

Histopathological Spectrum of Breast Lesions in a Tertiary Care Hospital: A Two-Year Retrospective Cross-Sectional Study

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Abstract

Background: Breast lesions form a heterogeneous group of diseases ranging from inflammatory and benign proliferative conditions to in-situ and invasive malignancy, and histopathological examination remains the diagnostic gold standard. This study was undertaken to analyse the histopathological spectrum of breast lesions received at a tertiary care teaching hospital in South India. **Material and Methods:** This retrospective, cross-sectional study was conducted in the Department of Pathology, Government Medical College and Hospital, Krishnagiri, over a two-year period from May 2022 to April 2024. A total of 116 breast specimens comprising lumpectomy, incisional biopsy, trucut biopsy and mastectomy specimens received from the Department of Surgery were processed by the conventional paraffin-embedding technique and stained with haematoxylin and eosin. Clinical data including age, sex, laterality and the surgical procedure performed were recorded, and the histopathological diagnoses were categorised as benign, malignant or inadequate for diagnosis. Data were analysed using descriptive statistics and the chi-square test, with $p < 0.05$ taken as statistically significant. **Results:** Of the 116 specimens, 94.8% were from female patients, with a mean age of 44.2 ± 18.2 years. Benign lesions accounted for 52.6% of cases, malignant lesions for 39.7%, and 7.8% were inadequate for a definitive diagnosis. Fibroadenoma (36.2%) was the most common benign lesion and invasive ductal carcinoma (37.1%) was the most common malignant lesion. A statistically significant association was observed between age group and the biological nature of the lesion ($\chi^2 = 44.95$, $p < 0.001$), with malignancy increasing sharply after the fourth decade of life. The right breast was more frequently involved (53.4%) than the left (37.9%), and excision biopsy (42.2%) was the most commonly performed procedure, followed by modified radical mastectomy (30.2%). **Conclusion:** Fibroadenoma and invasive ductal carcinoma constitute the predominant benign and malignant lesions of the breast, respectively, in this population, and increasing age is strongly associated with malignant transformation. Histopathological examination remains indispensable for the accurate diagnosis and management of breast disease, and age-stratified clinical vigilance is warranted for early detection of breast carcinoma.

Keywords: Breast lesions; histopathology; fibroadenoma; invasive ductal carcinoma; benign breast disease; breast carcinoma; tertiary care hospital.

Received: 10 July 2026

Revised: 28 July 2026

Accepted: 15 August 2026

Published: 22 August 2026

INTRODUCTION

The breast is a highly modified apocrine sweat gland composed of both epithelial and connective tissue components, and the spectrum of diseases affecting it may be inflammatory, or neoplastic in the form of benign or malignant tumours.^[1] Breast lesions constitute a remarkably heterogeneous group of clinical entities that range from simple inflammatory conditions and fibrocystic change to fibroepithelial tumours, papillary lesions, and a wide range of in-situ and invasive carcinomas, each with distinct morphological features, biological behaviour, and clinical implications.^[2,3]

Breast carcinoma is the most commonly diagnosed cancer among women worldwide and remains a leading cause of cancer-related mortality, with global estimates for 2022 placing it among the top contributors to both cancer incidence and death in women.^[4-12] In India, breast cancer has emerged as the leading female malignancy, and hospital-based cancer registries have documented a rising trend in

incidence, particularly in urban populations.^[12] Despite the predominance of malignant disease in public health discourse, benign breast lesions such as fibroadenoma, fibrocystic disease, and gynecomastia are encountered far more frequently in routine surgical pathology practice and constitute a substantial workload for the histopathology laboratory.^[4,5]

Clinical examination and radiological imaging aid in the preliminary evaluation of a breast lump, but histopathological examination of the excised tissue remains the definitive and most

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DOI:
10.21276/amt.2026.v13.i2.976

How to cite this article: Sharmila R, Doraiswamy JB, Devi. J, Shaji AP, Aurockiadhas AF. Histopathological Spectrum of Breast Lesions in a Tertiary Care Hospital: A Two-Year Retrospective Cross-Sectional Study. *Acta Med Int.* 2026;13(2):1885-1889.

reliable method for accurate diagnosis, as it allows direct visualisation of tissue architecture and cytological detail, and distinguishes benign proliferative changes from atypical and malignant lesions with a precision that neither clinical assessment nor cytology alone can achieve [3,19,20]. Awareness of the relative frequency of the various histopathological subtypes, and of their association with patient age, sex and laterality, is of considerable value to both pathologists and clinicians in framing a rational diagnostic and therapeutic approach. Regional variation in the pattern of breast disease has been reported across different populations, underscoring the need for institution-specific data.^[1,2,4,5]

With this background, the present study was undertaken with the following objectives: (i) to analyse the histopathological spectrum of various breast lesions received in the Department of Pathology; (ii) to study the distribution of these lesions across different age groups; and (iii) to evaluate the frequency, age, gender and histopathological features of breast carcinoma among patients attending a tertiary care hospital in Krishnagiri, Tamil Nadu.

