



Original Article

## Evaluation of Clinical and Histopathological Prognostic Markers of the Breast Carcinoma

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### ABSTRACT

**Background:** Breast carcinoma is one of the leading causes of cancer-related morbidity and mortality worldwide. According to GLOBOCAN 2022, it ranks second in incidence and fourth in mortality among all cancers globally, and it is the most common malignancy among women in India. Histopathological parameters remain fundamental prognostic indicators in routine diagnostic practice, particularly in resource-limited settings where advanced molecular testing may not be readily accessible.

**Aim:** To evaluate the clinical and histopathological prognostic markers of breast carcinoma in operable cases received at a tertiary care center.

**Material and Methods:** This retrospective, observational, descriptive cross-sectional study included 50 cases of operable breast carcinoma received as lumpectomy or mastectomy specimens in the Department of Pathology at P.D.U. Medical College, Rajkot, from January 2022 to December 2025. Trucut biopsies, wedge biopsies, mesenchymal and hematolymphoid tumours, metastatic tumours, and cases treated with neoadjuvant therapy were excluded. Clinical parameters including age, gender, laterality, tumour location, and tumour size were recorded. Histopathological parameters such as tumour grade (Nottingham modification of Bloom–Richardson system), tumour stage (pT), lymphovascular invasion, perineural invasion, necrosis, and lymph node metastasis were assessed using routine Hematoxylin and Eosin staining.

**Results:** The age of patients ranged from 32 to 78 years, with the majority in the fourth (48%) and fifth (40%) decades. All cases were females. Left breast involvement (54%) was slightly more common than right (46%). The subareolar region was the most frequent tumour location (50%). Tumour size ranged from 1.2 to 9.8 cm, with most tumours (54%) measuring 2–5 cm.

Histologically, Grade 2 tumours were most common (48%), followed by Grade 3 (42%). The majority of cases were pT2 stage (48%). Lymphovascular invasion was observed in 38% of cases, perineural invasion in 22%, necrosis in 60% (including 24% with comedo necrosis), and lymph node metastasis in 66% of cases. High-grade tumours showed a greater association with lymph node metastasis and other adverse prognostic factors.

**Conclusion:** Histopathological parameters such as tumour grade, stage, lymphovascular invasion, perineural invasion, necrosis, and lymph node metastasis remain crucial prognostic indicators in breast carcinoma. Grade 2 tumours were most prevalent; however, higher-grade tumours demonstrated a stronger association with lymph node metastasis and poor prognostic features. In resource-constrained settings, meticulous histopathological evaluation continues to play a pivotal role in guiding management and predicting outcomes.

**Keywords:** Breast carcinoma, Histopathology, Prognostic markers, Tumour grade, Lymph node metastasis, Lymphovascular invasion.

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## INTRODUCTION

The global incidence of cancer is steadily rising, making it one of the leading causes of death worldwide. According to GLOBOCAN 2022, breast carcinoma ranks second in incidence (11.6% of all cancers) and fourth in cancer-related mortality (6.9% of all cases). It is the most commonly diagnosed cancer among women across all levels of Human Development Index (HDI), including India.<sup>(1)</sup> Higher incidence rates in developed countries are associated with reproductive, hormonal, and lifestyle-related risk factors such as early menarche, late menopause, delayed first childbirth, low parity, reduced breastfeeding, use of hormonal therapy and oral contraceptives, alcohol consumption, obesity, physical inactivity, and widespread mammographic screening.<sup>(2)</sup>

The management of breast carcinoma is largely guided by established clinical, pathological, and predictive prognostic factors.<sup>(3)</sup> According to the WHO classification, the majority of cases are invasive ductal carcinoma, no special type.<sup>(4)</sup> Prognostic evaluation includes clinical parameters (age, gender, laterality, tumour location, and tumour size), histopathological factors (tumour grade, stage, lymphovascular invasion, perineural invasion, necrosis, and lymph node metastasis), and molecular markers such as estrogen receptors (ER), progesterone receptors (PR), human epidermal growth factor receptors 2 (HER 2), Ki-67 index, BRCA1 and BRCA2 mutations, molecular subtypes (Luminal A, Luminal B, HER2-enriched, Basal-like), and multigene assays including (Oncotype<sup>DX</sup>, Mammaprint<sup>TM</sup>, Blueprint<sup>TM</sup>, Breast Cancer Index and the PAM50-based Prosigna<sup>TM</sup> assay). However, despite advances in molecular diagnostics, histopathological assessment remains the cornerstone of routine prognostic evaluation, particularly in resource-limited settings.<sup>(5,6)</sup>

## AIM

To evaluate the clinical and histopathological prognostic markers of breast carcinoma in operable cases received at a tertiary care center.

