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Original Article

Ultrasonography Screening for Breast Lesions During Pregnancy and Lactation

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BSTRACT

Background: Breast lesions during pregnancy and lactation present diagnostic challenges due to physiological changes in breast tissue. Ultrasonography is a non-invasive and radiation-free imaging method that is widely used to evaluate breast conditions in this patient group.

Aim: To evaluate the effectiveness of ultrasonography in screening and diagnosing breast lesions in pregnant and lactating women.

Methods: This prospective cohort study enrolled 100 pregnant and lactating women referred for breast concerns at our institution from March 2022 to May 2024. Participants underwent bilateral breast ultrasonography, with lesions classified as cystic, solid, or complex. Additional diagnostic procedures, such as mammography and biopsy, were employed when necessary. Data were analyzed using IBM SPSS version 25.0.

Results: The mean age of participants was 28.15 ± 4.37 years. Ultrasound findings In our study, detailed ultrasound revealed various findings, including abscesses (4%), fibroadenomas (1%), mass-like lesions (prominent lactiferous duct) (1%), simple cysts (1%), mastitis (1%), irregular oval-shaped lesions (1%), and cystic lesions with mixed echogenicity (galactoceles) (1%).

Conclusion: Ultrasonography is an effective diagnostic tool for evaluating breast lesions in pregnant and lactating women, offering high accuracy in identifying benign conditions and guiding interventions.

Keywords: Ultrasonography, Breast Lesions, Pregnancy, Lactation, Benign Lesions, Mammography.

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Introduction:

Breast lesions during pregnancy and lactation present unique diagnostic challenges due to physiological changes in breast tissue that can obscure clinical and imaging findings. Increased glandular density, hormonal influences, and lactational changes may mask or mimic pathological conditions, making accurate diagnosis difficult. As a result, traditional imaging modalities like mammography may have limited sensitivity in this population. [(1)]

The incidence of breast cancer diagnosed during pregnancy, known as pregnancy-associated breast cancer (PABC), is increasing due to delayed childbearing trends. Early detection in this subgroup is essential, as delayed diagnosis often results in advanced-stage disease at presentation. Ultrasonography plays a key role in identifying suspicious lesions and enabling early intervention to improve patient outcomes. [(2, 3)]

ltrasonography (US) has emerged as the preferred imaging tool for evaluating breast lesions during pregnancy and lactation. It is non-invasive, does not expose the patient to ionizing radiation, and provides high-resolution imaging of both benign and malignant breast conditions. [(4-6)] Furthermore, US allows real-time assessment, guiding biopsy procedures when necessary to achieve definitive histological diagnosis. [(7-9)]

Despite the advantages of ultrasonography, there remains a lack of standardized guidelines for its use in pregnant and lactating women. Differentiating between benign lactational changes, infections such as mastitis or abscesses, and malignant tumors is crucial for timely and appropriate intervention. [(10-12)] In some cases, unnecessary biopsies or delays in diagnosis can lead to complications that impact maternal and fetal health. [(13, 14)]

This study aims to evaluate the effectiveness of ultrasonography as a screening and diagnostic tool for breast lesions in pregnant and lactating women.

PATIENTS AND METHODS

Study Design & Setting: This prospective cohort study was conducted at the Diagnostic Radiology Department, Sohag Oncology Institute, from March 2022 to May 2024.

Inclusion Criteria: Pregnant and lactating women referred from Obstetrics, Gynecology, or Surgery outpatient clinics, with or without breast pain or palpable lumps.

Exclusion Criteria: Non-pregnant, non-lactating women and those with prior breast surgery or pre-existing breast mass lesions diagnosed before pregnancy or lactation.

Ethical Considerations: Approved by the Sohag Faculty of Medicine's ethics committee, with informed written consent obtained. Patient data remained confidential, documented in case report forms. Participants incurred no costs or financial obligations.

