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Demographic Characteristics and Ultrasonographic Findings in Breast Lesions: A Cross-Sectional Study

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ABSTRACT

Introduction: Breast lesions are a common clinical concern, ranging from benign to malignant conditions, requiring accurate diagnosis for appropriate management. Ultrasonography, combined with the Breast Imaging Reporting and Data System (BI-RADS) classification system, is a non-invasive and effective imaging modality for evaluating breast abnormalities.

Objectives: The objective of this study was to investigate the sonographic findings of breast lesions, classifying them using Breast Imaging-Reporting and Data System (BI-RADS) and also to determine the distribution across different age groups.

Methodology: This descriptive cross-sectional study included 71 patients with breast complaints at Birat Medical College from 1 April to 5th September 2024. Ultrasonographic examinations were conducted using high-frequency transducers, and lesions were categorized according to the BI-RADS system. Patient demographics and lesion characteristics were analyzed using descriptive statistics to determine lesion distribution and classification.

Results: Most lesions 54 (76.05%) were classified under BI-RADS Category 2, with fibroadenomas being the most common 37 (52.1%) primarily observed in patients under 35 years of age. Malignant lesions, categorized as BI-RADS 5, included 13 cases of breast carcinoma and predominantly observed in patients over 35 years. Suspicious lesions, such as granulomatous mastitis, were also identified in two cases.

Conclusion: Benign lesions, particularly fibroadenomas, were the most common in younger women, while malignant lesions, including breast carcinoma, were more frequent in older individuals. These findings underscore the importance of ultrasonography combined with BI-RADS classification in accurately diagnosing breast abnormalities and guiding effective clinical management.

INTRODUCTION

Breast lesions are a common health concern among women worldwide, encompassing a range of underlying pathologies. These conditions, whether benign or malignant, significantly contribute to morbidity, impacting physical health, mental well-being, and overall quality of life. Among these, breast cancer stands out as the most prevalent cancer globally and is the leading cause of cancer-related deaths in women.[1] The burden of breast cancer disproportionately affects individuals in low- and middle-income countries due to limited access to early detection and treatment.[2] In Nepal, breast cancer ranks as the second most common cancer in terms of incidence, accounting for 10.2% of all cancer cases as of 2022.[3]

Although breast cancer is widely recognized as a leading cause of mortality in women worldwide, benign breast lesions also contribute substantially to clinical workloads and patient anxiety due to their frequency and the potential need for diagnostic and therapeutic intervention. Understanding the prevalence and characteristics of different types of breast lesions is essential to improve diagnostic accuracy and guide clinical management strategies. Ultrasonography (USG) is a widely utilized diagnostic

tool for evaluating breast lesions. Its advantages include non-invasiveness, affordability, and particular effectiveness in younger women with dense breast tissue. USG can help distinguish between cystic and solid masses, providing a clearer picture of underlying pathologies.[4]

This cross-sectional study investigated USG findings among patients with breast complaints, examining the age distribution, laterality (left vs. right side), and specific lesion types—ranging from benign conditions like fibroadenoma and simple cysts to malignant findings such as breast carcinoma. Additionally, understanding these patterns can aid clinicians in making informed decisions regarding patient management, early detection strategies, and further investigative needs.

METHODOLOGY

A hospital based descriptive cross sectional study was conducted in the Department of Radio diagnosis and Imaging of Birat Medical College Teaching Hospital (BMCTH)from 1 April to 5th September 2024. Ethical approval was obtained from the institutional review committee (IRC-PA-377/2024). Informed written consent was obtained from all patients before the procedure, ensuring confidentiality and voluntary participation.

The study included female patients who presented with clinical symptoms suggestive of breast lesions, such as palpable lumps, pain, or other abnormalities. Patients with prior breast surgery, those undergoing treatment for breast cancer, or inadequate imaging studies were excluded. A total of 71 breast lesions identified through USG during the study period were included using a total enumeration sampling technique.

Data were collected using a self-structured proforma, which recorded demographic details (age, laterality) and USG findings of each lesion. Ultrasonographic evaluation was performed by experienced radiologists using the Voluson S10 Expert 3D model and linear 5-12 megahertz of frequency probe. Each patient was positioned supine and breasts were evaluated in right and left decubitus maintaining their privacy. Lesions were classified according to the Breast Imaging Reporting and Data System (BI-RADS) categories based on their imaging characteristics, including shape, margins, echotexture, and other sonographic features.[5] The sonographic findings were categorized into BI-RADS categories (2–5) to assess the prevalence of different types of breast lesions. Data were entered in Microsoft Excel sheet. Descriptive statistics, including frequencies and percentages, were calculated to summarize the results.

RESULTS

Table 1: Age and laterality features of study participants (n=71)

Variables	n(%)
Age in years	**Range(16-70 years), Mean +/- S.D= 34+/- 12.5**
<35	42(59.2)
>35	29(40.8)
Breast affected	
Left Side	40(56.3)
Right Side	31(43.7)

A total of 71 patients with symptoms suggestive of breast lesions were included for the study. The mean age of patients was 34 years with standard deviation of 12.5 years ranging 16-70 years . More than half 42(59.2%) above 35 years and most of them had 40(56.3%) left side of breast affected, Table 1.