## OBJECTIVES

1. To evaluate the clinical and histopathological prognostic markers in operable cases of breast carcinoma.
2. To study the distribution of breast carcinoma with respect to age, gender, laterality of breast, tumour location, and tumour size.
3. To assess histopathological grading using the Nottingham modification of Bloom–Richardson system.
4. To determine tumour stage (pT) in the studied cases.
5. To evaluate the presence of adverse histopathological parameters including:
  - Lymphovascular invasion
  - Perineural invasion
  - Necrosis (including comedo type)
  - Lymphnode metastasis

## MATERIAL AND METHODS

This retrospective, observational, descriptive, cross-sectional study was conducted on 50 cases of operable breast carcinoma received as lumpectomy or mastectomy specimens in the Department of Pathology at P.D.U. Medical College, Rajkot, from January 2022 to December 2025.

Trucut biopsies, wedge biopsies, primary mesenchymal and hematolymphoid breast tumours, metastatic tumours to the breast, and primary breast carcinomas treated with neoadjuvant chemotherapy or radiotherapy were excluded from the study.

Clinical and gross pathological details, including patient age, gender, breast laterality, tumour location, and tumour size, were obtained from case records. All routine histopathological parameters such as tumour grade, tumour stage, lymphovascular invasion, perineural invasion, necrosis, and lymph node metastasis were evaluated following detailed microscopic examination. Hematoxylin and Eosin (H&E) staining was performed in all cases. Tumour grading was carried out according to the Nottingham modification of the Bloom–Richardson grading system.

## RESULTS

The age of the patients ranged from 32 to 78 years. The majority of cases were observed in the fourth decade (24 cases) followed by the fifth decade (20 cases) (Table 1). All patients (100%) in the present study were females.

Age Group (years)	Females	Percentage
31-40 years	01	2%
41-50 years	24	48%
51-60 years	20	40%
61-70 years	04	8%

71-80 years	01	2%
Total	50	100%

Among the 50 cases, left breast involvement was observed in 27 patients (54%), while 23 patients (46%) had right breast involvement (Table 2).

<b>Table-2: Distribution of cases according to laterality of breast involvement (n=50)</b>		
<b>Laterality of breast</b>	<b>No. of cases</b>	<b>Percentage</b>
Left	27	54%
Right	23	46%
Total	50	100%

Tumours were most commonly located in the subareolar region (25 cases, 50%), while the lower inner quadrant showed the least involvement (2 cases, 4%) (Table 3).

<b>Table-3: Distribution of cases according to tumour location (n=50)</b>		
<b>Tumour location</b>	<b>No. of cases</b>	<b>Percentage</b>
Subareolar region	25	50%
Upper outer quadrant	11	22%
Lower outer quadrant	7	14%
Upper inner quadrant	5	10%
Lower inner quadrant	2	4%
Total	50	100%

The tumour size ranged from 1.2 to 9.8 cm. The majority of tumours (27 cases, 54%) measured between 2 and 5 cm (Table 4).

<b>Table-4: Distribution of cases according to tumour size (n=50)</b>		
<b>Tumour size</b>	<b>No. of cases</b>	<b>Percentage</b>
<2 cm	6	12%
2-5 cm	27	54%
>5 cm	17	34%
Total	50	100%

Tumour grading was performed according to the Nottingham modification of the Bloom–Richardson system. The majority of cases were Grade 2 tumours (24 cases, 48%), followed by Grade 3 tumours (21 cases, 42%) (Table 5).

<b>Table-5: Distribution of cases according to grade of tumour (n=50)</b>		
<b>Grade of tumour</b>	<b>No. of cases</b>	<b>Percentage</b>
Grade 1	5	10%
Grade 2	24	48%
Grade 3	21	42%
Total	50	100%

The most common pathological tumour stage (pT) observed among the 50 cases was stage 2 (pT2) in 24 cases (48%), followed by stage 3 (pT3) in 18 cases (36%) (Table 6).

<b>Table-6: Distribution of cases according to stage of tumour (n=50)</b>		
<b>Stage of tumour</b>	<b>No. of cases</b>	<b>Percentage</b>
Stage 1(pT1)	3	6%
Stage 2(pT2)	24	48%
Stage 3(pT3)	18	36%
Total	50	100%

Lymphovascular invasion and perineural invasion were identified in 19 cases (38%) and 11 cases (22%), respectively (Figures 1 and 2).