Methods:

The study enrolled 100 women who underwent a thorough evaluation, beginning with history taking, which included demographic data such as age, parity, and gestational age for pregnant participants. Additionally, breast symptoms such as pain, swelling, skin discoloration, recent asymmetry, enlargement, and nipple retraction were documented.

Bilateral breast ultrasonographic imaging was conducted using the *Toshiba Xario200* ultrasound machine, known for its high-resolution capabilities. Patients were positioned supine with their arms raised to ensure optimal access to the breast tissue, and a conductive gel was applied to enhance image quality. A systematic scanning approach was employed, starting from the breast periphery and moving toward the nipple in radial sweeps. Both transverse and longitudinal scans were performed to ensure comprehensive imaging of the breast structures.

The evaluation criteria focused on identifying lesion characteristics such as shape, margin, echogenicity, orientation, and posterior acoustic features. Lesions were classified based on their sonographic appearance into cystic, solid, or complex categories. Specific findings included abscesses, which presented as irregular hypoechoic lesions with internal echoes and peripheral vascularity on Doppler imaging; fibroadenomas, characterized by well-defined, oval, hypoechoic structures with uniform internal echoes and posterior enhancement; and simple cysts, appear-

ing as well-circumscribed, anechoic lesions with posterior acoustic enhancement.

Other conditions included mastitis, identified by skin thickening, increased echogenicity of subcutaneous tissue, and dilated ducts, as well as galactoceles, which exhibited mixed echogenicity due to milk components. Suspicious lesions, such as irregular oval-shaped masses with heterogeneous internal echoes and shadowing, were flagged for further investigation.

For cases with concerning imaging findings, additional diagnostic methods were employed. Mammography was used to assess architectural distortion, calcifications, and lesion density, while MRI provided contrast-enhanced imaging to evaluate the lesion's extent and any associated ductal involvement. When malignancy was suspected, a *True Cut Needle biopsy* under ultrasound guidance was performed to obtain tissue samples for histopathological confirmation.

Statistical Analysis:
Data analysis was conducted using IBM SPSS version 25.0. Qualitative data were summarized with frequencies and percentages, and quantitative data with means and standard deviations, enabling a comprehensive analysis of breast lesion prevalence and characteristics in the cohort.

Selected Cases:

Case 1:

25 years old lactating female with severe right breast painful lump with redness 1 week ago

