

Original Research Article

HISTOPATHOLOGICAL SPECTRUM OF BREAST LESIONS IN A TERTIARY-CARE CENTRE: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Breast lesions comprise a heterogeneous group of non-neoplastic, benign neoplastic, in situ and invasive malignant conditions. Although benign lesions predominate in younger patients, breast cancer remains the most frequently diagnosed malignancy among women worldwide and an important cause of cancer-related mortality. Histopathological examination is essential for definitive diagnosis, classification, grading and treatment planning. The aim is to evaluate the histopathological spectrum and age-wise distribution of breast lesions and to determine the relative proportions of benign and malignant lesions in a tertiary-care centre.

Materials and Methods: A total of 100 breast specimens comprising 43 excision biopsies, 22 trucut biopsies and 35 mastectomy specimens were included. Relevant demographic and clinical information was recorded. Specimens were fixed in 10% neutral-buffered formalin, subjected to detailed gross examination and processed using standard paraffin-embedding techniques. Sections measuring approximately 3–5 µm were stained with haematoxylin and eosin. Breast lesions were classified according to the applicable World Health Organization classification, and invasive breast carcinomas were graded using the Nottingham modification of the Scarff–Bloom–Richardson system. Data were analysed using descriptive statistics.

Results: Among 100 cases, 94 occurred in females and six in males. Benign lesions constituted 59% and malignant lesions 41%. Fibroadenoma was the most frequent benign lesion, while invasive breast carcinoma of no special type was the predominant malignancy. Benign lesions occurred mainly during the second and third decades, whereas malignant lesions were concentrated after 40 years of age. The right breast was involved in 51% of cases, the left breast in 45% and bilateral involvement was observed in 4%. Histological grade was available in 18 invasive carcinomas, of which eight were Grade I, seven Grade II and three Grade III.

Conclusion: Benign breast lesions were more frequent than malignant lesions, with fibroadenoma predominating in younger patients. Invasive breast carcinoma of no special type was the most common malignancy and occurred mainly after the fourth decade. Histopathological examination remains indispensable for definitive diagnosis, accurate classification, grading and clinical management of breast lesions.

Keywords: Breast lesions; fibroadenoma; benign breast disease; invasive breast carcinoma of no special type; histopathology; Nottingham grade.

INTRODUCTION

The breast contains epithelial and stromal components that may develop inflammatory,

proliferative, benign or malignant lesions. Patients commonly present with a lump, pain, nipple discharge, skin changes or an imaging-detected abnormality. Because benign and malignant

conditions may overlap clinically and radiologically, histopathological examination is often required for definitive diagnosis.^[1-9]

Breast cancer is a major global health problem. GLOBOCAN 2022 estimated approximately 2.30 million new female breast cancer cases, accounting for 11.6% of all cancers and 6.9% of cancer deaths worldwide.^[1] The annual burden may exceed three million cases and one million deaths by 2040, particularly affecting countries undergoing socioeconomic transition.^[2] The World Health Organization therefore emphasises early detection, timely diagnosis and comprehensive management to reduce avoidable mortality.^[3]

Breast cancer also contributes substantially to the diagnostic and treatment workload in India.^[4] However, malignant tumours represent only part of the breast-disease spectrum, as benign and inflammatory lesions constitute a considerable proportion of pathology specimens.

Benign breast lesions are especially common among adolescents and women of reproductive age and include fibroadenoma, fibrocystic change, adenosis, papilloma, lactational lesions and fibroepithelial tumours. Fibroadenoma is the most frequent benign neoplasm, whereas invasive carcinoma of no special type is the predominant malignancy. The probability of malignancy increases with age, particularly after the fourth decade.^[5-8]

Indian studies have reported variable histopathological distributions. Qadri et al. identified 60.1% benign, 28.4% malignant and 11.5% inflammatory lesions.^[5] Kumbhakar and Talukdar reported 70.97% benign and 29.03% malignant lesions among 589 specimens.^[6] In Telangana, Mrudula et al. found 78.5% benign and 21.5% malignant lesions,^[7] while Bhavani et al. documented 59.68% benign, 39.68% malignant and 0.64% inflammatory lesions in Andhra Pradesh.^[8] Fibroadenoma and invasive ductal carcinoma were consistently the predominant benign and malignant diagnoses. Regional differences may reflect demographics, referral patterns, screening access and biopsy practices.

