



Clinical, Radiological and Pathological evaluation of breast lumps: a cross-sectional study from a tertiary care hospital of north-east India

Kaushik Datta^{1*}, Susmita Dutta², Diptendu Chaudhuri³

ABSTRACT

Background

Breast lumps are a frequent clinical finding among women, ranging from benign lesions to malignant conditions. Differentiating these lesions accurately is critical for timely diagnosis and treatment, especially in resource-limited settings. In India, breast cancer remains the most common cancer among women, with variable presentations. This study investigates the clinical, radiological, and pathological features of breast lumps in patients at a tertiary care hospital in Tripura, northeast India.

Methods

This cross-sectional study included 180 female patients with palpable breast lumps, excluding those previously diagnosed or unwilling to consent. Each patient underwent clinical examination, imaging (mammography or ultrasonography based on age), and Fine Needle Aspiration Cytology (FNAC) for preliminary diagnosis. In cases of atypical or indeterminate FNAC findings, biopsy was conducted for histopathological confirmation.

Results

The mean age of participants was 38.5 years. The cytological findings from Fine Needle Aspiration Cytology (FNAC) in 180 patients revealed that 76.7% of patients had benign lesions, while 17.2% had malignant lesions. After the histopathological findings as the final diagnosis, 33 cases were malignant and 147 cases were reported as of benign origin. Most lumps were located in the upper outer quadrant (42.2%). FNAC findings revealed that 76.7% of cases were benign, while 17.2% were malignant. Histopathological analysis confirmed fibroadenoma as the most common benign lesion (45.5%), and invasive ductal carcinoma as the predominant malignant type (15.5%).

Conclusion

Fibroadenoma and invasive ductal carcinoma were the most common benign and malignant breast lesions, respectively. Early detection and accurate differentiation of breast lumps are essential, particularly in limited-resource settings, to reduce morbidity and mortality. These findings emphasize the importance of structured diagnostic protocols to optimize patient outcomes.

Keywords: *breast lump, BIRADS, invasive ductal carcinoma, fibroadenoma, FNAC.*

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INTRODUCTION

Breast lumps are one of the most common clinical presentations in women and can be indicative of a range of underlying pathologies, from benign conditions to malignancies.^{1,2} The accurate diagnosis and management of breast lumps rely on a combination of clinical examination, radiological imaging, and pathological assessment.^{3,4} Early detection of malignant breast lesions is critical for improving prognosis and survival rates, making it essential to develop an integrated diagnostic approach that leverages these modalities effectively.⁵

Breast cancer remains a leading cause of morbidity and mortality among women globally. According to ICMR, in India, it is the most frequently diagnosed cancer in women, accounting for a significant proportion of cancer-related deaths.⁶ However, not all breast lumps are malignant; benign breast diseases, such as fibroadenomas, cysts, and fibrocystic changes, are also common and require differentiation from malignant lesions to avoid unnecessary interventions and anxiety.⁷

The diagnostic workup of breast lumps typically involves a "triple assessment," which includes clinical examination, radiological evaluation (mammography, ultrasonography, or MRI), and histopathological examination. Each of these diagnostic tools offers unique insights into the nature of the breast lump, and when used in conjunction, they significantly improve diagnostic accuracy.³

Despite advancements in diagnostic techniques, accurately differentiating between benign and malignant breast lesions remains challenging, particularly in resource-limited settings. In Tripura, breast cancer is the second most prevalent cancer among females, accounting for 14.4% of all cancers in women. While data on breast cancer prevalence exists, there is currently no research that specifically investigates the patterns of breast lumps among women in this region. Therefore, this study aimed to evaluate the clinical, radiological, and pathological characteristics of patients presenting with breast lumps from a tertiary care centre in Tripura.

Material & methodology

Study design, duration and settings

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This was a hospital-based cross-sectional study carried out in the Department of General Surgery, in collaboration with the Department of Pathology and Department of Radiology, Agartala Government Medical College & GBP Hospital (AGMC & GBPH), Tripura, India between January 2021 and December 2021.

Study population and selection criteria

All female patients with breast lumps presented to the Department of Surgery during the study period. All female patients with breast lumps attending the Surgery out-patients department (OPD) were included. While patients already diagnosed by cytology or histopathology, patients with coagulopathy, pregnant females, and participants unwilling to give informed written consent were excluded.