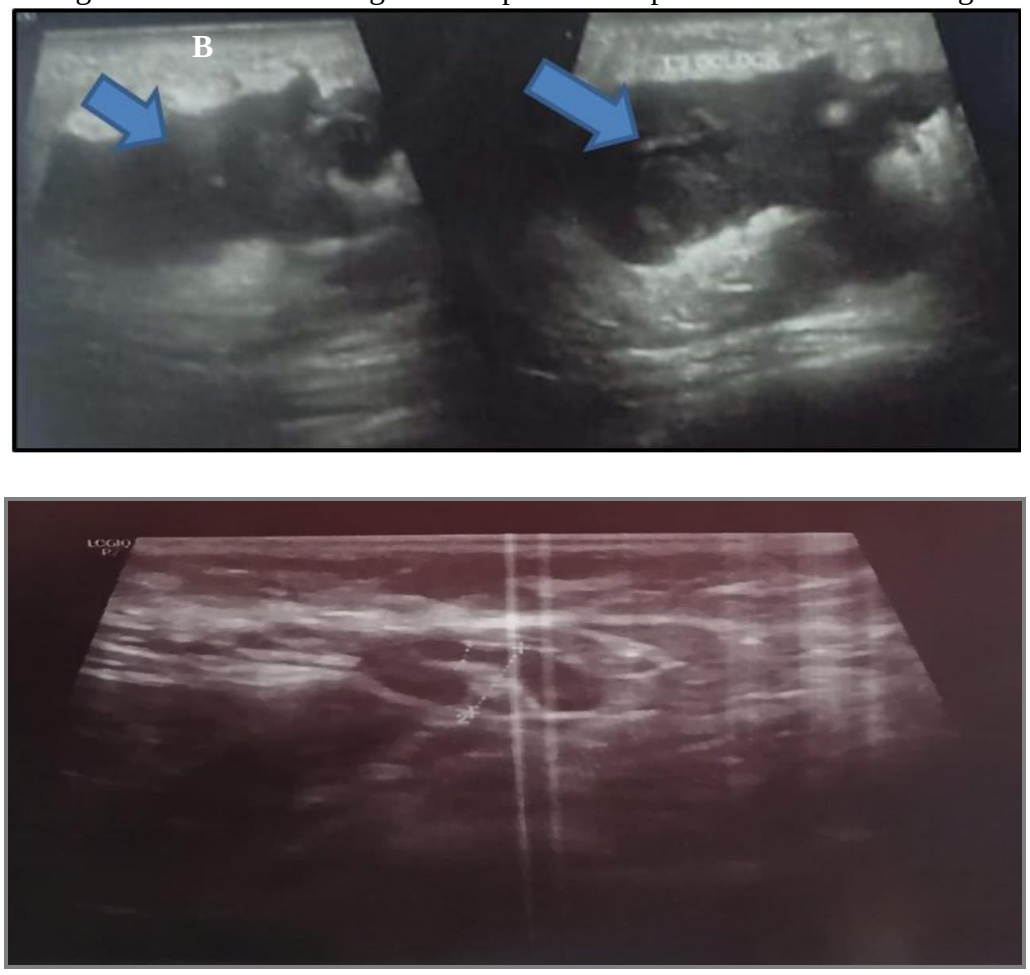

Fig. (1): Ultrasonography showed an ill-defined, turbid collection (arrow) A, B, oval shaped axillary lymph node C.

Case 2:

A 30 years old lactating female, with palpable left breast lump.

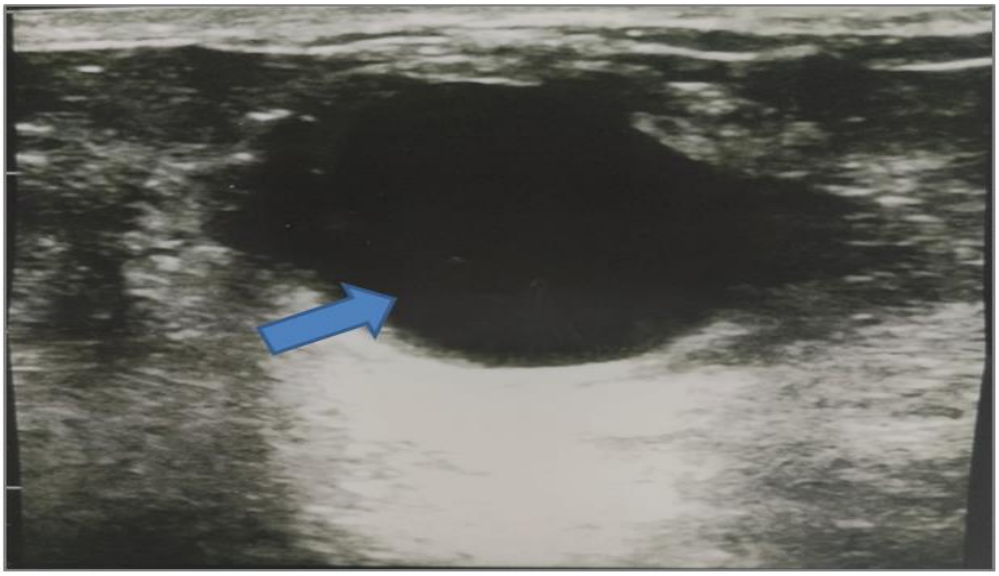

Fig. (2): well-defined, oval-shaped, anechoic lesion (simple cyst).

Case 3:

A 25 year old lactating female patient, presented with left breast lump 4 days ago.