Clinical examination, mammography, ultrasonography and cytology are important in breast evaluation, but histopathology remains essential for distinguishing benign, in situ and invasive lesions, identifying special subtypes and documenting prognostic features. The World Health Organization Classification of Breast Tumours provides standardised diagnostic criteria,^[9] while invasive carcinomas are graded using the Nottingham modification of the Scarff–Bloom–Richardson system.^[10]

Institution-specific studies are valuable because lesion frequencies vary across populations and healthcare settings. They help define local disease patterns, identify high-risk age groups and provide baseline data for future studies incorporating tumour stage, lymph-node status, receptor profile and clinical outcomes. This study therefore evaluated the

histopathological spectrum, demographic distribution and histological grading of breast lesions in a tertiary-care pathology department.

Need for the Study: Breast lumps occur across a wide age range and include lesions with different treatment and prognostic implications. Their overlapping clinical and radiological appearances make histopathological confirmation essential.

Local data on benign, in situ and invasive breast lesions remain limited in several Indian settings. Institutional evaluation can improve diagnostic awareness, standardise sampling and reporting, support clinicopathological correlation and provide a foundation for larger studies assessing stage, receptor status and patient outcomes.

Aim: To study the histopathological spectrum and distribution of breast lesions received in a tertiary-care pathology department.

Objectives:

1. To determine the histopathological spectrum and relative frequencies of benign and malignant breast lesions, including their age-wise, sex-wise and laterality distribution.
2. To identify the predominant benign and malignant histopathological diagnoses and assess the histological grade distribution of invasive breast carcinomas.

MATERIALS AND METHODS

Study Design, Setting and Period: This prospective, hospital-based observational study was conducted in the Department of Pathology at a tertiary-care hospital in Telangana over one year, from March 2024 to February 2025.

Study Population and Sample Size: All breast specimens received for histopathological examination during the study period and fulfilling the eligibility criteria were included. A total of 100 specimens were evaluated, comprising 43 excision biopsies, 22 trucut/core biopsies and 35 mastectomy specimens.

Eligibility Criteria: Breast specimens from male and female patients were included when adequate tissue and relevant clinical information were available. Excision, core-biopsy and mastectomy specimens diagnosed as benign, in situ or malignant lesions were eligible.

Inadequate, autolysed or poorly preserved specimens, cases with incomplete identification, cytology-only samples, consultation slides without adequate tissue or information and duplicate specimens from the same lesion were excluded. A later definitive excision was included when it provided a distinct final diagnosis.

Data Collection: Clinical and demographic information was obtained from histopathology requisition forms and available records. Variables included age, sex, laterality, presenting features, specimen type and provisional diagnosis. Each case

was assigned a unique study number to prevent duplication.

Gross Examination and Tissue Processing: Specimens were fixed in 10% neutral-buffered formalin. Gross examination documented specimen and lesion dimensions, appearance, consistency, relationship to the skin and nipple, margins and lymph nodes where applicable. Representative sections were obtained using standard sampling protocols.

Tissues were routinely processed, paraffin embedded and sectioned at approximately 3–5 µm. Sections were stained with haematoxylin and eosin, with additional sections or special stains used when required.

Histopathological Evaluation: All sections were examined microscopically and classified as benign or malignant according to recognised histomorphological criteria and the applicable World Health Organization classification of breast tumours.^[9]

The term invasive breast carcinoma of no special type was used for tumours previously designated invasive ductal carcinoma—not otherwise specified. Ductal carcinoma in situ was diagnosed when malignant epithelial proliferation remained confined within the duct–lobular system with preservation of the myoepithelial boundary.

