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Impact of Dense Breast Tissue on Mammographic Sensitivity and the Role of Adjunct Ultrasound

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ABSTRACT

Background: Breast cancer screening and early identification still heavily relies on mammographic imaging, however, the ability for mammograms to provide accurate diagnoses relies heavily upon the composition of the breast; women with dense breast tissue provide a greater challenge to accurate diagnosis because the fibroglandular density obscures pathologies beneath, which thus lowers the overall sensitivity when performing mammograms. For this reason, additional imaging modalities are becoming more widely accepted and utilized in order to increase diagnostic yields and identify mammographically occult pathologies; examples include breast ultrasound, MRI, and electrical impedence.

Aim and Objectives: This study's goal was to measure the effect of breast density on mammographic sensitivity and determine how helpful ultrasounds are in finding breast lesions in patients with increased-density breast tissue.

Methods: The current study analyzes 120 female patients undergoing mammographic evaluation for either breast-related symptoms or routine screening, from January 2023 until December 2024. The patients consisted entirely of females and were treated at an Indian academic tertiary hospital. All 120 patients' breast density was categorized into four categories (A through D), in accordance with the BI-RADS breast imaging reporting and data system. The findings of the mammograms were analyzed, particularly for those female patients whose mammograms revealed breast density BIRADS Levels C and D, as well as any related ultrasound. The sensitivity of mammography by breast density group, along with the number of additional detected lesions using ultrasound were calculated.

Results: Of the 120 women included in the study population, 68 (or 56.7%) had dense breast tissue (BI-RADS categories C and D). Compared to women with fatty breast or scattered fibroglandular tissue, women with dense breast tissue experienced decreased sensitivity of mammography. In the dense breast tissue group, mammography was able to identify 39 of 60 confirmed breast lesions, resulting in a sensitivity level of approximately 65%. In contrast, the addition of ultrasound allowed for the identification of an additional 14 lesions that were not detected by mammography, which increased the total detection rate to nearly 88%. Most of the additional breast lesions identified through ultrasound consisted of small invasive carcinomas or solid suspicious masses less than 1.5 cm in size. Furthermore, ultrasound provided improved lesion characterization in several instances, especially in differentiating between solid and cystic masses.

Conclusion: Mammography is significantly less sensitive to identifying abnormal tissue in women with dense breast tissue than it is for women with fatty breast tissue. Because of this, women with dense breast tissue are at increased risk of presenting with an occult (hidden) lesion that mammography cannot identify. Adjunctive ultrasound (AU) significantly improves the ability of breast imaging to diagnose mammographically occult lesions in women with dense breast tissue. Adding AU to the imaging evaluation of a woman with dense breast tissue therefore will yield improved ability to diagnose breast malignancies earlier. This should promote timely clinical management of women with breast cancer

Key Words: *Dense breast tissue, mammographic sensitivity, adjunct ultrasound, breast imaging, breast cancer screening, mammography, BI-RADS density classification.*

INTRODUCTION

Breast cancer is still one of the most common Malignant Conditions in the World (Public Health Issue) and is therefore Lactated Highly by Society. Early detection of breast cancer has been shown to Save Lives, Reduce Sickness from Treatment and allow for Less Intensive Treatment to be used[1]. Historically Mammography is the Established Imaging Technique to find breast cancer because it can find Microcalcifications and Subtle Architectural Distortions that may represent Early Cancer. The Introduction of Population Based Screening Programmes Utilizing Mammography have helped to Reduce Breast Cancer Deaths by Diagnosing the disease Early and Treating it Early[2].