Necrosis was observed in 30 cases (60%), of which 12 cases (24%) exhibited comedo-type necrosis (Figures 3 and 4). Lymph node metastasis was present in 33 out of 50 cases (66%) (Figure 5). (Table 7)

Table-7: Distribution of cases according to Lymphovascular invasion, Perineural invasion, Necrosis and Lymphnode metastasis (n=50)								
Histopathological parameters	Lymphovascular invasion		Perineural invasion		Necrosis		Lymphnode metastasis	
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%
Present	19	38%	11	22%	30	60%	33	66%
Absent	31	62%	39	78%	20	40%	17	34%
Total	50	100%	50	100%	50	100%	50	100%

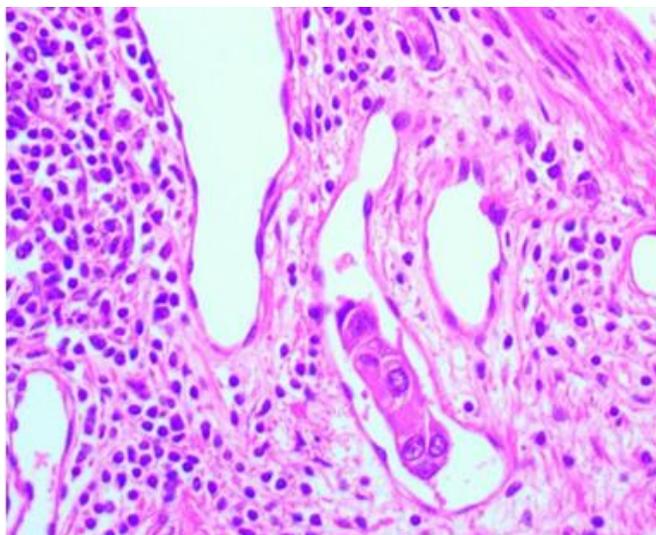


Figure no.1: H&E stain, 200x – Lymphovascular invasion

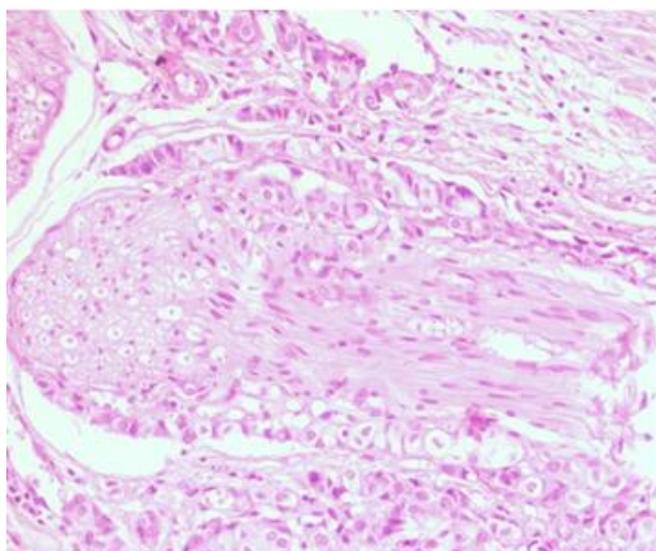
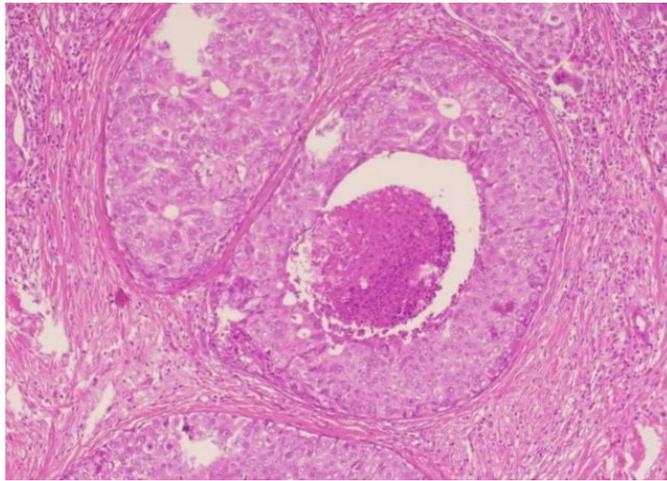
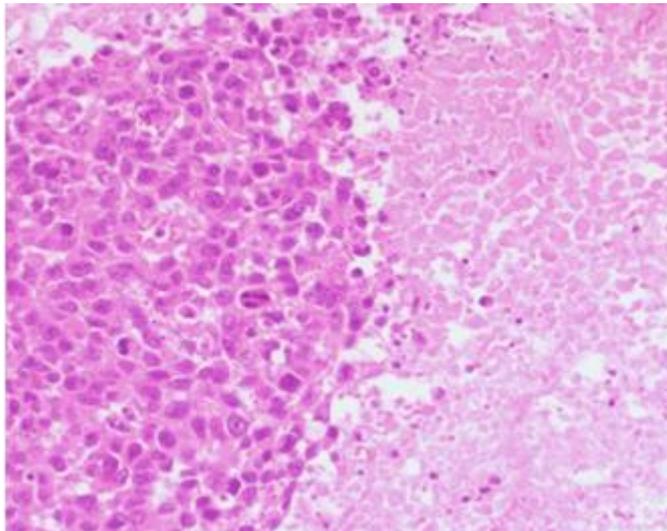