Histological Grading: Invasive carcinomas were graded, where adequate information was available,

using the Nottingham modification of the Scarff–Bloom–Richardson system. Tubule formation, nuclear pleomorphism and mitotic activity were each scored from 1 to 3. Combined scores of 3–5, 6–7 and 8–9 corresponded to Grades I, II and III, respectively. Histological grade was available for 18 invasive carcinomas.

Statistical Analysis: Data were entered into a spreadsheet and analysed descriptively. Categorical variables were presented as frequencies and percentages, while age was grouped by decade. Percentages were calculated using the relevant diagnostic category or total study population as appropriate. Inferential testing was not performed because the study primarily aimed to describe the histopathological spectrum.

RESULTS

A total of 100 breast lesion specimens were evaluated. Of these, 94 cases (94.0%) occurred in female patients and 6 cases (6.0%) in male patients, giving a female-to-male ratio of approximately 15.7:1. Among the male patients, five were diagnosed with gynaecomastia and one with invasive breast carcinoma of no special type. Overall, 59 cases (59.0%) were benign and 41 cases (41.0%) were malignant.

Table 1: Age-wise distribution of benign and malignant breast lesions

Age group (years)	Benign lesions, n (%)	Malignant lesions, n (%)	Total, n (%)
11–20	21 (35.6)	0 (0.0)	21 (21.0)
21–30	18 (30.5)	0 (0.0)	18 (18.0)
31–40	14 (23.7)	6 (14.6)	20 (20.0)
41–50	5 (8.5)	11 (26.8)	16 (16.0)
51–60	0 (0.0)	13 (31.7)	13 (13.0)
61–70	1 (1.7)	8 (19.5)	9 (9.0)
71–80	0 (0.0)	3 (7.3)	3 (3.0)
Total	59 (100.0)	41 (100.0)	100 (100.0)

Benign lesions predominated in younger patients, with 39 of 59 cases (66.1%) occurring at 11–30 years. The highest frequencies were in the 11–20-year group (21; 35.6%) and 21–30-year group (18; 30.5%).

No malignancies occurred below 31 years. Malignant lesions were most frequent at 51–60 years (13; 31.7%), followed by 41–50 years (11; 26.8%); 35 of 41 malignancies (85.4%) occurred after 40 years.

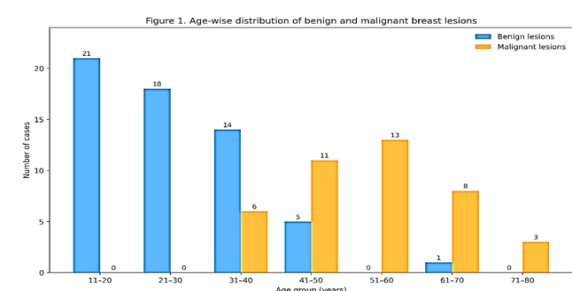


Figure 1: Age-wise distribution of benign and malignant breast lesions.

Table 2: Histopathological distribution of breast lesions

Histopathological diagnosis	Number cases	Percentage of lesions	Percentage of all	Percentage within category
Benign lesions				
Fibroadenoma	40	40.0		67.8
Fibroadenoma with fibrocystic change	5	5.0		8.5
Benign phyllodes tumour	6	6.0		10.2
Gynaecomastia	5	5.0		8.5
Lactating adenoma	2	2.0		3.4
Tubular adenoma	1	1.0		1.7
Malignant lesions				

Subtotal	59	59.0	100.0*
Malignant lesions			
Invasive breast carcinoma of no special type	27	27.0	65.9
Mucinous carcinoma	4	4.0	9.8
Ductal carcinoma in situ	4	4.0	9.8
Papillary carcinoma with adjacent ductal carcinoma in situ	2	2.0	4.9
Invasive carcinoma with medullary features	1	1.0	2.4
Lobular carcinoma with adjacent ductal carcinoma in situ	1	1.0	2.4
Metaplastic carcinoma	1	1.0	2.4
High-grade ductal carcinoma with neuroendocrine differentiation	1	1.0	2.4
Subtotal	41	41.0	100.0
Total	100	100.0	—

*Minor variation may occur because of rounding.