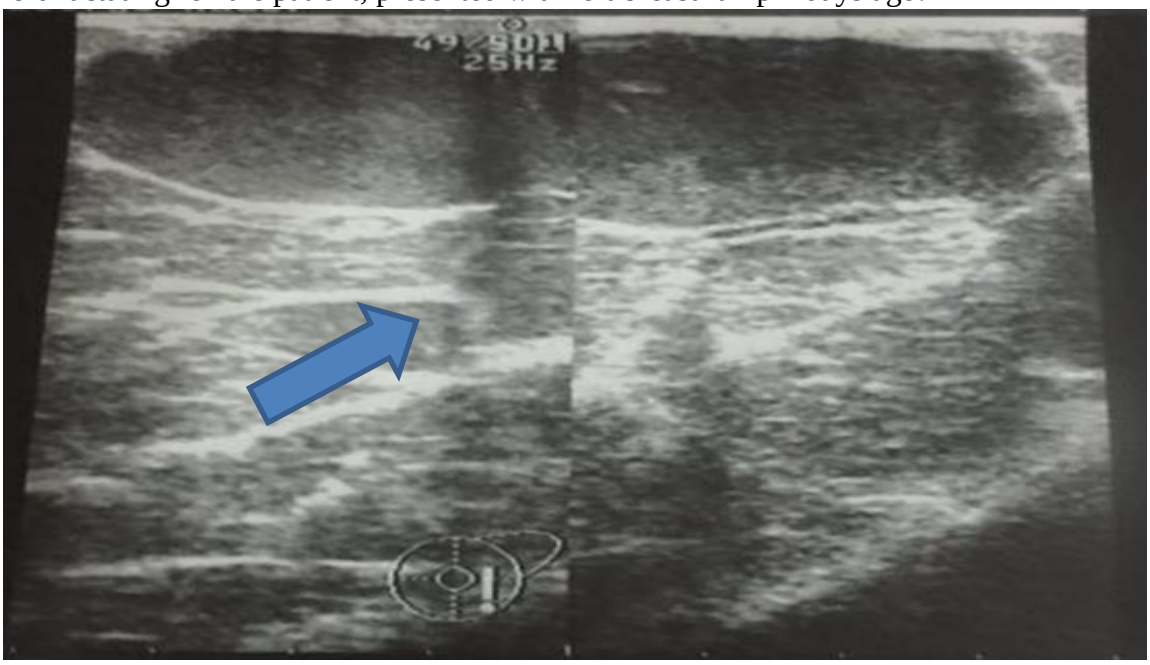

Fig. (3): well defined oval cystic lesion with mixed echogenicity (Galactocele).

Case 4:

A 35 years old lactating female with right painful breast lump diagnosed as inflammatory mastitis but not responding to antibiotic therapy for 1 month.

