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Original Research Article

A Descriptive Study on Clinical, Radiological, and Pathological Profile of Inflammatory Conditions of the Breast: A Prospective Study from a Tertiary Care Center in North India

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Abstract:

Background: Inflammatory breast diseases are a heterogeneous group of conditions that often clinically and radiologically mimic breast carcinoma. A comprehensive evaluation is required for accurate diagnosis and management.

Methods: This prospective descriptive study included 60 female patients presenting with inflammatory breast conditions at a tertiary care center between April 2024 and September 2025. Clinical features, laboratory parameters, imaging findings, pathological diagnosis, and treatment outcomes were analyzed.

Results: The mean age was 30.6 ± 6.0 years. Idiopathic granulomatous mastitis (26.7%) was the most common diagnosis, followed by non-lactational abscess (20%) and periductal mastitis/duct ectasia (18.3%). Ultrasound commonly revealed ill-defined hypoechoic masses, while histopathology confirmed granulomatous inflammation in most cases.

Conclusion: Inflammatory breast conditions predominantly affect young women and frequently mimic malignancy. Integrated clinical, radiological, and pathological assessment is essential for accurate diagnosis and optimal management.

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Introduction

Inflammatory conditions of the breast represent a diverse group of disorders encompassing infective and non-infective etiologies. These conditions commonly present with breast lump, pain, erythema, skin thickening, and nipple discharge, often closely resembling breast carcinoma in both clinical and radiological appearance. As a result, inflammatory breast diseases pose a significant diagnostic challenge and are a frequent cause of patient anxiety, delayed diagnosis, and occasionally unnecessary surgical intervention [1,2].

Traditionally, breast inflammation has been associated with lactation; however, recent literature has highlighted an increasing prevalence of non-lactational inflammatory breast disorders, including idiopathic granulomatous mastitis, periductal mastitis, and chronic breast abscesses [2–6]. These entities are particularly important in developing countries, where additional etiologies such as tubercular mastitis remain clinically relevant [7,8]. Despite this, existing literature largely focuses on individual disease entities, with limited data integrating clinical, radiological, and pathological features into a unified diagnostic framework.

Accurate diagnosis of inflammatory breast conditions requires a multidisciplinary approach involving careful clinical assessment, appropriate imaging, and pathological confirmation. Ultrasound and mammography provide valuable initial information but often yield non-specific findings. Consequently, fine-needle aspiration cytology and core needle biopsy play a pivotal role in establishing definitive diagnosis and excluding malignancy. There remains a paucity of prospective studies from the Indian subcontinent evaluating the combined clinicoradiological and pathological profile of inflammatory breast diseases.

The present study was undertaken to systematically evaluate the clinical presentation, radiological findings, and pathological spectrum of inflammatory breast conditions in patients presenting to a tertiary

care center in North India, and to correlate these findings with management strategies and outcomes.

Materials and Methods

Study Design and Setting: This was a prospective descriptive study conducted in the Departments of General Surgery, Radiology, and Pathology at University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi, a tertiary care referral center in North India. The study was carried out over a period of 18 months from April 2024 to September 2025.

Study Population: All female patients aged 12 years and above presenting to the surgical outpatient department or emergency services with clinical features suggestive of inflammatory breast disease were screened for inclusion. Patients willing to provide informed consent were enrolled in the study.

Inclusion and Exclusion Criteria: Inclusion criteria comprised patients with clinical diagnosis of inflammatory breast conditions, including infective, non-infective, and malignant inflammatory presentations. Patients with benign breast conditions without inflammation (such as mastalgia, fibroadenoma, or physiological nipple discharge) and those with breast carcinoma without inflammatory features were excluded from the study.

Sample Size: The sample size was calculated based on previously published data reporting a prevalence of infective inflammatory breast conditions of approximately 67%, with a 5% alpha error and 15% margin of error. Although a sample size of 84 was estimated, a minimum convenient sample size of 60 patients was included due to feasibility constraints.