MATERIALS AND METHODS

Study design and setting: This was a retrospective, cross-sectional, observational study conducted in the Department of Pathology, Government Medical College and Hospital, Krishnagiri, Tamil Nadu, India.

Study period: The study spanned a period of two years, from May 2022 to April 2024.

Study population and sample size: All breast specimens received from the Department of Surgery during the study period were included, comprising a total of 116 specimens in the form of lumpectomy, incisional biopsy, trucut biopsy and mastectomy specimens.

Inclusion criteria: Female patients belonging to the pubertal age group (10–14 years), the reproductive age group (15–49 years), and the postmenopausal age group (above 50 years) were included in the study. Specimens obtained by excisional biopsy, incisional biopsy, trucut biopsy and mastectomy were taken up for histopathological evaluation. A small number of male breast specimens received during the study

period, principally for clinically suspected gynecomastia, were also processed and are included in the overall histopathological analysis, though the primary inclusion criteria were framed around female patients.

Exclusion criteria: Women who had been previously treated for breast malignancy were excluded from the study. Females of the prepubertal age group (below 10 years) were also excluded.

Method of study: Specimens received from the Department of Surgery were fixed in 10% neutral buffered formalin. Relevant clinical details, including patient age, sex, tumour location and laterality, were recorded from the biopsy requisition forms. The specimens were grossed and processed by the routine paraffin-embedding technique, and paraffin blocks were sectioned on a rotary microtome to a thickness of 3–4 microns. Sections were stained with the conventional haematoxylin and eosin (H&E) stain and examined under the light microscope by qualified pathologists. Cases were assigned a final histopathological diagnosis, and the biological nature of each lesion was further categorised as benign, malignant, or inadequate for a definitive diagnosis when the tissue sample was insufficient or non-representative.

Statistical analysis: Data were entered into a Microsoft Excel spreadsheet and analysed using descriptive statistics, with categorical variables expressed as frequencies and percentages, and continuous variables expressed as mean $\pm$ standard deviation (SD). The association between age group and the biological nature of the lesion (benign versus malignant) was tested using the chi-square (χ^2) test. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations: The study was conducted after obtaining due institutional approval, and patient confidentiality was maintained throughout data collection and analysis, in accordance with institutional ethical guidelines.

RESULTS

A total of 116 breast specimens were included in the study. The majority of patients were female (94.8%), with a mean age of 44.2 ± 18.2 years. Benign lesions constituted 52.6% of the cases, malignant lesions accounted for 39.7%, and 7.8% of specimens were inadequate for a definitive histopathological diagnosis.

Table 1: Demographic characteristics of the study population (n = 116)

Variable	Frequency (%)
Sex	
Female	110 (94.8)
Male	5 (4.3)
Not specified	1 (0.9)
Age group (years)	
10–20	15 (12.9)
21–30	15 (12.9)
31–40	20 (17.2)
41–50	27 (23.3)
51–60	14 (12.1)
61–70	17 (14.7)
>70	7 (6.0)
Mean age $\pm$ SD	44.2 $\pm$ 18.2 years

Most patients were in the 41–50-year age group (23.3%), followed by the 31–40-year group (17.2%). Female patients

overwhelmingly predominated (94.8%), reflecting the general epidemiology of breast lesions.

Table 2: Histopathological spectrum of breast lesions (n = 116)

Histopathological diagnosis	Frequency (%)
Fibroadenoma	42 (36.2)
Invasive ductal carcinoma	43 (37.1)
Papillary neoplasm	4 (3.4)
Papillary carcinoma	2 (1.7)
Gynecomastia	2 (1.7)
Lipoma	2 (1.7)
Fibrocystic disease	1 (0.9)
Suppurative lesion	1 (0.9)
Other benign lesions	10 (8.6)
Inadequate sample	9 (7.8)

Invasive ductal carcinoma (37.1%) was the most common malignant lesion, while fibroadenoma (36.2%) was the most

common benign lesion. Papillary neoplasms and papillary carcinoma together accounted for 5.1% of cases.