Table 2: Age and Sonographic findings distribution of breast lesions according to BI-RADS Classification (n=71)

BI-RADS Categories	Age in years		Total n(%)
Category 2	**<35**	**>35**	
Fibroadenoma	33	4	37(52.1)
Simple Cysts	3	4	7(9.9)
Breast abscess	0	5	5(7)
Lipoma	2	2	4(5.6)
Galactocele	1	0	1(1.4)
Category 3			
Epithelial Hyperplasia	1	1	2(2.8)
Category 4			
Granulomatous Mastitis	0	2	2(2.8)
Category 5			
CA Breast	2	11	13(18.3)

The sonographic findings of breast lesions were categorized based on the BI-RADS classification system, with a total of 71 lesions evaluated. The majority of cases (52.1%) were classified under BI-RADS Category 2(n=54), indicating benign lesions. Among these, fibroadenomas were the most common, accounting for 37 cases (52.1%). The majority of fibroadenomas(n=33), categorized under BI-RADS 2, were found in patients younger than 35 years. Lesions classified under BI-RADS Category 3 included epithelial hyperplasia, which was observed in 2 cases (2.8%) evenly in both age groups. Under BI-RADS Category 4, granulomatous mastitis was reported in 2 cases (2.8%) and occurred in age >35 years. Malignant lesions, categorized under BI-RADS 5, included 13 cases (18.3%) of breast carcinoma and were predominantly observed in patients over 35 years, with only a small fraction in younger patients, Table 2.

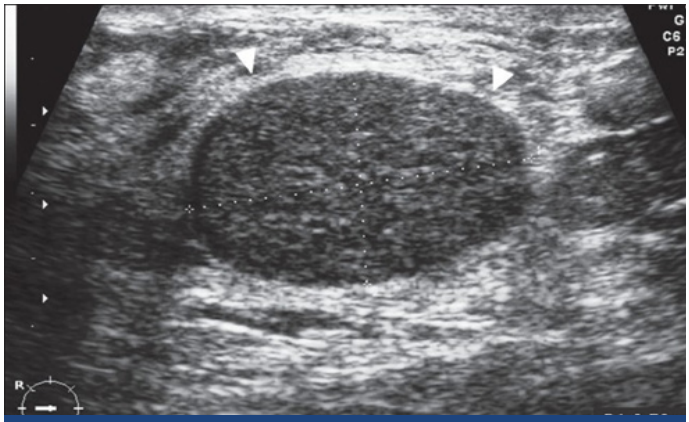

Fig 1: Fibroadenoma. Transvere image reveals a typical larger transverse than anteroposterior diameter, homogenous echotexture, and a thin capsule (arrowheads)[6]

Fig 1: Sonography shows an irregular lesion with hypoechoic band like extensions in a 25 years old lady with granulomatous mastitis.[7]

DISCUSSION

This study aimed to evaluate the sonographic findings of breast lesions using the BI-RADS classification system in a sample of 71 patients. The findings of this study provide an in-depth understanding of the sonographic distribution of breast lesions across different age groups, categorized according to the BI-RADS system. The results align with and contribute to existing knowledge in the field, offering important insights into the relationship between patient age and the nature of breast abnormalities. A comparison with previously published literature reveals several parallels and variations discussed below.

Fibroadenomas were the most prevalent lesion in this study(52.1%), predominantly occurring in younger women under 35 years of age. This aligns with findings from studies conducted by Fusun Taskin et al. (2012) and Richard Ha et al. (2014), which identified fibroadenomas as the most common benign breast tumors, especially in younger women.[8,9] Similar prevalence rates have been reported in a study by et al. J A Ngbea (2016), where fibroadenomas were most common among younger age groups in ultrasonographic evaluations.[10] The high prevalence in this age group is attributed to hormonal influences, particularly elevated estrogen levels during reproductive years. The characteristic sonographic features of fibroadenomas, such as well-defined margins, oval shape, and homogeneous echotexture, make them easily distinguishable on ultrasonography. In contrast, fibroadenomas may be rarely seen in older women and among men due to the hormonal changes associated with menopause as fibroadenomas are less likely to form or grow in a hypoestrogenic environment.[11] Contrary to our study, the prevalence of fibroadenoma was stable across age groups.[12]