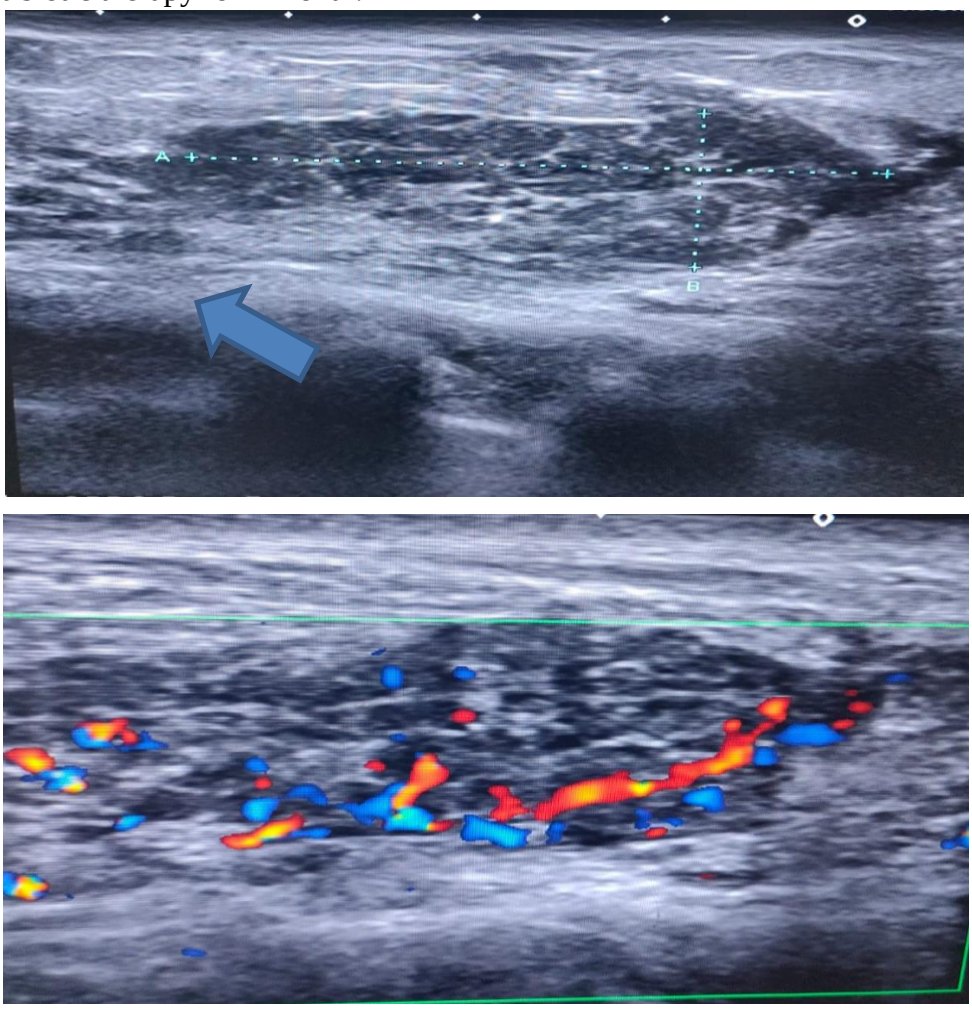

Fig. (4): Heterogeneous lesion with some hyperechoic debris content and hypervascularity with surrounding echogenic fat. Chronic mastitis after histopathology A, B.

Case 5:

32 years old lactating Female presented with sever left breast painful lump week ago

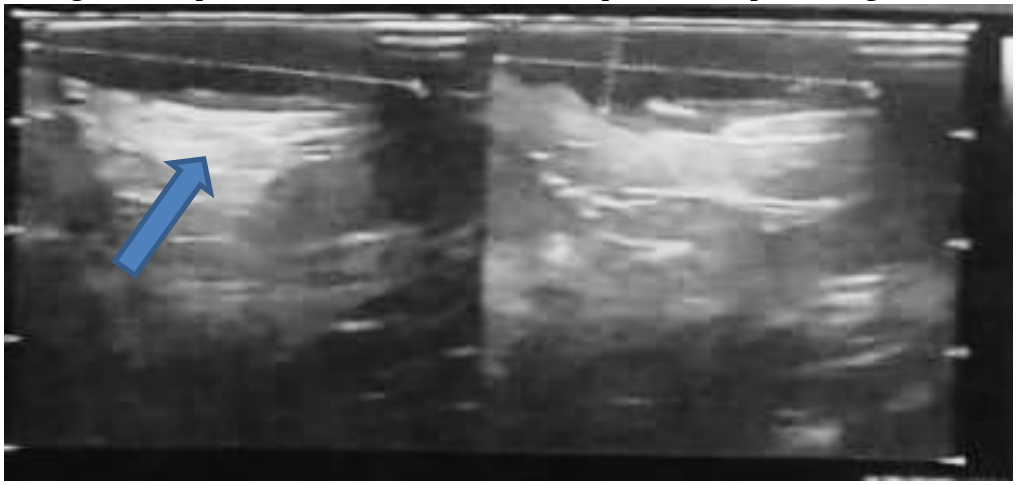

Fig. (5): ill-defined localized turbid fluid collection (subcutaneous abscess).