Fibroadenoma was the commonest benign lesion, comprising 40 cases (40.0% of all cases; 67.8% of benign lesions). Other benign lesions included benign phyllodes tumour in six cases, fibroadenoma with fibrocystic change and gynaecomastia in five each, lactating adenoma in two and tubular adenoma in one.

Invasive breast carcinoma of no special type was the predominant malignancy, accounting for 27 cases (27.0% of the cohort; 65.9% of malignant lesions). Mucinous carcinoma and ductal carcinoma in situ occurred in four cases each, papillary carcinoma with adjacent ductal carcinoma in situ in two, and the remaining malignant subtypes in one case each.

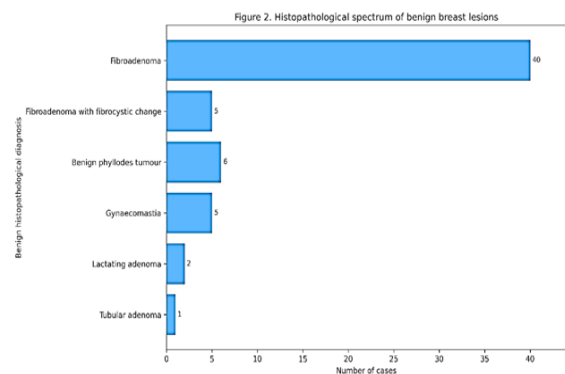


Figure 2: Histopathological spectrum of benign breast lesions.

Table 3: Distribution of breast lesions according to laterality

Laterality	Number of cases	Percentage
Right breast	51	51.0
Left breast	45	45.0
Bilateral	4	4.0
Total	100	100.0

Most lesions were unilateral. Right-breast involvement was observed in 51 cases (51.0%), left-breast involvement in 45 cases (45.0%) and bilateral

involvement in four cases (4.0%), indicating a slight right-sided predominance.

Table 4: Histological grading of invasive breast carcinomas

Histological grade	Number of cases	Percentage
Grade I	8	44.4
Grade II	7	38.9
Grade III	3	16.7
Total	18	100.0

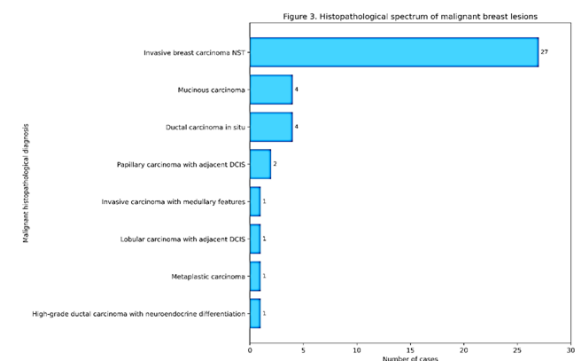


Figure 3: Histopathological spectrum of malignant breast lesions.

Among the 18 graded invasive breast carcinomas, Grade I was the most frequent, accounting for eight

cases (44.4%), followed by Grade II in seven cases (38.9%) and Grade III in three cases (16.7%).

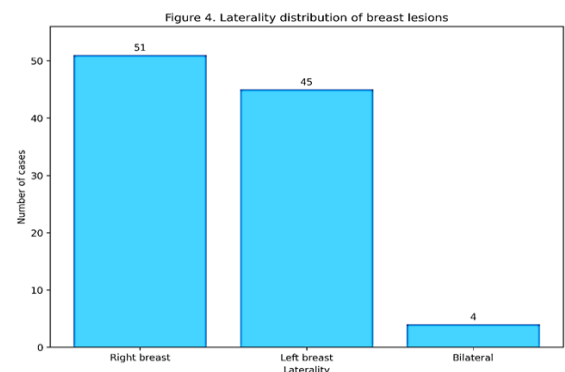


Figure 4: Laterality distribution of breast lesions.