However, While Mammography has its Established Role in the Field the Diagnostic Performance of this Technique is Not Consistent Throughout All Patient Populations One of the Main Factors that Impacts on Diagnostic Performance of Mammography is Breast Composition. The Ratio of Dense Breast Tissue to Fatty Breast Tissue is referred to as Breast Density and is generally Categorised into Four Categories Utilizing Breast Imaging Reporting and Data System (BI-RADS). The Categories are Almost Entirely Fatty, Scattered Fibroglandular Density, Heterogeneously Dense and Extremely Dense. Women with Heterogeneously Dense and Extremely Dense categories of breast density are termed to have Dense Breast Tissues[3,4]. Dense Breast Tissue Is a Recognised Challenge to Physicians who Use Mammography Technique to evaluate Patients. Fibroglandular Breast Tissue is Radiopaque on a Mammogram Like Many Breast Lesions Including Carcinomas, Therefore when this Occurs it can Potentially Obscure the Abnormality Underneath and make it more difficult to identify the lesions that are presently. The diagnostic accuracy of mammograms can be significantly impaired by the presence of dense breast tissue. Studies show that mammogram sensitivity decreases substantially when evaluating dense breasts compared to fatty breasts, increasing the likelihood of interval cancers and delayed diagnosis[5,6]. In addition to masking potential malignant disease, dense tissue is an independent risk factor for breast cancer development. The risk of developing breast cancer is considerably higher for women with very dense breasts than for those whose breasts contain mostly fatty tissue. Detecting breast cancer is therefore important in breast imaging practices because of this dual challenge of reduced sensitivity and increased risk of breast cancer for very dense breasts[7]. In overcoming these limitations, the use of additional imaging modalities, such as adjunct ultrasound, to supplement mammography screening has been explored. Breast ultrasound is now widely accepted as a complementary imaging modality to mammograms.Ultrasound is especially useful to assess dense tissue since lesions can be seen in ultrasound without regard to tissue density (as in mammography), but based in physical sonographic principles (sound waves or acoustic energy), ultrasound allows real-time discernment of cystic from solid lesions, and facilitated detection of small masses that mammography may miss if hidden within a dense fibroglandular area of breast tissue[8]. Adjunct ultrasound holds great potential for better detection of breast cancer, otherwise not seen on mammogram, which permits mammograms to miss entirely especially in women with dense breasts. The use of ultrasound along with mammography does improve breast cancer detection rates when evaluating screening or at-risk patients with heterogeneous or extremely dense breast tissue. Aside from those purposes, breast ultrasound can be used to further characterize suspicious lesions and obtain plethoric additional information about these breast tissues for symptomatic patients[9]. The pitfalls of adjunct ultrasound include things like being operator dependent, taking more time, and having a greater chance of false-positives causing extra studies or biopsy techniques. For those reasons, it becomes prudent to determine which specific clinical scenarios adjunct ultrasound is optimal in providing diagnostic value.

Notably, breast density as part of consideration in breast cancer detection spurred interest in the mingle of roles of mammography and ultrasound with women with dense breast tissue. Prognosticating the impact of breast density regarding mammographic sensitivity, and the benefit each type of imaging has as adjunct ultrasound, it will help show the best imaging methods for improving breast cancer detection.

This study sought to investigate the degree that dense breast tissue decreases mammography in sensitivity, and the additional diagnostic value of adjunct ultrasound for detecting breast lesions missed by mammographic examination.

MATERIALS AND METHODS

Study Design

The goal of this project was to conduct an observational study in the past to learn how breast density affects the accuracy of mammography and to determine how much ultrasound assists in diagnosing women with higher levels of breast density.

Study Setting

The Department of Radiology at a tertiary hospital located in India performed breast imaging services (both mammograms and breast ultrasounds) as part of routine screening or diagnostic evaluation for breast-related issues.

Study Duration

The study included cases evaluated over a two-year period from January 2023 to December 2024.

Study Population
This study included female patients who went through mammograms either as part of their routine checkups or to address breast issues related to breast symptom(s).
In total, there were 120 women who met the qualifications needed to be included in this study.