Results:

A total of 100 women participated in the study, with ages ranging from 21 to 39 years. The mean age of the participants was 28.15 years (SD ± 4.366). The majority of the women were multiparous (72%), while 28% were nulliparous. Participants were categorized into two groups: lactating (63%) and pregnant (37%). The gestational age of the pregnant women ranged from 4 to 9 months, with a mean gestational age of 6.541 months (SD ± 1.282) (Table 1).

Clinical symptoms were reported by 10% of the participants. Among those with symptoms, 6% presented with painful lumps, and 4% reported non-painful lumps (Table 2).

Ultrasound findings revealed a variety of breast lesions. The most common findings included abscesses (4%) (fig 1,5) , fibroadenomas (1%), mass-like lesions with prominent lactiferous ducts (1%) (fig 4) , simple cysts (1%) (fig 2), mastitis (1%), irregular oval-shaped lesions (1%), and cystic lesions with mixed echogenicity consistent with galactocele (1%) (fig 3) (Table 3).

Histopathological analysis of biopsy samples identified conditions in 4% of the study participants. The conditions observed included fibroadenoma, chronic inflammation (fig 4), adenoma, and galactocele (fig 3) , with each condition accounting for 1% of the positive histopathological results (Table 4).

Table (1): Demographic data of studied patients

Age	**Range**	21-39	
	Mean ±SD	28.150±4.366	
Gestational age (Months)	**Range**	4-9	
	Mean ±SD	6.541±1.282	
		N	**%**
Parity	**Nuli Para**	28	28.00
	Multi Para	72	72.00
		Status	
		N	**%**
Lactating		63	63.00
Pregnant		37	37.00
Total		100	100.00

Table (2): Clinical symptoms of studied women

		N	**%**
No symptoms		90	90.00
Symptoms	**Painful lump**	6	6.00
	Non Painful lump	4	4.00

Table (3): Distribution of studied patients regarding ultrasound finding

	N	**%**
Normal	90	90.00
Abscess	4	4.00
Fibro adenoma	1	1.00
Mass like lesion, prominent lactiferous duct	1	1.00
Simple cyst	1	1.00
Mastitis	1	1.00
Irregular oval shaped lesion	1	1.00
Cystic lesion with mixed echogenicity, galactocele	1	1.00
Total	100	100.00

Table (4): Histopathology results in 4 patients with US lesions

Histopathology results		**N**	**%**
TCNB	**Fibro adenoma**	1	1
	Chronic inflammation	1	1
	Adenoma	1	1
Aspiration	**Revealed milk (galactocele)**	1	1
Total		4	100

Discussion:

The breast undergoes significant changes throughout a woman's life, particularly during pregnancy and lactation, due to hormonal fluctuations. [15] These changes, including altered parenchymal tissue patterns and increased blood flow, can complicate the clinical and radiological evaluation of breast masses. [16] While most breast lesions during pregnancy and lactation are benign, delayed diagnosis due to lack of awareness contributes to the advanced stage and poor prognosis of pregnancy-associated and postpartum breast cancers. [17]

All breast disorders in this period should be carefully evaluated, as conditions like lactating adenoma, galactocele, fibroadenoma, mastitis, abscesses, and granulomatous mastitis are common, but pregnancy-associated breast cancer (PABC) must be excluded, as it is often diagnosed late. [18,19]

Ultrasound (US) is especially valuable, as it is non-invasive, lacks ionizing radiation, and can detect most masses. [20-22]

Ultrasonography during pregnancy typically shows diffuse hypoechogenicity, fibroglandular enlargement, and increased vascularity, while in lactating women, it reveals diffuse hyperechogenicity, a prominent ductal system, and increased vascularity.[18, 23, 24] According to the ACR Appropriateness Criteria, pregnant women with palpable masses or pathological nipple discharge should undergo initial ultrasonography to characterize the lesion and guide management. [25] This study involved 100 pregnant and lactating women with or without breast pain or lumps. The study aimed to screen for breast lesions and determine the incidence of various breast lesions in this group.

The present study included women aged 21 to 39 years, with a mean age of 28.15 years (SD ± 4.366). The majority were multiparous (72%) compared to nulliparous (28%).