Sample size and sampling

A total of 195 female patients with breast lumps were treated during the study period. However, after considering the inclusion and exclusion criteria, 180 participants were considered as the final sample size. Nonprobability sampling was done to select participants.

Study procedures and data collection

Prior to enrollment, informed consent was obtained from all eligible subjects. All patients meeting the eligibility criteria, who attended the Surgery Outpatient Department (OPD), underwent a standard, structured clinical breast examination. During the examination, specific individual characteristics of the breast lump were recorded, including nipple retraction, presence of peau d'orange, lump consistency (ranging from firm to hard), irregularity of the lump margins, fixation to the skin, fixity of the lump to underlying structures, presence of palpable axillary lymph nodes. Patients aged 40 years and above were subjected to mammography, while those below 40 years underwent ultrasonography (USG). Based on the radiological findings, cases were categorized according to their Breast Imaging Reporting and Data System (BIRADS) score. Following the radiological assessment, all patients underwent Fine Needle Aspiration Cytology (FNAC) for cytological evaluation. In cases where FNAC results were indeterminate, atypical, or suspicious for malignancy, excision biopsy or tru-cut biopsy was performed for definitive diagnosis through histopathological examination. A semi-structured

proforma was used to systematically collect all relevant clinical, radiological, and pathological data.

Data analysis

Data were analyzed and interpreted to pursue defined objectives by using tables and graphs using Microsoft Excel and IBM SPSS, version 26.0. Qualitative variables were summarized using percentages, and quantitative variables were summarized using mean (SD).

Ethical consideration

This study was approved by the Institutional Ethics

Committee, Agartala Government Medical College and GBP Hospital, Agartala, Tripura, India. Informed written consent was taken from the participants before enrolment and were treated as per guidelines. Data obtained from this study was kept confidential and used for research purposes only.

Results

The mean age of the participants was 38.5 (± 11.7) years, ranging from 17 to 73 years. Most of the patients were 21-40 years old, followed by 41-60 years old (**Table 1**).

Table 1: Age distribution of patients (n=180)

Age-group	Frequency	Percentage
≤20	17	9.4%
21-40	99	55.0%
41-60	51	28.3%
>60	13	7.2%

Clinical and Radiological findings

Majority (42.2%) of the lumps were observed in the upper outer quadrant. During clinical examination, peau d' orange appearance was observed in 2.8% of patients, while irregular margins were noted in 26.1% of cases. Fixation of the lump to the skin was

present in 9.4% of patients, and fixation to the underlying structure was observed in 6.1% of patients. Palpable axillary lymph nodes were detected in 16.1% of the patients (**Table 2**).

Table 2: Distribution of clinical presentation (n=180)

Criteria	Sub-category	Frequency	Percentage
Location	Upper outer	76	42.2%
	Upper inner	43	23.9%
	Lower outer	33	18.3%
	Lower inner	14	7.8%
	Central	14	7.8%
Nipple Retraction	Absent	173	96.1%
	Present	7	3.9%
Peau-d-Orange	Absent	175	97.2%
	Present	5	2.8%
Consistency of lump	Firm	121	67.2%
	Hard	38	21.1%
	Soft	21	11.7%
Margin	Irregular	47	26.1%
	Regular	133	73.9%
Fixity To Skin	Fixed	17	9.4%

Fixity To Underlying Structure	Not Fixed	163	90.6%
	Fixed	11	6.1%
Palpable Axillary Lymph Node	Not Fixed	169	93.9%
	Not Palpable	151	83.9%
	Palpable	29	16.1%

The radiological findings based on the BIRADS classification revealed that 65.5% (118/180) of patients had BIRADS II lesions, followed by BIRADS V being the second most frequent category in 15%

(27/180) of patients. BIRADS III and BIRADS IV lesions were present in 11.7%(21/180) and 7.8%(14/180) of patients respectively (**Table 3**).

BIRADS category	Frequency	Percentage
BIRADS II	118	65.5
BIRADS III	21	11.7
BIRADS IV	14	7.8
BIRADS V	27	15.0

Cytological and histopathological findings

The cytological findings from Fine Needle Aspiration Cytology (FNAC) in 180 patients revealed that 76.7%

of patients had benign lesions, while 17.2% had malignant lesions (**Figure 1**).