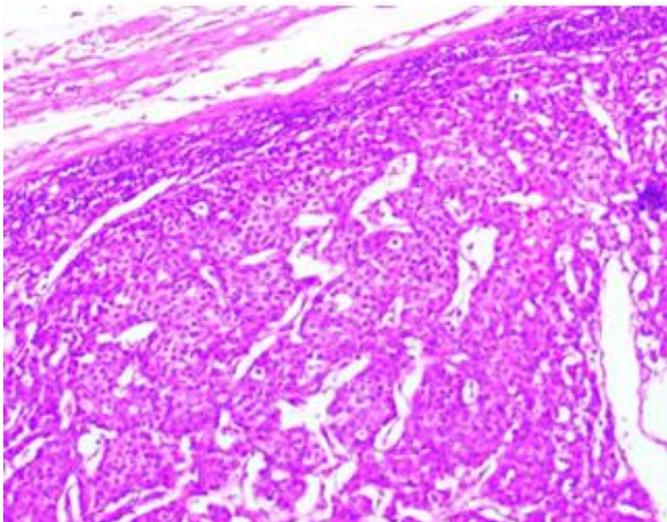
Figure no.2: H&E stain, 200x – Perineural invasion



**Figure no.3: H&E stain, 100x - Comedo necrosis**



**Figure no.4: H&E stain, 400x – Necrosis**



**Figure no.5: H&E stain, 100x – Lymphnode metastasis**

## **DISCUSSION**

Histopathological evaluation plays a pivotal role in the diagnosis and management of breast carcinoma. Although several newer molecular predictive and prognostic markers are available, their high cost and limited accessibility make them less feasible for routine use in the Indian population.

In the present study, the majority of patients were in the fourth (48%) and fifth decades (40%), which was comparable to findings reported by Kaur et al<sup>(3)</sup>(64%), Ramchandwani et al<sup>(7)</sup>(62%) and Manjunatha Y A et al<sup>(8)</sup>(86.66%).

All 50 cases in the present study were females, demonstrating marked female predominance, which was consistent with observations by Kaur et al<sup>(3)</sup>(100%) and Imad Q et al<sup>(7)</sup>(93.33%), where the majority of patients were also females.

Left breast involvement (54%) was more common in the present study, which was comparable to findings reported by Papalexis P et al<sup>(8)</sup>(55.8%) and Manjunatha Y A et al<sup>(8)</sup>(60%). In contrast, Kaur et al<sup>(3)</sup>(60%) reported right breast involvement as more frequent.

The subareolar region (50%) was the most common tumour location in the present study. However, Kaur et al<sup>(3)</sup>(100%) and Imad Q et al<sup>(7)</sup>(93.33%) reported the upper outer quadrant as the most frequent site. According to the WHO bluebook literature, the upper outer quadrant is generally the most common location for breast carcinoma.<sup>(4)</sup>

In the present study, tumour size ranged from 1.2 to 9.8 cm, with the majority of cases (54%) measuring between 2 and 5 cm. Similarly, Kaur et al<sup>(3)</sup> reported tumour sizes ranging from 1 to 5 cm, with 70% of cases measuring 2–5 cm. Papalexis P et al<sup>(8)</sup>, reported a median tumour size of 2.6 cm (range: 0.4–12 cm).