Table 3: Distribution of breast lesions according to biological nature (n = 116)

Nature of lesion	Frequency (%)
Benign	61 (52.6)
Malignant	46 (39.7)
Inadequate for diagnosis	9 (7.8)

Benign lesions were slightly more common than malignant lesions, constituting 52.6% of all breast specimens. Malignant lesions accounted for 39.7%, indicating a

substantial burden of breast carcinoma in this tertiary care centre.

Table 4: Association between age group and nature of breast lesion

Age group (years)	Benign n (%)	Malignant n (%)
10–20	13 (86.7)	1 (6.7)
21–30	15 (100.0)	0 (0.0)
31–40	14 (70.0)	5 (25.0)
41–50	11 (40.7)	13 (48.1)
51–60	4 (28.6)	9 (64.3)
61–70	4 (23.5)	11 (64.7)
>70	0 (0.0)	7 (100.0)
Chi-square test		$\chi^2 = 44.95$, $p < 0.001$

A statistically significant association was observed between age group and the biological nature of breast lesions ($\chi^2 = 44.95$, $p < 0.001$). Benign lesions predominated in younger

women (≤ 30 years), whereas malignant lesions increased markedly after 40 years of age, with all patients above 70 years having malignant lesions.

Table 5: Laterality of breast lesions and procedures performed (n = 116)

Variable	Frequency (%)
Laterality	
Right breast	62 (53.4)
Left breast	44 (37.9)
Bilateral	5 (4.3)
Not specified	5 (4.3)
Procedure performed	
Excision biopsy	49 (42.2)
Modified radical mastectomy (MRM)	35 (30.2)
Incision biopsy	13 (11.2)
Trucut biopsy	10 (8.6)
Webster procedure	3 (2.6)
Other procedures	6 (5.2)

The right breast was more commonly affected (53.4%) than the left breast (37.9%). Excision biopsy was the most frequently performed procedure (42.2%), while modified radical mastectomy (MRM) accounted for 30.2% of procedures, reflecting the proportion of malignant breast lesions requiring definitive surgical management.

DISCUSSION

In the present study, breast lesions were overwhelmingly encountered in female patients (94.8%), consistent with the well-established epidemiology of breast disease, though a small proportion of male specimens (4.3%), largely representing gynecomastia, were also received, in keeping with the recognised, if uncommon, occurrence of male breast disease.^[14]

The mean age of patients in this study was 44.2 ± 18.2 years, which is somewhat higher than that reported by Boral and Jagtap (30.45 years),^[7] and Prabhu et al. in their South Indian tertiary hospital series, but broadly comparable to hospital-based series from other tertiary centres in India where a wider distribution of benign and malignant disease was represented.^[4,5] This difference likely reflects the more balanced representation of malignant disease, which typically presents at an older age, in the present cohort as compared with series that are weighted more heavily towards benign fibroepithelial lesions occurring in younger reproductive-age women.^[6,9]

Fibroadenoma emerged as the single most common benign lesion in this study (36.2%), a finding that is consistent with an extensive body of literature from tertiary care centres across the Indian subcontinent, where fibroadenoma is almost universally reported as the leading benign breast lesion, typically accounting for between one-third and two-thirds of benign specimens.^[1,2,4,5,7,9] Boral and Jagtap similarly reported fibroadenoma in 66% of benign breast disease specimens,^[7] while other Indian series have reported comparable, if somewhat lower, proportions in the range of 24–52%,^[4,5,17,18] The predominance of fibroadenoma reflects its status as the most common benign fibroepithelial neoplasm of the breast, arising from hyperplasia of a single terminal ductolobular unit under hormonal influence, and its well-documented peak incidence among women in the second and third decades of life.^[6,17]

Invasive ductal carcinoma was the most frequently diagnosed malignant lesion in the present series (37.1% of all specimens, and the great majority of malignant cases), which is in agreement with the near-universal observation across breast pathology literature that invasive carcinoma of no special type is the predominant histological subtype of breast cancer, typically accounting for 70–80% of all invasive breast malignancies.^[12,13] This finding is corroborated by several regional studies, including that of Memon et al. from Pakistan, in which intraductal/invasive carcinoma was identified in the overwhelming majority of malignant cases (91.1%),^[10] and is consistent with global cancer burden data, which identify breast carcinoma, predominantly of ductal origin, as the most frequently diagnosed cancer in women.^[12] Papillary neoplasms and papillary carcinoma together accounted for a small but notable proportion of cases (5.1%) in this study; papillary lesions of the breast are well recognised to pose considerable diagnostic difficulty because of overlapping morphological and immunohistochemical features between benign, atypical and malignant categories, a challenge that has been extensively documented in the literature and that underscores the importance of careful histopathological evaluation, particularly in core needle biopsy specimens where sampling is limited.^[19,20]