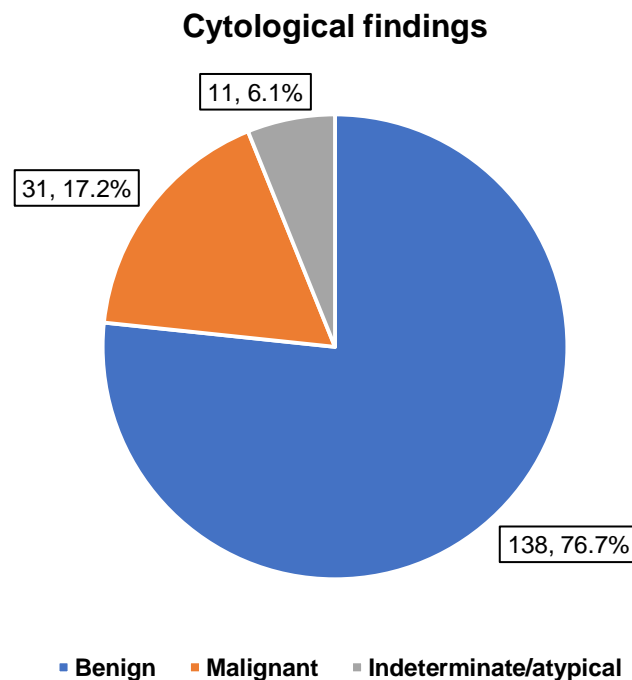


Figure 1: Distribution of cytological findings (n=180)

Those who had indeterminate/atypical findings in FNAC were further subjected to excision biopsy, and it was found that among the 11 cases, two turned out to be malignant lesions, while the rest were benign lesions. After the histopathological findings as the

final diagnosis, 33 cases were malignant and 147 cases were reported as of benign origin. The distribution of clinical findings according to the category of lump is depicted in **Table 4**.

Table 4: Distribution of clinical findings according to lump category

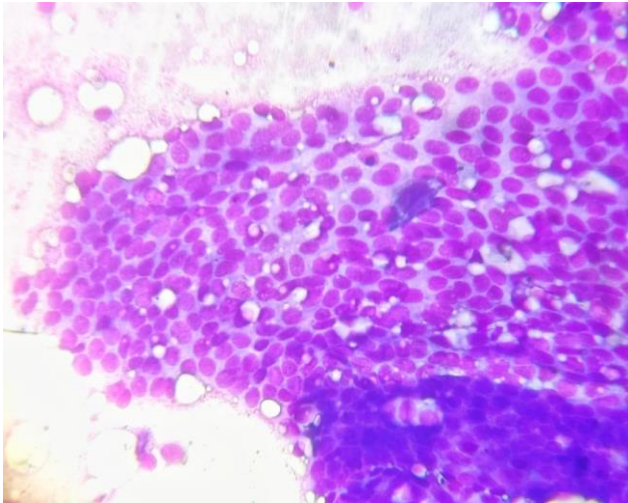
Clinical findings	Benign	Malignant	Total
Location			
Upper outer	61	15	76
Upper inner	35	8	43
Lower outer	28	5	33
Lower inner	12	2	14
Central	11	3	14
Nipple Retraction			
Absent	147	26	173
Present	0	7	7
Peau D Oorange			
Absent	147	28	175
Present	0	5	5
Consistency			
Firm	117	4	121
Hard	9	29	38
Soft	21	0	21
Margin			
Irregular	22	25	47
Regular	125	8	133
Fixity To Skin			
Fixed	3	14	17
Not Fixed	144	19	163
Fixity To Underlying Structure			
Fixed	1	10	11
Not Fixed	146	23	169
Palpable Axillary Lymph Node			
Not Palpable	133	18	151
Palpable	14	15	29
Total	147	33	180

The final diagnosis of all patients (n=180) showed that the most common condition was fibroadenoma (**Figure 2a, 2b, 2c**) accounting for 45.5% (n=82) of

cases, followed by fibrocystic disease at 17.2% (n=31).