Participants were between 4 to 9 months pregnant, with a mean gestational age of 6.541 months (SD ± 1.282).

Our findings align with those of Asmaa et al. [26] study that reviewed ultrasound findings of benign and malignant breast lesions during pregnancy and lactation, including 70 women. Their participants, aged 20 to 40 years, had a mean age of 30.8 ± 5.6 years. Similarly, our results are consistent with another study that reviewed ultrasound characteristics of breast lesions in 195 patients (206 lesions) during pregnancy/lactation, with an age range of 21 to 45 years (mean age: 31.7 ± 4.7 years). [27]

Additionally, our study corresponds with Hosny et al. [28] study that examined the role of imaging modalities in diagnosing palpable breast masses, including 48 patients (ages 19–39, mean 29 years).

In our study, clinical symptoms were reported by 10% of participants, with painful lumps accounting for 6% and non-painful lumps for 4%. This contrasts with a study, [7] which found that 89% of 134 lesions presented with symptoms, while 11% were identified in asymptomatic women during follow-up or routine breast imaging. Painful lumps accounted for 7% in that study.

In our study, ultrasonography revealed normal findings in 90% of the cohort, while 10% presented with abnormalities. This contrasts with Haliloglu et al. [29] study that aimed to demonstrate the spectrum of ultrasound findings in lactating women, where 36% of 77 patients showed normal imaging with lactational changes in breast parenchyma. Additionally, Asmaa et al. [26] study found that 80% of their cohort had lesions, while 20% had abnormalities. Another study reported that 82% of 164 lesions had pathology results or follow-up data longer than 12 months. [7]

In our study, detailed ultrasound revealed various findings, including abscesses (4%), fibroadenomas (1%), mass-like lesions (prominent lactiferous duct) (1%), simple cysts (1%), mastitis (1%), irregular oval-shaped lesions (1%), and cystic lesions with mixed echogenicity (galactoceles) (1%).

Our results align with those of Haliloglu et al. [29] study, which reported a range of findings, including cysts in 16 patients (with 1 showing increased size), stable fibroadenomas in 4, mastitis in 6, galactoceles in 5, and 1 abscess.

Another study found similar findings, with abscesses in 21.4%, fibroadenomas in 4.3%, simple cysts in 1.4%, mastitis in 20%, and galactoceles in 12.9% (26). Likewise, Qian et al. [27] study identified 73.8% of patients with benign lesions, including mastitis/abscesses (n=103), fibroadenomas (n=45), and other benign conditions.

Additionally, Hosny et al. [28] reported findings such as gigantomastia, fibroadenomas, lactating

adenomas, mastitis, and abscesses. Similarly, a study found fibrocystic changes (38%), cysts (15%), fibroadenomas (13%), and inflammatory conditions (8%) among pregnant and lactating women. [30] Furthermore, Son et al. [31] study reported pathological results including galact-oceles (n=11), mastitis and abscesses (n=9), fibroadenomas (n=2), lactating adenomas (n=3), and breast cancer (n=6).

In our study, histopathological analysis post-tissue core needle biopsy (TCNB) or aspiration revealed that 4% of cases were positive for conditions like fibroadenoma, chronic inflammation, adenoma, and galactocele, each contributing 1%.

Our findings are consistent with Asmaa et al. [26] study that reported 4.3% of patients diagnosed with fibroadenoma after biopsy, with a stationary course during a 6-month follow-up. Similarly, Robbins et al. [7] found that 85% of core biopsies were benign, including lactational changes (36%), fibroadenomas (32%), fibrocystic changes (14%), and inflammation/infection (9%), while 15% were malignant.

Conclusion:

Our findings show that physiological changes during pregnancy and lactation complicate the evaluation of breast issues. Most findings in these patients are benign. We also found that ultrasound is the primary imaging modality for evaluating breast conditions and guiding interventional procedures in pregnant and lactating women. Further studies with larger sample sizes are needed to confirm our results.

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