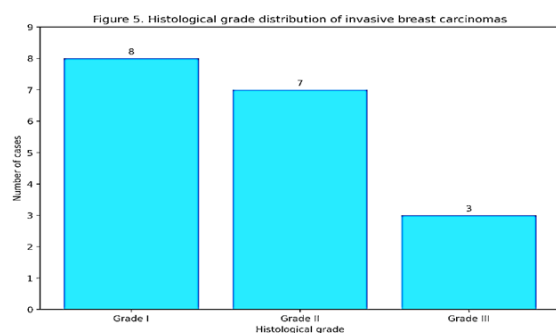


Figure 5: Histological grade distribution of invasive breast carcinomas.

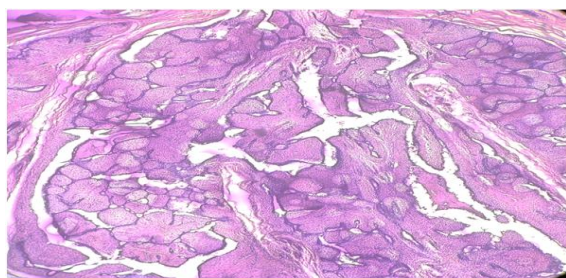


Figure 6: Fibroadenoma, H&E 10X

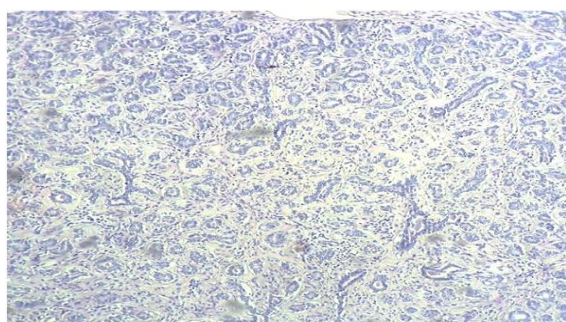


Figure 7: Tubular adenoma, H&E 10x

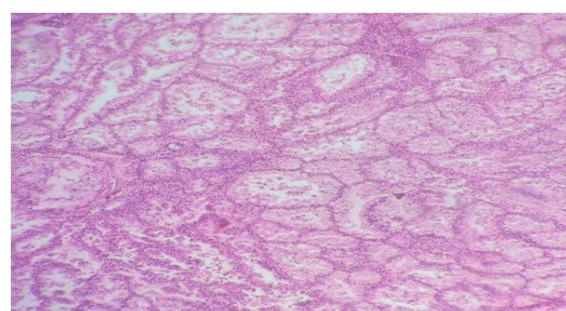


Figure 8: Lactating adenoma, H&E 10x

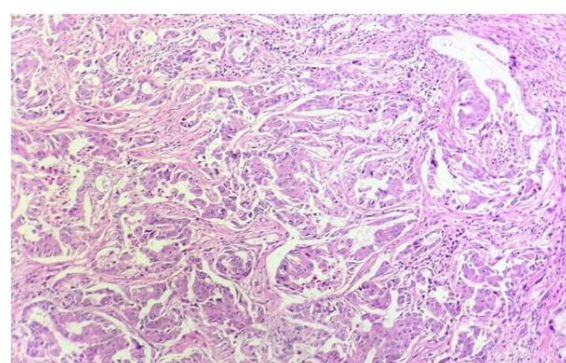


Figure 9: Invasive Breast Carcinoma NSTH&E 10x

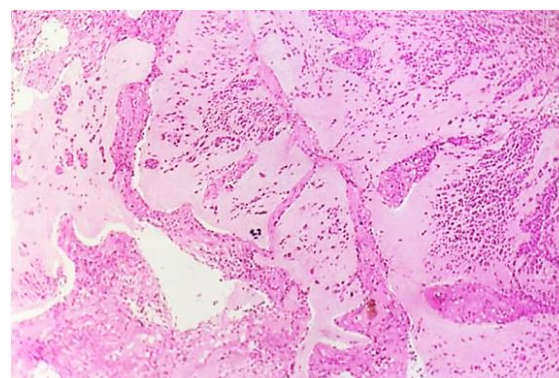


Figure 10: Mucinous carcinoma, H&E 10x

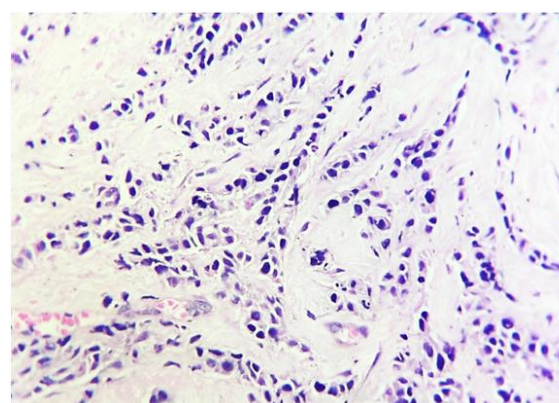


Figure 11: Lobular carcinoma, H&E 40x

DISCUSSION

The present study evaluated 100 breast lesions, of which 59% were benign and 41% were malignant. This distribution was comparable to Bhavani et al., who reported 59.68% benign and 39.68% malignant lesions among 310 breast specimens.^[8] In contrast, Mrudula et al. reported 78.5% benign and 21.5% malignant lesions in a Telangana cohort of 70 cases.^[7] Differences between hospital-based studies may reflect variations in referral patterns, specimen selection and institutional biopsy practices.

Females constituted 94% of the study population, while males accounted for 6%. Among the six male patients, five had gynaecomastia and one had invasive breast carcinoma of no special type. Qadri et al. similarly reported a marked female predominance and identified gynaecomastia as the most frequent male breast lesion.^[5] Hatim et al. also reported gynaecomastia in 4.3% of benign breast lesions.^[13] These observations emphasise that although most male breast lesions are benign, clinically suspicious masses require histopathological evaluation.