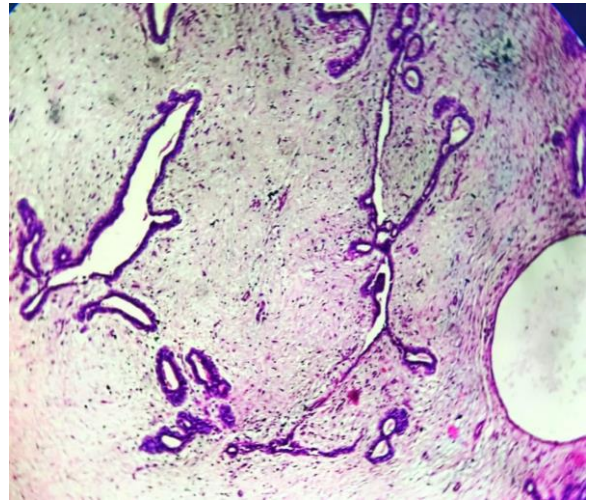
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Figure 2a: Fibroadenoma



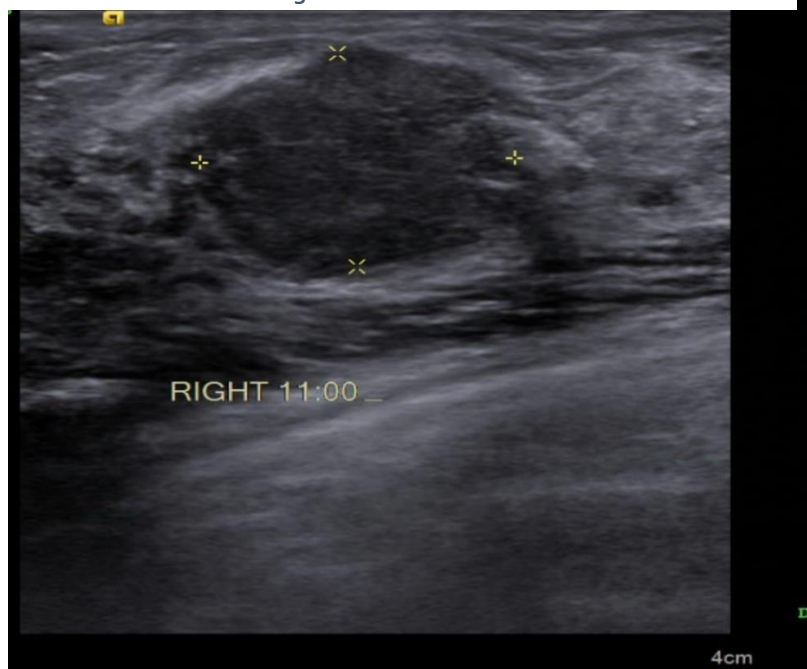
(Fine-needle aspiration cytology,
Haematoxylin and Eosin stain, 400x magnification)

.Figure 2a: Fibroadenoma



(Histopathology, Haematoxylin and Eosin stain, 100x
magnification)

Figure 2c: Fibroadenoma

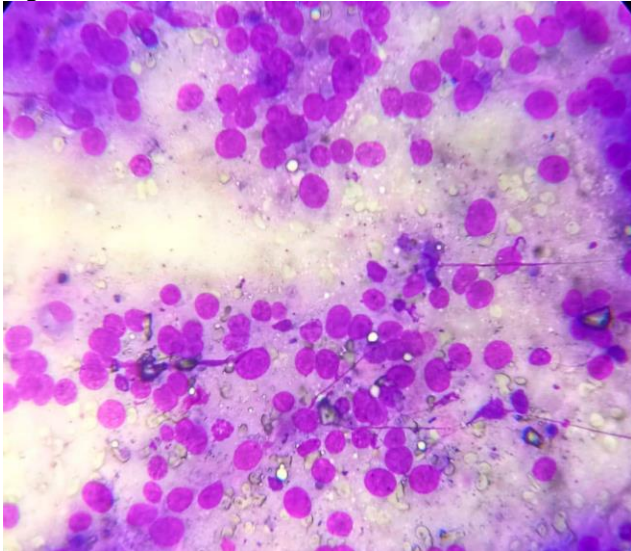


(Ultrasonography of breast lump of a 29-year-old female showing a well-defined hypoechoic, ovoid, wider than taller lesion without any architectural distortion and microcalcification)

