

# Ultrasound Findings of Mammographically Dense Breasts in a Sample of Iraqi Female Patients

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## Abstract:

**Background:** Breast problems including breast cancer have been increasing in Iraq during the recent years. Yet, early detection and screening programs using mammography mainly with complementary ultrasound had dramatically decreased the mortality rates from this emerging disease.

**Objective:** To assess the dense breast detected by mammography for the presence of any hidden suspicious lesion by using ultrasound.

**Patients and methods:** this is a cross-sectional study on 53 female patients who came for breast cancer screening or attended the Breast Clinic in the Oncology Teaching Hospital of the Medical City Complex in Baghdad – Iraq. The study was conducted from January to October 2018. Two-view mammography was done for each breast, and those with dense breasts underwent further ultrasound assessment done by a board-certified radiologist.

**Results:** The mean age for the 53 patients included in the study was 48 years. Mammographic findings showed that heterogeneous fibroglandular tissue density was present in (89%) of the study population. Suspicious or clearly defined mass(es) by mammograph were seen in 16 (30%) of the patients, while no mass was identified in (22%). Ultrasound findings were as follows: Suspicious mass in (75%) of the cases and benign lesions such as simple cysts or fibroadenoma in (9%). The results showed that ultrasound has upgraded 12 cases that were diagnosed as BI-RADS I/II to BI-RADS IV/V and this represented (23%) of the cases. On the other hand, the mammogram and the ultrasound were in concordance for BI-RADS IV/V in 28 cases (54%). The positive predictive value of the ultrasound and the mammogram for BI-RADS IV and V breast lesions is 72% for BI-RADS IV and 95% for BI-RADS V for ultrasound and that of mammograph is 83% for BI-RADS IV 80% for BI-RADS V, while the negative predictive value of mammograph is 55% for BI-RADS I/II 25% for BI-RADS III.

**Conclusion:** Dense breast is still an important problematic issue in mammographic screening as it may obscure small lesions, for which, ultrasound is proved to be a complementary and essential targeting tool in the assessment process.

**Keywords:** Dense breasts, mammography, breast cancer screening, breast ultrasound.

## Introduction:

Breast cancer is the leading cause of death in Iraqi women according to Iraqi cancer registry [1]. The best way to reduce that is by screening and early detection that was achieved by using mammography which is considered to be the first line modality for breast cancer screening that was shown to reduce the mortality by 40% when used in women under the age of forty [2].

However, in spite of powerful cancer detection by mammography, it is still weak in patients with dense breasts, in whom cancer detection sensitivity was decreased from 85% to about 46-65% [3]. Breast density is defined as the consistency of breast

according to the relative amounts of fat and glandular tissue and hence four categories were established according to the American College of Radiology's breast imaging reporting and data system (BI-RADS) which includes four categories: (A) almost entirely fatty, (B) scattered fibro-glandular tissue, (C) heterogeneous glandular breast and (D) an extremely dense breast[4]. According to these categories, detecting the pathology by mammography was imperfect in both categories C and D as those were considered as dense breasts while each category A and B are regarded as non-dense breasts [4]. Dense breast tissue is common and represents more than 50% of women younger than 50 years while this percentage decreases to 30% of women aged over 50 years [5]. To solve the dense breasts problem as a false negative cause on mammography, alternative solutions and strategies were employed including frequent screening sessions [6]. The previous solution is somewhat costly, with more radiation effects and

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more importantly the mammography is less accurate in the dense breast and therefore it was preferable to use a different radiological modality better than repeating the mammography several times [7].

For these reasons, the desire to use ultrasound as an adjuvant to mammography in the assessment of the dense breast tissue has emerged [8]. Ultrasound is simple, likable examination modality, as it is available, well accepted by patients, usually performed using high-resolution linear transducers that permit detailed depiction of solid and even small masses, also for it lacks ionizing radiation [9].

Women with dense breasts are five-folds more susceptible to develop breast cancer than those with soft ones. Not only that, but the tumor is often larger and usually spreads more to the loco-regional lymphatics [10, 11]. Furthermore, the Interval breast cancer also comes with higher rates [12].

#### Patients and Methods:

The study was conducted on 53 female patients who attended the Breast Clinic in the Oncology Teaching Hospital of the Medical City Complex in Baghdad – Iraq, from January to October 2018. They presented complaining of pain or a mass, or those who came to check. The clinical examination was done by a specialist general surgeon, which when revealed non-significant abnormality, they were referred to the radiology department for mammography. Mammography was performed by a specialist operator using GE healthcare seno essential digital mammography. During mammography, the patient had her breasts fully exposed and compression paddles were used with two projections, mediolateral oblique and craniocaudal, the mammography film was read by a specialist radiologist and revealed either heterogeneous or extremely dense breasts with no suspicious mass. The patients, then underwent breast ultrasound using Siemens Voluson E6 machine where they were asked to lie down supine on the examination couch with both breasts and axillae completely exposed and each breast was examined in a radial pattern using a GE machine's linear probe 5-12MHz. Following the breast examination, the axilla was fully assessed for any pathological adenopathy. All variables and findings were recorded including the following: Mammography: Breast density, presence or absence of a mass, micro calcification, macro calcification, skin thickness and axillary adenopathy

Ultrasonography: Breast echotexture, ductal dilatation, mass lesion (solid or cystic), skin thickening and axillary adenopathy. Any suspicious lesion seen by ultrasound was subjected to Fine needle aspiration done by cytologist under ultrasound guide.