Simple cysts, another common benign lesion, distributed more in age above 35 years in this study. Breast cysts are the commonest cause of breast lumps in women aged 35 and 50 years.[13] Ultrasonography reliably identifies these lesions due to their anechoic appearance and posterior acoustic enhancement, minimizing diagnostic challenges. Breast abscesses were observed in five patients (7%) age above 35 years of cases in this study. Breast abscesses are more common in non-lactating women and older age groups, often linked to chronic inflammation or underlying conditions which was supported by the research findings by Fusun Taskin(2012).[14] Sonographically, abscesses present as complex fluid collections with irregular margins, necessitating differentiation from malignant lesions through clinical correlation and, in some cases, aspiration or biopsy.[15] Lipomas and galactoceles accounted for 5.6% and 1.4% of cases, respectively. Lipomas were distributed equally across both age groups, reflecting their occurrence in women of all ages in our study. Their characteristic compressible, hypoechoic appearance on ultrasonography allows for straightforward identification. The low prevalence of galactoceles in our study among young women are typically associated with lactation and hormonal changes.[16]

Epithelial hyperplasia, observed in both younger and older women in this study, represents a condition with a slightly increased risk of malignancy. Contrary to our finding an epidemiologic characteristics of epithelial hyperplasia suggest it to be more common among women of 40 years and above. Atypical lobular hyperplasia (ALH) and atypical ductal hyperplasia (ADH), both are high-risk breast lesions that are associated with a four-fold to a five-fold increased lifetime risk of developing breast cancer.[17] Sonographic differentiation of epithelial hyperplasia from other benign lesions can be challenging, often requiring biopsy and mammogram for confirmation. This highlights the importance of careful follow-up in cases classified under BI-RADS 3.[18,19]

Two patients above the age 35 years had granulomatous mastitis in this study. Granulomatous mastitis is a rare inflammatory condition whose accurate diagnosis is confounded by mimicry of other breast pathologies (infectious mastitis and abscess, malignancy). Its occurrence in older women may be linked to autoimmune or infectious etiologies, requiring biopsy for definitive diagnosis.[20] The identification of granulomatous mastitis in this study underscores the importance of maintaining a high index of suspicion for non-malignant conditions that can present with atypical imaging features.

Thirteen (18.3%) out of 71(100%) had breast carcinoma in this study and were classified as BI-RADS 5. It was predominantly observed in women over 35 years of age which constituted 11 women. This finding is consistent with global epidemiological trends, as reported by the World Health Organization (WHO), 2024, which indicate that the incidence of breast cancer increases significantly with age and amongst females. Hormonal, genetic, and environmental factors contribute to this age-related increase in malignancy.[21] Since the malignant breast cancer is of great concern and requires prompt care, USG criteria may not only confirm the diagnosis hence recommended to validate the diagnosis by alternatives like biopsy.

In resource-constrained settings, the availability of ultrasound as an affordable and non-invasive diagnostic tool is particularly valuable. The ability to distinguish between benign and malignant lesions reduces unnecessary biopsies and provides a

cost-effective approach to managing breast abnormalities. The findings of this study highlight the critical role of ultrasonography in evaluating breast lesions across different age groups. The BI-RADS classification system provides a standardized framework for risk stratification, ensuring that benign lesions are appropriately managed while suspicious and malignant lesions receive timely intervention. In the present study, BI-RADS Categories 2 and 3 accounted for the majority of lesions, highlighting the importance of follow-up imaging for probably benign findings. The detection of BI-RADS 4 and 5 lesions further underscores the need for vigilance in identifying suspicious and malignant lesions, particularly in resource-limited settings. The predominance of benign lesions in younger women underscores the need for reassurance and education, while the higher prevalence of malignancy in older women emphasizes the importance of early detection and screening programs.

CONCLUSION

This study provided valuable insights into the distribution of breast lesions across age groups, emphasizing the utility of ultrasonography and BI-RADS classification in clinical practice. While benign lesions predominate in younger women, malignant and suspicious lesions are more common in older individuals. The findings underscore the importance of age-specific diagnostic approaches and highlight the need for comprehensive breast cancer screening programs, particularly in resource-limited settings.

RECOMMENDATIONS

We recommend routine breast ultrasonography screenings especially for women over 35 years, to facilitate early detection and management of malignant lesions. The consistent application of the BI-RADS classification system is crucial for standardized reporting and effective clinical decision-making. Future studies with larger, multi-center populations and histopathological correlation are essential to validate findings and enhance diagnostic precision. Addressing limitations, such as the small sample size and single-center design, will strengthen future research. Additionally, follow-up studies could provide valuable insights into the progression and outcomes of detected breast lesions.

LIMITATION

This study has some limitations. The relatively small sample size and single-center design may limit the generalizability of the findings. Future studies with larger, multi-center cohorts are needed to validate these findings and explore potential regional and demographic variations further. Moreover, the study did not account for histopathological confirmation of all lesions, particularly those categorized as BI-RADS 2 and 3, which could enhance the diagnostic accuracy of the findings. Longitudinal follow-up of patients, particularly those with BI-RADS 3 lesions, would provide valuable insights into the natural progression of these conditions and their eventual outcomes. The article includes an age-wise distribution of lesions; however, the absence of additional data represents a limitation of this study.

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CONFLICT OF INTEREST None

FINANCIAL DISCLOSURE None

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