Invasive ductal carcinoma (**Figure 3a, 3b**) was identified in 15.5% (n=28) of patients, while chronic mastitis and acute mastitis were diagnosed in 6.6% (n=12) and 5.0% (n=9) of patients, respectively. Other less common conditions included granulomatous lobular mastitis (1.7%), galactocele

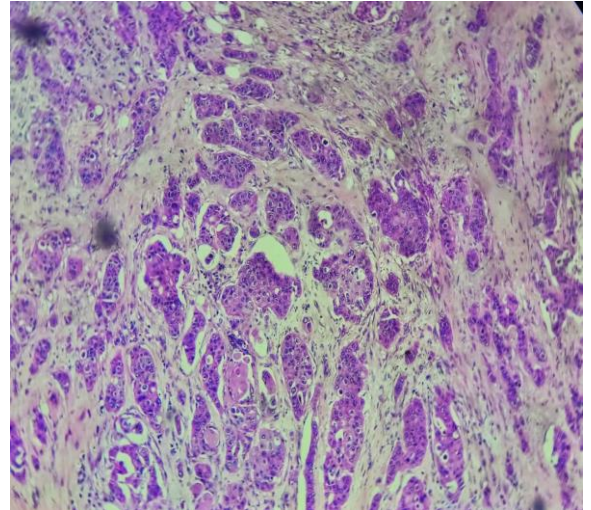
(1.7%), mucinous carcinoma (1.1%), medullary carcinoma (1.1%), benign epithelial proliferative lesion (1.1%), lipoma (1.1%), duct ectasia (0.6%), hemangioma (0.6%), phyllodes tumor (0.6%) and lobular carcinoma (0.6%).

Figure 3a: Ductal carcinoma



(Fine-needle aspiration cytology, Haematoxylin and Eosin stain, 400x magnification)

Figure 3b: Invasive Ductal carcinoma



(Histopathology, Haematoxylin and Eosin stain, 100x magnification)

These findings highlight the diverse spectrum of breast lesions encountered in the study population (**Table 5**).

Table 5: Distribution of final diagnosis (n=180)

Final Diagnosis	Frequency	Percentage
Fibroadenoma	82	45.5%
Fibrocystic Disease	31	17.2%
Invasive Ductal Carcinoma	28	15.5%
Chronic Mastitis	12	6.6%
Acute Mastitis	9	5.0%
Granulomatous Lobular Mastitis	3	1.7%
Galactocele	3	1.7%
Mucinous Carcinoma	2	1.1%
Medullary Carcinoma	2	1.1%
Benign Epithelial Proliferative Lesion	2	1.1%
Lipoma	2	1.1%
Duct Ectasia	1	0.6%
Hemangioma	1	0.6%
Phyllodes	1	0.6%
Lobular Carcinoma	1	0.6%
TOTAL	180	100.0%



DISCUSSION

The mean age of the patients in our study was 38.5 (± 11.7) years, with a range from 17 to 73 years, which is notably younger than the findings reported by Eng et al.⁸ However, a study conducted in Bihar reported a mean age of 34.5 years among patients presenting with breast lumps.⁹ In our study, the majority (55%) of patients fell within the 21-40 year age group, aligning with the findings of Hussain et al. and Hiremath et al.^{10,11} Similarly, studies from abroad like Akinnibosun-Raji et al. found that the age of patients ranged from 16 to 75 years, with a mean of 33.03 ± 12.32 years, while Bello et al. reported an age range of 18 to 69 years with a mean of 34.66 ± 13.99 years.^{12,13} These findings suggest that younger, premenopausal women are at a higher risk for non-proliferative breast diseases, which may explain why the mean age of patients presenting with palpable breast lumps in these studies was consistently young.

The cytological and histopathological findings in this study highlight the diverse spectrum of breast lesions in the population, aligning with patterns reported in similar research across India. Fine Needle Aspiration Cytology (FNAC) identified that 76.7% of the cases were benign, while 17.2% were malignant. These figures are consistent with the regional data, though slight variations reflect the heterogeneity of breast pathology across geographic and clinical settings. For instance, Srivastava et al. conducted a study in Bihar, reporting 79.5% of breast lesions as benign or non-neoplastic, with 20.5% classified as malignant.⁹ Sankaye et al., in a broader cohort of 225 cases, observed 58.22% benign and 28.88% malignant lesions, while 5.7% of cytological samples were deemed unsatisfactory.¹⁴ Similarly, Mohan et al. reported 58.25% of cases as benign and 41.75% as atypical or malignant, presenting a notably higher incidence of malignancy compared to both the present study and other cited research.¹⁵ This divergence highlights the need for a critical examination of regional differences in screening practices, awareness, and healthcare infrastructure, which may account for earlier or more frequent detection of malignant lesions in some populations. Taken together, these studies suggest a consistent yet regionally influenced trend in the cytological distribution of breast lesions in India. The convergence in benign lesion prevalence across studies strengthens the case for targeted early