Benign lesions occurred predominantly in younger patients, with 66.1% diagnosed during the second and third decades. In contrast, 85.4% of malignant lesions occurred after 40 years of age, with the highest frequency in the 51–60-year group. Bhavani et al. similarly reported benign lesions mainly during the second to fourth decades and malignant lesions during the fifth and sixth decades.^[8] Mrudula

et al. found the largest proportion of benign lesions in the 21–30-year group and most malignant lesions between 41 and 60 years.^[7] Malik and Bharadwaj also documented the predominance of benign lesions among young women.^[12]

Fibroadenoma was the most frequent benign lesion, accounting for 40 cases and 67.8% of all benign lesions. Bhavani et al. reported fibroadenoma in 141 of 185 benign lesions, while Mrudula et al. documented it in 33 of 55 benign lesions.^[7,8] Qadri et al. and Hatim et al. also identified fibroadenoma as the predominant benign breast lesion.^[5,13] The consistency of these findings confirms fibroadenoma as the principal benign breast neoplasm encountered in younger patients.

Benign phyllodes tumour accounted for six cases, while fibroadenoma with fibrocystic change and gynaecomastia occurred in five cases each. Lactating adenoma and tubular adenoma were uncommon. Similar uncommon benign lesions were documented by Mrudula et al.^[7] Their clinical and radiological resemblance to other fibroepithelial lesions highlights the importance of adequate sampling and careful evaluation of stromal cellularity, architecture, atypia, mitotic activity and tumour margins.