Inclusion Criteria
- Female patients aged 30 years and above who underwent mammographic evaluation
- Patients undergoing mammography for screening or diagnostic purposes
- Patients with available complete imaging records including mammography and ultrasound where applicable

Exclusion Criteria
- Patients with previously diagnosed breast malignancy undergoing follow-up imaging
- Patients with incomplete imaging records
- Patients with a history of prior breast surgery significantly altering breast anatomy
- Patients with breast implants

Data Collection
The records of patients and the imaging archive from the radiology department were reviewed retrospectively, includes demographic data (age and clinical indication for imaging) for each patient. For patients with suspicious findings on their mammogram, images were reviewed for breast density and suspicious findings. Breast density was classified according to the BI-RADS Density Classification into four categories:
- Category A – Almost entirely fatty
- Category B – Scattered fibroglandular densities
- Category C – Heterogeneously dense
- Category D – Extremely dense

For analytical purposes, categories C and D were grouped together as dense breasts, while categories A and B were considered non-dense breasts.

Mammographic Evaluation
Digital mammograms were obtained on all patients in craniocaudal (CC) and mediolateral oblique (MLO) views. The mammograms were evaluated for masses, architectural distortions, asymmetries, and suspicious calcifications. Its findings were assessed according to BI-RADS criteria.

Adjunct Ultrasound Examination
Women that were recognized with dense breast tissue (BI-RADS categories C and D) were sent for adjunct whole-breast ultrasound examination. A high-frequency linear transducer was used for the ultrasound scan. The systematic examination included scanning of every breast quadrant and the retroareolar area and axilla when appropriate. Findings from the ultrasound were recorded and correlated with the mammogram findings.

Outcome Measures
The primary outcomes assessed in the study included:
- Distribution of breast density among the study population
- Sensitivity of mammography in detecting breast lesions across different density categories
- Additional lesion detection achieved through adjunct ultrasound in patients with dense breasts
- Characterization of lesions detected exclusively on ultrasound

Statistical Analysis
Standard statistical techniques were used to compile and analyze the data. Descriptive statistics were used to characterize the sample population and their imaging findings using mean and median values; frequencies / proportions were calculated for categorical characteristics. The degree of sensitivity was based on comparing the mammography results with the final diagnoses resulting from a combination of additional imaging techniques (where available) and histopathological examination(s). The degree of sensitivity was determined using two different approaches: first, comparing the results of the mammography and final diagnosis and secondly, comparing the results of mammography to those of histopathological evaluation. The sensitivity of mammography was based on these two approaches. A number of different outcomes can be derived from using an adjunct ultrasound study on patients with dense breasts that may not have been detected during the routine mammography examination. Results are summarized in tabular form to show how breast density, imaging characteristics and the incremental value of subsequent ultrasound examinations were affected by breast density.

RESULTS
For purposes of this analysis, 120 female patients who had received a mammographic evaluation during the specified period were included. The analysis assessed how the patients' breast density was distributed across all patients, what

mammographic findings occurred among these patients, how adjunct ultrasound contributed to the diagnosis of women with dense breast tissue, and other diagnostic usefulness of adjunct ultrasound to evaluate lesions not identifiable by mammography. Breast density was classified according to the BI-RADS breast density classification system; patients who had heterogeneously dense breasts were classified as having dense breasts and were used as part of the analysis. An ultrasound examination was performed among the patients with dense breasts, and findings illustrated that there was decreased mammographic sensitivity in subjects with dense breasts compared to those who were not and the adjunct ultrasound improved the number of identified lesions in patients with dense breasts.

Table 1: Age-wise Distribution of Study Participants

Table 1 shows the distribution of patients across different age groups undergoing mammographic evaluation.

Age group (years)	Number of patients	Percentage (%)
30–39	22	18.3
40–49	38	31.7
50–59	34	28.3
60–69	18	15.0
≥70	8	6.7
Total	120	100

Table 2: Indication for Breast Imaging

Table 2 presents the clinical indications for which patients underwent mammographic evaluation.