Data Collection and Investigations: All enrolled patients underwent detailed clinical evaluation including demographic data, duration of symptoms, lactational status, comorbidities, and presenting complaints. Laboratory investigations included hemoglobin, total leukocyte count, and erythrocyte sedimentation rate. Radiological evaluation consisted of ultrasonography of the breast and axilla with Doppler using a high-frequency linear probe (3–12 MHz). Mammography and magnetic resonance imaging were performed selectively when indicated.

Pathological evaluation was performed using fine-needle aspiration cytology and/or core needle biopsy in cases with suspicious or non-resolving lesions. Acid-fast bacilli staining was carried out when tuberculosis was suspected. Management decisions were based on clinicoradiological and pathological findings and included medical therapy and surgical or minimally invasive interventions as appropriate.

Outcome Measures and Statistical Analysis: The primary outcomes assessed were the clinical profile, radiological characteristics, pathological diagnosis, and treatment modalities employed in inflammatory breast diseases. Data were entered into Microsoft Excel and analyzed using SPSS version 20.0. Descriptive statistics were used to summarize categorical variables as frequencies and percentages and continuous variables as mean ± standard deviation.

Results

Table 1: Age Distribution (n=60)

Age group (years)	Number	Percentage
21–30	31	51.7
31–40	26	43.3
41–50	3	5.0

Table 2: Duration of Symptoms (n=60)

Duration	Number	Percentage
<1 week	15	25.0
1–2 weeks	20	33.3
3–4 weeks	4	6.7
>4 weeks	21	35.0

Table 3: Clinical Presentation (n=60)

Feature	Number	Percentage
Breast lump	55	91.7
Pain	32	53.3
Skin changes	42	70.0
Nipple discharge	23	38.3
Fever	10	16.7

Table 4: Lactational Status

Status	Number	Percentage
Lactating	13	22.0
Non-lactating	47	78.0

Table 5: Final Diagnosis Distribution (n=60)

Diagnosis	Number	Percentage
Idiopathic granulomatous mastitis	16	26.7
Non-lactational abscess	12	20.0
Periductal mastitis / duct ectasia	11	18.3
Lactational abscess	6	10.0
Lactational mastitis	4	6.7
Tubercular mastitis	4	6.7
Others	7	11.6

Table 6: Ultrasound Findings (n=59) [9,11].

Finding	Number	Percentage
Mass lesion	55	93.2
Ill-defined margins	34	57.6
Hypoechoic lesion	38	64.4
Skin thickening	23	39.0
Increased vascularity	27	45.8

Table 7: BI-RADS Category (n=59)

BI-RADS	Number	Percentage
2	29	49.2
3	26	44.1
4	3	5.1
5	1	1.7

Table 8: FNAC Findings (n=23)

Finding	Number	Percentage
Giant cells	16	69.5
Caseating necrosis	4	17.4
AFB positive	3	13.0

Table 9: Histopathology on Core Needle Biopsy (n=13)

Diagnosis	Number	Percentage
Granulomatous mastitis	11	84.6
Tubercular mastitis	2	15.4

Table 10: Treatment Modalities (n=60)

Treatment	Number	Percentage
NSAIDs	60	100
Antibiotics	45	75.0
Steroids	9	15.0
Anti-tubercular therapy	4	6.7
Aspiration / I&D	32	53.3