Invasive breast carcinoma of no special type was the predominant malignancy, accounting for 27 cases and 65.9% of malignant lesions. Bhavani et al. reported invasive ductal carcinoma–NOS in 97 of 123 malignant lesions, while Mrudula et al. likewise identified invasive carcinoma of no special type as the most frequent malignancy.^[7,8] Qadri et al. reported infiltrating ductal carcinoma in 97.6% of malignant cases, and Nwafor and Udo also identified conventional invasive ductal carcinoma as the predominant malignant category.^[5,11]

Mucinous carcinoma and ductal carcinoma in situ accounted for four cases each. Papillary carcinoma with adjacent ductal carcinoma in situ occurred in two cases, while invasive carcinoma with medullary features, lobular carcinoma with adjacent ductal carcinoma in situ, metaplastic carcinoma and high-grade ductal carcinoma with neuroendocrine differentiation were represented by one case each. These uncommon diagnoses demonstrate the morphological heterogeneity of breast malignancies and reinforce the need for adequate tissue sampling and precise histopathological classification.

Right-sided involvement was observed in 51% of cases, left-sided involvement in 45% and bilateral disease in 4%. The small difference indicates an almost comparable distribution between the two breasts, with only a slight right-sided predominance. Qadri et al. similarly reported marginal right-sided predominance in their North Indian series.^[5]

Among the 18 graded invasive breast carcinomas, Grade I was the most frequent at 44.4%, followed by Grade II at 38.9% and Grade III at 16.7%. This differed from Mrudula et al., who reported Grade II in 69% of graded invasive carcinomas.^[7] Grade II predominance was also reported by Ahmad et al.

and Ambrose et al.^[14,16] Mudduwa demonstrated an inverse relationship between Nottingham grade and hormone-receptor expression, supporting the prognostic significance of histological grading.^[15] Differences in grade distribution may reflect variations in tumour characteristics and institutional case profiles.

Overall, the findings were consistent with the established pattern of breast disease in tertiary-care practice: benign lesions predominated, fibroadenoma was the commonest benign diagnosis in younger patients, and invasive breast carcinoma of no special type was the predominant malignancy after the fourth decade.^[5,7,8,11–13] Histopathological examination remains essential for definitive diagnosis, accurate classification, grading and appropriate clinical management.

Strengths of the Study

The study included a broad spectrum of benign, in situ and invasive breast lesions in both female and male patients. Multiple specimen types were evaluated, including excision biopsies, trucut biopsies and mastectomy specimens. The study also documented age, sex, laterality, histological diagnosis and tumour-grade distribution, providing useful institution-specific data for comparison with other Indian studies.

Limitations

The study was limited by its single-centre design and modest sample size. Histological grading was available only for a subset of invasive carcinomas. Immunohistochemical markers, including ER, PR, HER2 and Ki-67, were not evaluated. Clinical–radiological–pathological concordance, treatment response, recurrence and survival outcomes were beyond the scope of the study.

Future Directions

Larger multicentric studies using standardised breast-pathology reporting protocols are recommended. Future research should incorporate complete Nottingham grading, pathological staging, lymphovascular invasion, margin and nodal assessment, and ER, PR, HER2 and Ki-67 expression. Clinical, radiological, cytological and histopathological correlation, together with longitudinal outcome assessment, would further improve diagnostic and prognostic evaluation.

CONCLUSION

Benign breast lesions were more frequent than malignant lesions. Fibroadenoma was the predominant benign neoplasm and occurred mainly in younger patients, whereas invasive breast carcinoma of no special type was the commonest malignancy and was predominantly identified after the fourth decade. Gynaecomastia was the most frequent male breast lesion.