A statistically significant association was found between increasing age and the likelihood of a malignant diagnosis ($\chi^2 = 44.95$, $p < 0.001$), with benign lesions predominating in women below 30 years of age and malignant lesions becoming increasingly frequent from the fifth decade onward, a pattern mirrored in numerous prior studies that have demonstrated a similar age-related shift from benign to

malignant breast pathology.^[1,2,4,5,10] This trend is consistent with the biological understanding that fibroadenoma and other benign proliferative lesions are hormonally driven and therefore more prevalent during the reproductive years, whereas the cumulative acquisition of genetic alterations with advancing age underlies the rising incidence of carcinoma in older women.^[12,13] The finding that all patients above 70 years of age in this cohort had malignant disease, while based on a small subgroup, reinforces the clinical teaching that any new breast lump in an elderly woman should be regarded with a high index of suspicion for malignancy until proven otherwise.

The right breast was affected marginally more often than the left (53.4% versus 37.9%) in the present study, a finding that has been variably reported in the literature, with some series noting a slight right-sided predominance and others reporting near-equal or left-sided predominance; this asymmetry is generally regarded as incidental rather than of established biological significance.^[4,5,10] With regard to the surgical procedures performed, excision biopsy was the most common (42.2%), reflecting the substantial proportion of benign, well-circumscribed lesions such as fibroadenoma that are amenable to simple excision, while modified radical mastectomy was required in 30.2% of cases, corresponding closely to the proportion of malignant lesions identified on final histopathology and reflecting the definitive surgical management typically required for invasive breast carcinoma in this setting.^[10,13]

Gynecomastia, though an uncommon benign lesion in this series (1.7%), remains an important entity in male breast pathology, characterised histologically by ductal epithelial hyperplasia and peri-ductal stromal changes, and its presence in this cohort is consistent with its recognised status as the most common cause of a palpable male breast mass, usually reflecting an imbalance between oestrogenic and androgenic stimulation of breast tissue.^[14] Fine needle aspiration cytology (FNAC), although not the primary focus of the present histopathological study, continues to serve as a valuable first-line, minimally invasive triage tool in the evaluation of a palpable breast lump, with several studies reporting a close correlation between cytological and final histopathological diagnosis, particularly for common benign entities such as fibroadenoma and fibrocystic disease.^[15–18] Immunohistochemical markers such as p63, which selectively highlights the myoepithelial cell layer, have also been shown to be of considerable value in distinguishing benign proliferative lesions from invasive carcinoma in diagnostically challenging cases, and represent a useful adjunct where morphology alone is equivocal.^[8,9]

This study has certain limitations that merit consideration. It was conducted at a single tertiary care centre over a two-year period with a relatively modest sample size of 116 specimens, which may limit the generalisability of the findings to the wider population and reduces the statistical power for subgroup analyses, particularly for uncommon lesions such as papillary carcinoma and gynecomastia. As a retrospective study based on archived histopathology requisition forms and slides, it was also subject to the inherent limitations of incomplete clinical documentation in a small proportion of cases, and did not incorporate ancillary immunohistochemical or molecular data, such as hormone receptor or HER2/neu status, which would have added further prognostic and biological depth to the malignant

cases identified. Future prospective, multicentric studies incorporating a larger sample size and molecular characterisation of breast carcinoma would be valuable in further defining the histopathological and biological spectrum of breast disease in this population.

CONCLUSION

This study demonstrates that breast lesions in this tertiary care hospital population predominantly affect women in the fourth and fifth decades of life, with fibroadenoma and invasive ductal carcinoma representing the most common benign and malignant lesions, respectively. A statistically significant and clinically important association exists between increasing age and the likelihood of malignancy, with the risk of a malignant diagnosis rising sharply after the age of 40 years. These findings reinforce the essential role of histopathological examination as the diagnostic gold standard for breast lesions and highlight the need for heightened clinical vigilance, timely biopsy, and appropriate surgical management of breast lumps in women of all age groups, but particularly in those beyond the fourth decade of life. Continued institutional audit of the histopathological spectrum of breast disease will help refine local diagnostic and treatment protocols and contribute to the wider understanding of the regional epidemiology of breast lesions.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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