Indication for imaging	Number of patients	Percentage (%)
Screening evaluation	46	38.3
Palpable breast lump	42	35.0
Breast pain (mastalgia)	18	15.0
Nipple discharge	8	6.7
Follow-up of benign lesion	6	5.0
Total	120	100

Table 3: Distribution of Breast Density According to BI-RADS Classification

Table 3 illustrates the distribution of breast density categories among the study population.

BI-RADS breast density	Number of patients	Percentage (%)
Category A (Almost entirely fatty)	18	15.0
Category B (Scattered fibroglandular density)	34	28.3
Category C (Heterogeneously dense)	48	40.0
Category D (Extremely dense)	20	16.7
Total	120	100

Table 4: Distribution of Dense and Non-dense Breast Tissue

Table 4 summarizes the proportion of patients with dense and non-dense breast tissue.

Breast density group	Number of patients	Percentage (%)
Non-dense breasts (BI-RADS A & B)	52	43.3
Dense breasts (BI-RADS C & D)	68	56.7
Total	120	100

Table 5: Mammographic Findings in the Study Population

Table 5 shows the spectrum of findings identified on mammographic examination.

Mammographic finding	Number of patients	Percentage (%)
Normal study	50	41.7
Suspicious mass lesion	36	30.0
Architectural distortion	10	8.3
Suspicious calcifications	12	10.0
Asymmetry or focal density	12	10.0
Total	120	100

Table 6: Mammographic Detection of Lesions According to Breast Density

Table 6 compares the lesion detection rate of mammography in dense and non-dense breasts.

Breast density group	Lesions detected on mammography	Total confirmed lesions	Detection rate (%)
Non-dense breasts	31	34	91.2
Dense breasts	39	60	65.0

Table 7: Ultrasound Findings in Patients with Dense Breasts

Table 7 presents the findings obtained on adjunct ultrasound examination in patients with dense breast tissue.

Ultrasound finding	Number of patients	Percentage (%)
Benign cystic lesions	18	26.5
Benign solid lesions	20	29.4
Suspicious solid masses	16	23.5
No abnormality detected	14	20.6
Total	68	100

Table 8: Additional Lesions Detected Only on Ultrasound

Table 8 shows the lesions that were not visualized on mammography but were detected using adjunct ultrasound.

Lesion type	Number of lesions	Percentage (%)
Small invasive carcinoma	6	42.9
Suspicious solid mass	5	35.7
Complex cystic lesion	2	14.3
Intraductal lesion	1	7.1
Total	14	100

Table 9: Size Distribution of Lesions Detected Only on Ultrasound

Table 9 shows the size range of lesions that were detected exclusively on ultrasound.

Lesion size	Number of lesions	Percentage (%)
<1 cm	5	35.7
1–1.5 cm	6	42.9
1.6–2 cm	2	14.3
>2 cm	1	7.1
Total	14	100

Table 10: Overall Diagnostic Yield with Combined Imaging

Table 10 demonstrates the improvement in lesion detection when mammography is combined with adjunct ultrasound.

Imaging modality	Lesions detected	Detection rate (%)
Mammography alone	70	74.5
Mammography + Ultrasound	84	89.4