In the present study, Grade 2 tumours were the most common (48%), which was comparable to findings reported by Papalexis P et al<sup>(8)</sup>(53.8%), Manjunatha Y A et al<sup>(8)</sup>(60%) and Soni et al<sup>(11)</sup>(57.29%). In contrast, Kaur et al<sup>(3)</sup> reported Grade 3 as the most prevalent tumour grade.

The most common pathological tumour stage in the present study was stage 2 (48%), similar to observations by Papalexis P et al<sup>(8)</sup>(53.8%) and Manjunatha Y A et al<sup>(8)</sup>(60%). However, Imad Q et al<sup>(7)</sup>(46.66%) reported stage 1 as the most frequent tumour stage (46.66%).

Lymphovascular invasion was identified in 38% of cases in the present study, which was slightly higher than the 32.36% reported by Soni et al<sup>(11)</sup>.

In present study, perineural invasion was present in 22% of cases whereas in the study conducted by Soni et al<sup>(11)</sup>, perineural invasion was present in only 6.1% of cases.

Necrosis was present in 60% of cases in the present study, with 24% demonstrating comedo-type necrosis, whereas Soni et al<sup>(11)</sup>, reported necrosis in 46.15% of cases.

Lymph node metastasis was observed in 66% of cases, which was higher than the 55.23% reported by Soni et al<sup>(11)</sup>.

## CONCLUSION

Breast cancer incidence and mortality increase with advancing age. Histopathological parameters—including tumour grade, stage, lymphovascular invasion, perineural invasion, necrosis, and lymph node metastasis—remain vital prognostic indicators in breast carcinoma. Although Grade 2 tumours (48%) were the most prevalent in the present study, higher-grade tumours showed a stronger association with lymph node metastasis and adverse prognostic features. In resource-limited settings, careful histopathological evaluation continues to be essential for guiding therapeutic decisions and predicting patient outcomes.

**Conflict of Interest:** None

## REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, Jemal A. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians*. 2024 May; 74(3):229-63.
2. Brinton LA, Gaudet MM, Gierach GL. Breast cancer. In: Thun M, Linet MS, Cerhan JR, Haiman CA, Schottenfeld D, eds. *Cancer Epidemiology and Prevention*. 4th ed. Oxford University Press; 2018:861-888.
3. Kaur M, Kaur H, Manjari M, Rai V, Kaur K. Assessment of clinical parameters and histopathological grading of breast cancer. *International Journal of Contemporary Medical Research*. 2016;3(10):2938-41.
4. Rakha EA, Allison KH, Ellis IO, Horii R, Masuda S, Penault-Llorca F, et al. Invasive Cree IA, editors. *Breast Tumours, WHO Classification of Tumours*. 5 ed. Lyon: IARC; 2019. p. 82–101.
5. Taneja P, Maglic D, Kai F, et al. Classical and Novel Prognostic Markers for Breast Cancer and their Clinical Significance. *Clin Med Insights Oncol*. 2010;4:15-34. Published 2010 Apr 20. doi:10.4137/cmo.s4773
6. Li J, Chen Z, Su K, Zeng J. Clinicopathological classification and traditional prognostic indicators of breast cancer.

Int J ClinExpPathol 2015;8(7):8500–5. Jul 1.

7. Ramchandwani S, Dash M, Panda D, Sahoo SS. Molecular and Histopathological Correlation of Breast Cancer Subtypes with Prognostic Markers in Eastern India: A Study from a Tertiary Care Center. *European Journal of Cardiovascular Medicine*. 2025 Jan 1;15(1).
8. Manjunatha Y A, Jaishree T, Narasappa N, Chandrasekar N. Histomorphological evaluation of Breast carcinoma – A study of 15 cases. *IP Archives of Cytology and Histopathology Research*. 2020;5(2):126–130.
9. Imad Q. The clinicopathological parameters in patients with breast carcinoma in baaquba (Doctoral dissertation, University of Diyala).
10. Papalexis P, Georgakopoulou VE, Keramydas D, Vogiatzis R, Taskou C, Anagnostopoulou FA, Nonni A, Lazaris AC, Zografos GC, Kavantzias N, Thomopoulou GE. Clinical, histopathological, and immunohistochemical characteristics of predictive biomarkers of breast cancer: A retrospective study. *Cancer Diagnosis & Prognosis*. 2024 May 3;4(3):340.
11. Soni S, Sethi N, Gupta A, Srivastava AS. Breast carcinoma histopathological correlation with molecular classification: A comparative study. *Indian J PatholOncol*. 2020;7(4):613-19.