The study highlights the wide histopathological spectrum of breast disease encountered in tertiary-care practice. Histopathological examination

remains essential for definitive diagnosis, classification, grading and appropriate clinical management of breast lesions.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2024;74(3):229–263. doi:10.3322/caac.21834. PMID:38572751.
2. Arnold M, Morgan E, Rumgay H, Mafra A, Singh D, Laversanne M, et al. Current and future burden of breast cancer: global statistics for 2020 and 2040. *Breast.* 2022;66:15–23. doi:10.1016/j.breast.2022.08.010. PMID:36084384.
3. World Health Organization. Global breast cancer initiative implementation framework: assessing, strengthening and scaling up of services for the early detection and management of breast cancer. Geneva: World Health Organization; 2023. ISBN:978-92-4-006598-7.
4. Indian Council of Medical Research–National Centre for Disease Informatics and Research. Clinicopathological profile of cancers in India: a report of the hospital-based cancer registries, 2021. Bengaluru: ICMR-NCDIR; 2021. ISBN:978-93-5526-696-5.
5. Qadri SK, Sejwal P, Priyadarshni R, Jaiswal M, Khandewal R, Khanna M, et al. Spectrum of breast diseases: histopathological and immunohistochemical study from North India. *Gulf J Oncolog.* 2019;1(29):6–13. PMID:30956191.
6. Kumbhakar D, Talukdar PP. Histopathological patterns of breast lesions: a hospital-based study. *J Evid Based Med Healthc.* 2021;8(10):567–574. doi:10.18410/jebmh/2021/111.
7. Mrudula A, Ali MI, Samalla S, Chary RN. Spectrum of histopathological patterns of breast lesions in a tertiary care hospital. *Asian J Med Sci.* 2023;14(2):151–156. doi:10.3126/ajms.v14i2.48750.
8. Bhavani C, Neeraja M, Sravani P. A study of histopathological spectrum of breast lesions in a tertiary care hospital. *Int J Clin Diagn Pathol.* 2019;2(2):356–360. doi:10.33545/pathol.2019.v2.i2f.128.
9. WHO Classification of Tumours Editorial Board. Breast tumours. 5th ed. Lyon: International Agency for Research on Cancer; 2019. WHO Classification of Tumours Series; vol 2. ISBN:978-92-832-4500-1.
10. Elston CW, Ellis IO. Pathological prognostic factors in breast cancer. I. The value of histological grade in breast cancer: experience from a large study with long-term follow-up. *Histopathology.* 1991;19(5):403–410. doi:10.1111/j.1365-2559.1991.tb00229.x. PMID:1757079.
11. Nwafor CC, Udo IA. Histological characteristics of breast lesions in Uyo, Nigeria. *Niger J Surg.* 2018;24(2):76–81. doi:10.4103/njs.NJS_29_17.
12. Malik R, Bharadwaj VK. Breast lesions in young females: a 20-year study for significance of early recognition. *Indian J Pathol Microbiol.* 2003;46(4):559–562.
13. Hatim KS, Laxmikant NS, Mulla T. Patterns and prevalence of benign breast disease in Western India. *Int J Res Med Sci.* 2017;5(2):684–688. doi:10.18203/2320-6012.ijrms20170174.
14. Ahmad Z, Khurshid A, Qureshi A, Idress R, Asghar N, Kayani N. Breast carcinoma grading, estimation of tumour size, axillary lymph-node status, staging, and Nottingham Prognostic Index scoring on mastectomy specimens. *Indian J Pathol Microbiol.* 2009;52(4):477–481. doi:10.4103/0377-4929.56123.
15. Mudduwa LK. Quick score of hormone-receptor status of breast carcinoma: correlation with other clinicopathological prognostic parameters. *Indian J Pathol Microbiol.* 2009;52(2):159–163. doi:10.4103/0377-4929.48906.
16. Ambroise M, Ghosh M, Mallikarjuna VS, Kurian A. Immunohistochemical profile of breast cancer patients at a tertiary-care hospital in South India. *Asian Pac J Cancer Prev.* 2011;12(3):625–629. PMID:21627355.