screening programs to optimize clinical outcomes. However, the variation in malignant cases across different regions emphasizes the need for further exploration of the underlying factors, including genetic predispositions, environmental influences, and healthcare accessibility, which may be driving these differences. In this study, fibroadenoma was the most common benign breast lesion, accounting for 45.5% of cases. This finding is consistent with several other studies, including those by Srivastava et al., who reported a higher prevalence of fibroadenoma at 57.23%, and Hussain et al., who observed fibroadenoma in 64% of cases.^{9,10} Malini et al. also identified fibroadenoma in 48.3% of benign cases, while Sankaye et al. reported a similar frequency, with 46.56% of benign lesions being fibroadenomas.^{14,16} These findings collectively reinforce fibroadenoma as the predominant benign breast lesion across different regions. The second most common benign condition seen among the patients was fibrocystic disease, present in 17.2% of cases. This aligns with reports from Mohan et al., Sankaye et al., and Hussain et al., where fibrocystic disease was similarly noted as the second most frequent benign finding.^{10,14,15} These lesions, though benign, often require careful differentiation from malignant conditions due to their overlapping clinical presentations. Less common benign conditions, including granulomatous lobular mastitis, galactocele, lipoma, duct ectasia, phyllodes tumors and hemangioma were also identified. While rare, these lesions contribute to the broad spectrum of breast pathology and should be considered in differential diagnoses, particularly in patients presenting with atypical clinical features. In addition, chronic mastitis was observed in 6.6% of cases, and acute mastitis in 5.0%, underscoring the prevalence of inflammatory breast conditions in patients with breast lumps. This is consistent with existing literature, highlighting the importance of including mastitis in differential diagnoses for breast lesions, particularly in regions where inflammatory conditions are common.

Among the malignant lesions, invasive ductal carcinoma was the most prevalent, reflecting a well-established trend. In Sankaye et al.'s study, infiltrating ductal carcinoma accounted for 84.62% of all malignant breast lesions, further confirming its dominant role in breast cancer pathology.¹⁴ Mohan

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et al. also reported similar trends, reinforcing the predominance of ductal carcinoma and the importance of a comprehensive diagnostic approach.¹⁵ However, Srivastava et al. reported invasive carcinoma of no special type as the most common malignancy (73.17%), followed by medullary carcinoma (16.63%) and less frequent types such as invasive papillary carcinoma.⁹ Other rarer malignancies detected in this study, such as mucinous carcinoma (1.1%), medullary

carcinoma (1.1%), and lobular carcinoma (0.6%), were consistent with their known low prevalence in the general population. These findings highlight both the consistency and variability in the presentation of breast lesions across different studies, emphasizing the need for a thorough and individualized diagnostic approach.

Strengths and limitations

This study represents the first of its kind in Tripura, north-east India, focusing on the clinical, radiological, and pathological patterns of breast lumps among female patients. However, several limitations should be considered. The institution-based design limits the generalizability of the findings to the broader population, as the sample is restricted to patients attending this specific healthcare facility. Additionally, the potential for

selection bias cannot be overlooked, as health-conscious individuals may have been more likely to seek medical evaluation, potentially skewing the results. These factors should be taken into consideration when interpreting the findings and applying them to larger populations.

Conclusion

This study provides a comprehensive overview of the clinical, pathological, and radiological characteristics of breast lumps in patients attending a tertiary care center in northeast India. The majority of patients were between 21-40 years old, with benign breast lesions being the most prevalent. Fibroadenoma emerged as the most common benign tumor, while invasive ductal carcinoma was the leading malignancy identified. These findings emphasize the critical need for early detection and timely intervention, especially in cases with clinical and radiological signs suggestive of malignancy, to improve patient outcomes and optimize management strategies in similar healthcare settings.

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