Table 1 shows that 40–49 years is the oldest group at 31.7% (38 patients), followed by the 50–59 age group at 28.3% (34 patients). People in the 30–39 age group made up 18.3% of those evaluated (22 patients). The 60–69 age group included 15% of the patient's group (18 patients) and lastly, the people in the older group (70+) included 6.7% of the patients evaluated (8 patients). Overall results show that women undergoing breast examination primarily came from the age group of 40-59. According to **Table 2**, among 120 breast images obtained in 2021, 38.3% of exams were performed as part of a routine screening program, while the second largest group of exams done for evaluating a palpable mass was 35%. Mastalgia was the third most frequent reason for obtaining imaging (15%) and discharge from a nipple was also one of the reasons people sought imaging, although it represents only 6% of all breast imaging cases. There were 6 patients who received imaging due to the follow-up of a previously diagnosed benign breast lesion (5%). From these data it can be inferred that routine screening and evaluation of a palpable breast mass are the primary reasons why women are screened using mammograms. Based upon the observation of breast density patterns listed in **Table 3,** the predominance of heterogeneously dense breasts (BI-RADS Category C) is observed in 48 study subjects (40.0% of all participants), indicating that this pattern occurred most frequently. Scattered fibroglandular density (BI-RADS Category B) was noted in 34 study subjects (28.3%). Extremely dense breasts (BI-RADS Category D) were seen in an additional 20 study subjects (16.7%), while nearly all fatty (BI-RADS Category A) breast tissue was noted to be the least frequently noted breast density pattern across 18 study subjects (15.0% of study subjects). Taken all together, the high proportions of the sample population with dense breast tissue suggest that the majority of subjects within the study had breast tissue characterized as "dense." According to **Table 4,** dense breast tissue (BI-RAD categories C and D) have been present for 68 (56.7%) patients, while non-dense breast tissue (BI-RAD categories A and B) has been detected in 52 patients (43.3%). Therefore, the majority of study subjects had more than half of their cases of dense breast tissue; thus, it is important clinically to evaluate the potential limitations of using mammography as a diagnostic tool for these individuals due to the increased chances of developing breast cancer when compared to the average person without dense breast tissue. **Table 5** shows the Mammographic Examination Results. The results of mammographic examinations indicated that the majority (41.7%) of mammograms from this sample were reported as normal (n=50), with slightly less than one-third (n=36 or 30.0%) of the mammograms showing abnormal results due to suspicion of presence of a breast mass. A total of 12 mammograms (10.0%) demonstrated suspicious calcifications, and another twelve mammograms (10.0%) had asymmetry or focal density. The remaining ten patients (8.3%) had distortions of breast architecture as a result of mammographic examination. All of these results indicate that mammography can identify potential breast abnormalities that may need further evaluation. The information in **Table**

6 explains that the detection of breast lesions by mammography was much greater in women who had nondense (or less dense) breasts than women who had dense breasts. For women who had nondense (or less dense) breasts, mammographic detection rates were calculated based on a total of 34 confirmed breast lesions and the detection rate was 91.2% (or 31 of 34 confirmed lesions were detected). However, for women who had dense breasts, mammographic detection rates were based on 60 confirmed breast lesions and the detection rate was 65.0% (or 39 of 60 confirmed lesions were detected). This finding highlights the fact that mammographic sensitivity decreases as breast tissue becomes denser. As per **Table 7** the use of adjunct ultrasound examinations on women with dense breast tissue discovered 20 benign solid lesions (29.4% of women) and 18 benign cystic lesions (26.5% of women), of which 16 were found to contain suspicious solid masses (23.5% of women), which left 14 (20.6%) of women having no abnormalities found. This suggests that adjunct ultrasound examinations can be effective in detecting a variety of breast abnormalities among women with dense breast tissue. The data in **Table 8** indicates that adjunct ultrasound identified 14 lesions that were not identified with mammographic imaging. The adjacent ultrasound identified 6 (42.9%) cases of small invasive carcinoma, 5 (35.7%) cases of suspicious solid mass, 2 (14.3%) cases of complex cystic lesion, and 1 (7.1%) case of intraductal lesion as the histological diagnoses. These results demonstrate that ultrasound plays an essential role in the identification of mammographically occult lesions. **Table 9** shows that the Ultrasound imaging was found to be very efficient for detecting small breast lesions. The vast majority of lesions identified solely via ultrasound were of a small size; 6 of the 14 (42.9%) were between 1 cm and 1.5 cm, 5 of the 14 (35.7%) were less than 1 cm, 2 of the 14 (14.3%) were between 1.6 cm and 2 cm, and only 1 of the 14 (7.1%) was larger than 2 cm, which indicates that ultrasound is very useful to find small breast lesions that might be obscured by normal dense fibroglandular tissue when using traditional mammograms. According to **Table 10,** 74.5% of the 70 lesions detected solely through mammography were correctly identified. By using mammograms and ultrasound together, 84 lesions were detected with 89.4% diagnostic yield. This demonstrates the additional benefits that the combination of the two methods provides for detecting lesions in women who have dense breast tissue