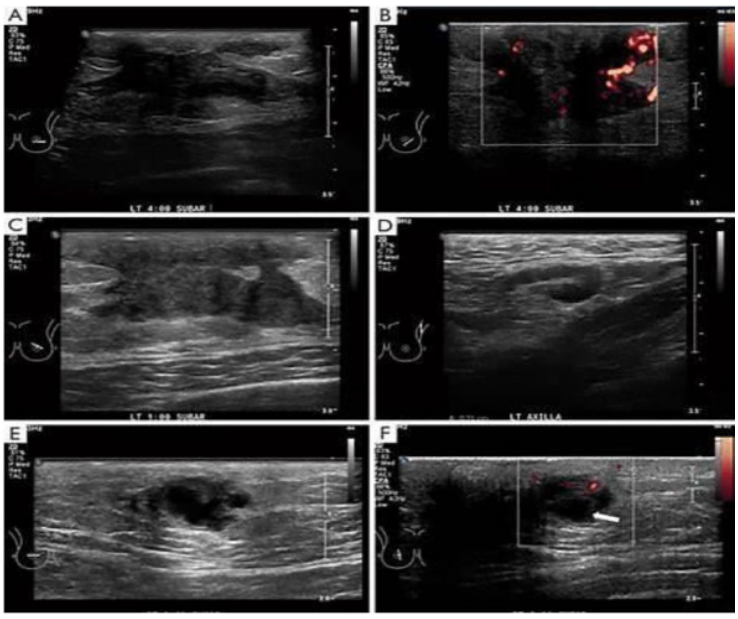

Figure 1: Ultrasound image showing ill-defined hypoechoic lesion with surrounding edema.

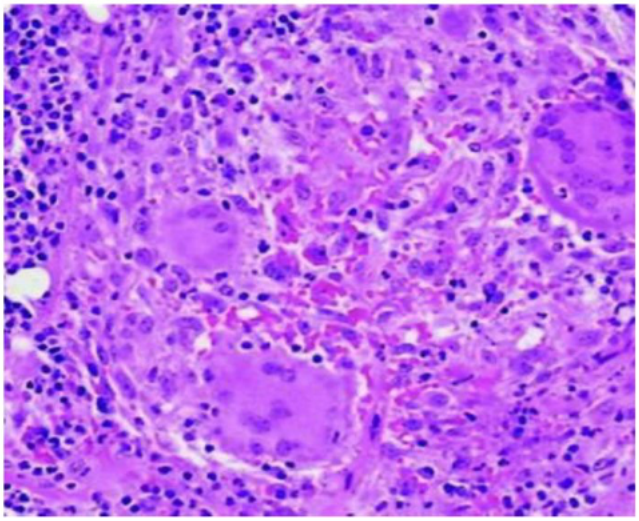

Figure 2: Histopathology (H&E stain) showing non-caseating granulomas consistent with granulomatous mastitis.

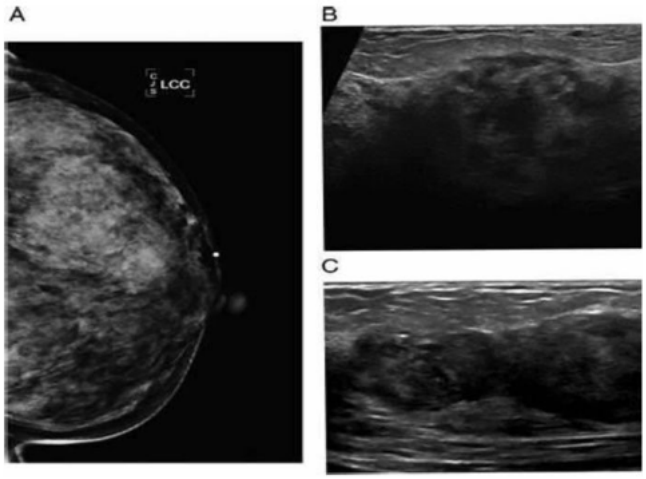

Figure 3: Mammography showing increased density with ill-defined margins. [2–6]. [9,11].

Discussion

This prospective descriptive study provides a comprehensive overview of the clinical, radiological, and pathological spectrum of inflammatory breast conditions encountered at a tertiary care center in North India. The principal finding of this study is the predominance of non-lactational inflammatory breast diseases, with idiopathic granulomatous mastitis emerging as the most frequent diagnosis (26.7%). This observation is clinically significant, as granulomatous mastitis is a benign yet chronic inflammatory condition that often mimics breast carcinoma, leading to diagnostic uncertainty and potentially unnecessary surgical interventions.