#### Statistical analysis

All women's data were entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics

were presented as (mean ± standard deviation) and frequencies / percentages.

#### Results :

The age range for the patients in the study was 36 - 60 years with a mean age of 48 years. Over half of the patients were in the 6th decade. The age distribution is further detailed in table (1).

**Table (1): Age distribution of the cases**

| Age (Years) | Number | Percentage |
|-------------|--------|------------|
| 30-39       | 4      | 7.5 %      |
| 40-49       | 22     | 41.5 %     |
| 50-60       | 27     | 51%        |
| Total       | 53     | 100%       |

Regarding the mammographic findings in the study group, the extremely dense glandular breasts were seen in 7 out of 53 (11%) of the patients, while the mammograph in the remaining patients (89%) showed heterogeneous fibroglandular tissue density. Suspicious or clearly defined mass(es) by mammograph were seen in 17 (32%) of the patients, no mass were identified in (22%) of the sample. Other findings detected by mammograph were skin thickening, glandular asymmetry, positive axillary lymph nodes, and micro calcification, table (2) illustrates more details about the above mentioned findings.

**Table (2): Mammographic findings**

| Mammographic findings            | Number | Percentage |
|----------------------------------|--------|------------|
| Mass                             | 17     | 32.0%      |
| No mass                          | 12     | 22.6%      |
| Skin thickening                  | 9      | 17.0%      |
| Extremely dense glandular breast | 7      | 13.2%      |
| Positive axillary lymph nodes    | 3      | 5.7%       |
| Glandular asymmetry              | 3      | 5.7%       |
| Microcalcification               | 2      | 3.8%       |
| Total                            | 53     | 100.0%     |

The majority of BI-RADS scores identified by mammography: BI-RADS IV was seen in 20 (37.7%) of the patients, BI-RADS I and II were seen in 19 (36%) of the patients, patients with BI-RADS III were 7 (13%) and finally, BI-RADS V was seen in 7 (13%) of the patients. the ultrasound findings were as follows: Suspicious mass in (75%) of the cases, and benign lesions such as simple cysts or fibroadenoma in (9%). Other findings included skin thickening, benign adenopathy, thick cortex lymph nodes and distorted hilum adenopathy, as shown in the table (3).

**Table (3): The ultrasonographic findings**

| Ultrasonographic Findings                   | Number          | Percentage |     |
|---|-----------------|------------|-----|
| Suspicious (speculated or ill-defined mass) | 40              | 75%        |     |
| Benign mass                                 | 5               | 9%         |     |
| Skin thickening                             | 9               | 17%        |     |
|   | Benign          | 10         | 19% |
| Lymph Adenopathy                            | Thick cortex    | 5          | 9%  |
|   | Distorted hilum | 7          | 13% |

In patients with heterogeneous or extremely dense breast, a test was performed to measure if there is a significant BI-RADS difference between the ultrasound and the mammogram in the field of cancer detection, the results showed that ultrasound has upgraded 12 cases that were diagnosed as BI-RADS I/II to BI-RADS IV/V and this represented (23%) of the cases. Otherwise, the mammogram and the ultrasound were in concordance for BI-RADS IV/V in 28 cases (54%). The Accuracy of the ultrasound and the mammogram for BI-RADS IV and V breast lesions in comparison with cytopathology through the use of fine needle aspiration cytology, the negative predictive value for mammography regarding the BI-RADS I/II and III by considering the ultrasound and fine needle aspiration cytology as references for true negative and false negative, the results are 55% for BI-RADS I/II and 25% for BI-RADS III, the detailed results are shown in the table (4).

**Table (4): The accuracy of the ultrasound and mammography for BI-RADS IV and V lesions in comparison with cytopathology**

| Ultrasound Score          | BI-RADS | Fine Needle Aspiration Cytology             |           |
|---------------------------|---------|---|-----------|
|                           |         | Benign                                      | Malignant |
| IV                        |         | 8   | 16        |
| V                         |         | 1   | 19        |
| Positive Predictive Value |         | 72% for BI-RADS IV<br>95% for BI-RADS V     |           |
| Mammography RADS Score    | BI-     | Fine Needle Aspiration Cytology             |           |
|                           |         | Benign                                      | Malignant |
| IV                        |         | 3   | 15        |
| V                         |         | 2   | 8         |
| Positive predictive value |         | 83% for BI-RADS IV<br>80% for BI-RADS V     |           |
| Mammography RADS Score    | BI-     | Fine Needle Aspiration Cytology             |           |
|                           |         | Benign                                      | Malignant |
| I, II                     |         | 11  | 9         |
| III                       |         | 1   | 3         |
| Negative Predictive Value |         | 55% for BI-RADS I/II<br>25% for BI-RADS III |           |