DISCUSSION

Screening and early detection of breast cancer continue to be an important aspects in reducing breast cancer-related morbidity and mortality. As the most established and reliable form of imaging for screening for breast cancer, mammography has been proven to identify early signs of disease, such as microcalcifications and subtle changes in the structure of the breast. One key factor affecting the diagnostic performance of mammography is breast density; this is particularly true of women with dense breast tissue. The current research study examined how the composition of dense breast tissue affects mammography's sensitivity and considered whether or not the use of adjunct ultrasound adds value for diagnosing breast lesions in women with dense breast tissue[10]. Over half of the women included in this study were in the middle age range (40-59 years old). Women in this age range are often thought to represent the primary target population for breast cancer screening programs; studies show that the incidence of breast cancer continues to increase after age 40. The increased awareness of breast cancer screenings and breast-related symptoms likely contribute to the relatively high number of patients seeking routine mammography evaluations[11]. The findings of this study also showed that the two most common reasons for performing breast imaging were for screening evaluations and for further evaluation of a palpable breast lump. Screening evaluations assist in identifying abnormal findings/changes before they become clinically detectable; symptomatic evaluations assist in establishing a diagnosis for palpable breast lesions or for related concerns. Collectively, these two types of evaluations indicate the utility of mammography as both a screening and diagnostic method used during routine clinical practice[12]. In this paper, one of the main conclusions was that there is a significant number of women with a high prevalence of dressing breast density in our population. Patients who presented with breast density diagnosed as heterogeneously dense or extremely dense accounted for over 50% of the sample size. High-density breasts consist mainly of fibroglandular elements versus fatty tissue. Therefore, on a mammography, fibroglandular tissue presents itself as radiopaque as do many of the lesions seen in the breast, including cancer. Because of this, abnormalities can be masked by dense fibroglandular tissue and this may decrease the ability of mammography to detect abnormalities[13].

The findings from the current study show that there is a clear difference between mammography and the detection of breast cancer and the detection of cancerous breast masses between women who had breast density compared to women who did not have breast density. The failure of mammography to detect breast cancer is typically due to the masking effects of fibroglandular tissue. Lesions that could ultimately be detected in fatty breast tissue will likely be obscured in the dense breast and thereby increase the likelihood of a missed or late diagnosis[14]. The use of adjunctive ultrasounds was found to be highly beneficial in overcoming this issue. Using an ultrasound examination of the breast tissues of women who presented with dense breast tissue allowed for better visualization of many breast abnormalities (including cysts, benign, solid, and suspicious masses) than that seen in mammography. Better visualization of these lesions was made possible because they could not be adequately visualized on the mammogram.Ultrasound imaging can discriminate between normal tissue and pathological lesions better than mammography because of the differences in acoustic impedance that are inherent in ultrasound imaging, rather than only utilizing tissue density[15]. In this study, another of the more notable findings was the presence of additional lesions detected by ultrasound imaging that were not noted on mammography imaging. A number of these additional lesions were small invasive carcinoma or suspicious solid masses that did not show up on the mammogram. At a clinical level, early detection of these lesions can lead to increased patient treatment outcomes and increased survival rates due to smaller tumor size at diagnosis[16]. Given that ultrasound can detect lesions >1.5cm, these

results further support the role of ultrasound imaging as an adjunctive imaging modality for breast cancer diagnosis in women with dense breasts.