The age distribution in our cohort, with a mean age of 30.6 years and majority of patients in the 21–40-year age group, is consistent with published literature, which describes inflammatory breast diseases as predominantly affecting women of reproductive age [2–6]. The high proportion of non-lactating patients (78%) in our study further supports the growing recognition of non-puerperal mastitis and granulomatous mastitis as important clinical entities distinct from classical lactational mastitis.

Our finding of idiopathic granulomatous mastitis as the most common diagnosis is comparable to reports by Barreto et al. and Akcan et al., who observed a rising incidence of granulomatous mastitis in tertiary care settings [2,6]. The etiology of this condition remains uncertain; however, proposed mechanisms include autoimmune response, hormonal influences, and localized immune dysregulation. Recognition of this entity is crucial, as its management differs substantially from that of infective mastitis or abscess.

Non-lactational breast abscesses and periductal mastitis constituted a significant proportion of cases in this study. These findings align with previous studies highlighting smoking, ductal obstruction, and bacterial colonization as key contributing factors [9–11]. In regions with high tuberculosis prevalence, tubercular mastitis continues to be an important differential diagnosis, accounting for 6.7% of cases in our cohort. Similar incidences have been reported in Indian studies, emphasizing the need for microbiological and histopathological confirmation in chronic inflammatory breast lesions [7,8].

Radiological evaluation played a pivotal role in the initial assessment of patients. Ultrasound was the primary imaging modality and frequently demonstrated ill-defined hypoechoic masses, skin thickening, and increased vascularity. These features, while suggestive of inflammation, often overlap with malignancy, explaining the predominance of BI-RADS 3 and 4 categories in our cohort. Mammography, performed in selected patients, further illustrated the diagnostic challenges posed by inflammatory changes. These findings reinforce the limitation of imaging alone and highlight the necessity of tissue diagnosis in suspicious or non-resolving cases.

Pathological evaluation using FNAC and core needle biopsy was instrumental in establishing definitive diagnoses. The presence of granulomas, giant cells, and necrosis enabled differentiation between idiopathic granulomatous mastitis, tubercular mastitis, and other inflammatory conditions. Importantly, histopathology also facilitated the identification of inflammatory breast carcinoma in one patient, underscoring the need for vigilance in atypical presentations.

Management strategies in this study were guided by etiology. While antibiotics and non-steroidal anti-inflammatory drugs formed the cornerstone of initial therapy, corticosteroids were effectively utilized in granulomatous mastitis, supporting evidence from prior studies advocating conservative medical management to avoid overtreatment [4,5]. Anti-tubercular therapy resulted in favorable outcomes in confirmed cases of tubercular mastitis. Minimally invasive procedures such as aspiration and incision and drainage were reserved for selected patients with abscess formation.

The strengths of this study include its prospective design and integrated clinicoradiological-pathological approach. However, certain limitations must be acknowledged. The single-center nature and modest sample size may limit the generalizability of findings. Additionally, long-term follow-up data regarding recurrence, particularly in granulomatous mastitis, were limited. Future multicentric studies with standardized follow-up protocols are warranted to better define optimal management strategies.

Conclusions

Inflammatory breast conditions predominantly affect young women and frequently present with features that mimic breast malignancy. Idiopathic granulomatous mastitis emerged as the most common diagnosis in this cohort, highlighting the importance of considering non-infective etiologies in non-lactating patients. A systematic approach integrating clinical assessment, imaging, and histopathological evaluation is essential for accurate diagnosis and appropriate management. Early recognition of specific inflammatory entities can prevent unnecessary surgical interventions and facilitate tailored therapy. Further large-scale studies are required to refine diagnostic algorithms and establish evidence-based management guidelines.

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