**Discussion:**

The breast cancer mortality has been significantly reduced since the introduction and the progression in screening programs using mammography [13]. Strict standards have been developed to improve and maintain the quality of this program [14]. Mammography sensitivity is decreased with dense breasts [15]. Therefore, performing breast ultrasoundography is of great benefits that outweigh the BI-RADS overestimation or underestimation. [16] The mean age in the current study population is within the late 5th decade. BI-RADS I, II and III scores detected by mammography represented 45% of the cases, while BI-RADS IV represented 36%. This is in agreement with a study carried out by Hooley in 2018[17]. Ultrasound BI-RADS score revealed that 17% of the patients were in scores I, II but it came significantly higher for BI-RADS IV and V where they represented 82% which is in agreement with a study done by Berg et al [18]. Regarding the

ultrasound positive predictive values for BI-RADS IV and V lesions, they were 72% and 95% respectively which was comparable to the mammography predictive results for the same BI-RADS scores which represented 83% and 80% respectively. Accordingly, mammography predictive values are still lower than those of the ultrasound for BI-RADS V lesions, mainly because of the high breast density obscuring cancers, especially the small ones that get easily overlooked with dense breast tissues. These findings are relatively in agreement with a study done by Moshina et al [19]. Mammography negative predictive values for BI-RADS I, II and III collectively represented 80%, which was closely in concordance with the study conducted by Masroor et al on a nearly similar study group, with patients complaining of mastalgia. Differences between the two studies may be attributed to the selection of patients with dense breast tissues, and to racial differences [20]. Mammography results were found to be false negative in 26% of the cases while ultrasound was true positive in 73% of them. This indicates that the complementary use of the ultrasound is mandatory in the setting of heterogeneous and extremely dense breasts, which was in agreement with the study done by Devolli-Disha et al [21].

**Conclusion:**

Dense breasts represent a diagnostic challenge to the radiologist, especially in high-risk populations where the breast cancer comes to be as the leading cause of death among other cancers, so adding breast ultrasound in this setting is mandatory especially when performed by highly qualified radiologists.

**Author’s Contributions:**

Dr. Khaleel Ibraheem Mohson, Dr. Tara Farook: collect the data, made the design of the study, Dr. Khaleel and D. Anas K.Awn were writing the manuscripts in addition.

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## مشاهدات الفحص بالموجات فوق الصوتية (السونار) للثدي ذو الكثافة العالية في جهاز الماموجرام لعينة من النساء العراقيات

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### الخلاصة:

**الخلفية:** مشاكل الثدي بما في ذلك سرطان الثدي في تزايد في العراق خلال السنوات الأخيرة، ومع ذلك، فإن برامج الكشف المبكر والفحص باستخدام التصوير الشعاعي للثدي (بشكل رئيسي) ومساعدة الموجات فوق الصوتية كفحص تكميلي قد خفضت معدلات الوفيات بشكل كبير من هذا المرض الخبيث.

**المرضى وطرق البحث:** شملت الدراسة 53 مريضة أتين للكشف عن سرطان الثدي في مستشفى الأورام التعليمي التابع لمجمع مدينة الطب في بغداد - العراق. خلال الفترة من يناير حتى أكتوبر 2018. تم إجراء تصوير الثدي بالأشعة لكل ثدي ثم خضعت المصابات بثدي ذو كثافة نسيجية عالية إلى مزيد من التقييم بالموجات فوق الصوتية من قبل أخصائي الأشعة.

**النتائج:** من بين 53 مريضة في الدراسة كان متوسط العمر 48 سنة، فيما يتعلق بنتائج الماموجرافي في عينة الدراسة، وجدت كثافة الأنسجة الليفية غير المتجانسة في (89%) من عينة الدراسة. وشوهت كتلة مشبوهة بوضوح بواسطة التصوير الشعاعي للثدي في 16 (30%) من المريضات، ولم يتم تحديد أية كتلة في (22%) من العينة، وشملت نتائج الموجات فوق الصوتية على النحو التالي: كتلة مشبوهة في (75%) من الحالات، والأفات الحميدة كأكياس بسيطة أو ورم غدي ليفي في (9%)، أظهرت النتائج أن الموجات فوق الصوتية قد رفعت 12 حالة تم تشخيصها بأنها بايراد 1 و2 إلى بايراد 4 و5 وهذا يمثل (23%) من الحالات.

**الاستنتاج:** لا يزال الثدي ذو الكثافة النسيجية العالية مشكلة هامة في الفحص باشعة الماموجرام، حيث أنه قد يحجب الأفات الصغيرة، لذلك ثبت أن الموجات فوق الصوتية هي أداة تشخيص تكملية وأساسية في عملية التقييم في الحالات اعلاه.

**مفتاح الكلمات:** الثدي الكثيف، التصوير الشعاعي للثدي، فحص سرطان الثدي، تصوير الثدي بالموجات فوق الصوتية.