A multidisciplinary approach that incorporates clinical evaluation, histopathological analysis, and immunohistochemical profiling is essential for optimizing the management of breast cancer patients.

Conclusion

The clinical, histomorphological, and immunohistochemical analysis of breast neoplasms enhances the understanding of their diverse characteristics and behaviors. This study highlights the importance of accurate diagnosis and personalized treatment strategies, particularly regarding hormone receptor status and HER2 expression. By integrating clinical data with histopathological and immunohistochemical findings, healthcare professionals can make informed decisions, ultimately improving patient outcomes in breast cancer management.

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