Another advantage of ultrasound imaging over mammography is its increased ability to characterise breast lesions. The use of ultrasound, most recently the ultrasound Doppler technique, has given clinicians a method for separating cystic lesions from solid masses, defining the margins of lesions and evaluating the vascularity (internal blood supply or vessels) of lesions—information that is helpful (and in some cases critical) to making treatment choices. Ultrasound imaging is also used to guide breast interventional procedures such as fine needle aspiration and core needle biopsy[17].

The combination of mammography and adjunct ultrasound in this study led to a significantly higher breast lesion detection rate than either modality used in isolation, and augurs well with emerging burgeoning data suggesting that multimodality approaches to imaging may yield superior diagnostic accuracy in select patient populations, particularly those with dense breasts[18]. Although many advantages exist, there are also several limitations regarding the use of adjunct ultrasound imaging. Ultrasound imaging is highly operator dependent and can vary greatly depending on the qualifications and experience of the radiologist performing the examination. Additionally, the increased detection of benign lesions can result in increased follow-up investigations and biopsies. Therefore, careful patient selection and standardised imaging protocols should be used when incorporating adjunct ultrasound imaging into practice.

In conclusion, this study demonstrates the substantial impact breast density has on mammographic sensitivity and the essential complementary role ultrasound plays in the detection of breast lesions and malignancies in the dense breast patient population. In conjunction with traditional mammographic evaluation, ultrasound adds to the totality of the assessment of female breast pathology, thereby facilitating the early diagnosis of malignant breast cancers.

Limitations of the Study

Several limitations influence interpretation of the present study's findings. Firstly, a retrospective analysis conducted based on available imaging records means that retrospective studies inherently rely upon previously recorded data and, therefore, are subject to incompleteness in documentation or variability in imaging protocol. Such limitations may adversely affect the consistency of both data collection and analysis.

Secondly, the study had a relatively small sample size and was limited to patients treated at one tertiary care facility. While it provides some insight into how breast density affects mammographic performance, these results cannot be generalized completely to other larger groups or facilities.

Thirdly, adjunctive ultrasound was only performed in patients who had dense breasts identified through mammography. Therefore, although this is consistent with typical clinical practice, the exclusion of ultrasound imaging in all patients limits the ability to directly compare diagnostic performance among the different breast density classifications.

Other limitations are related to the operator-dependent aspect of ultrasound imaging. The interpretation of ultrasound findings and the accuracy of ultrasound diagnosis vary with the level of experience and expertise of the radiologist performing the test. Therefore, variations in technique and interpretation can affect lesion detection rates, thus affecting accuracy of study results.

Lastly, the primary focus of the current study was on imaging findings and lesions detected by mammography rather than correlation with long-term clinical follow-up for every patient. Histopathological confirmation of benign or malignant status may not always be available for every detected lesion.

In conclusion, the present study provides informative data regarding the effect of breast density on mammographic performance, along with highlighting the significance of adjunctive ultrasound when attempting to identify lesions in women with dense breast tissue.

CONCLUSION

Mammography's diagnostic sensitivity is adversely affected with having dense breast tissue; it's more difficult to see breast lesions and that’s evidenced by the present study as mammographic detection rates in women whose breasts are dense were far less than those in women whose breasts are not dense. But in addition to mammography, adjunct ultrasound is a great imaging tool for women with dense breast tissue because it gives additional lesions that mammography would otherwise missed. Among other things, a lot of those lesions in adjunct ultrasound contained small tumours of invasive carcinoma and solid masses which speaks to the importance of ultrasound for diagnosing abnormalities that might otherwise be present and missed via mammography. Using adjunct ultrasound will improve overall detection rate of breast lesions and will increase the level of confidence when diagnosing breast abnormalities. Adjunct ultrasound would give better characterization of breast lesions, especially of cystic or solid lesions. Using adjunct ultrasound in the assessment of women with dense breast tissue would improve detection and thereby allow for better management of breast cancers. The results of this study indicated that multimodal imaging should be taken into consideration for comprehensive assessment of breast health especially in women in geographic areas of high-density breast tissue prevalence.

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