

## An Evaluation of Ultrasound Features of Breast Fibroadenoma

### Abstract

**Background:** Breast cancer is among the most common cancers in the world. Ultrasound evaluations of breast have come into attention as an alternative route. Ultrasound features of benign lesions such as fibroadenoma can be overlapping with those in a malignant tumor. Here, we assessed the reports of breast ultrasound in patients with pathologic diagnosis of fibroadenoma. **Materials and Methods:** We conducted a cross-sectional study and enrolled female patients with confirmed histologic diagnosis of fibroadenoma. Ultrasound studies were performed on the participants to see which sonographic patterns are more frequent in such lesions. **Results:** In 92 patients with  $40.4 \pm 9.2$  years of age, all participants were classified as stage 4 on Breast Imaging-Reporting and Data System scale. The mean  $\pm$  standard deviation of size for the lesions was  $167.4 \pm 101.4$  mm<sup>2</sup>. Upper outer quadrants in the breasts had the most number of lesions. Almost lesions were round with only 2.2% were oval. When assessed for the margin definition, 57.8% were circumscribed. Noncircumscribed masses were reported in 21.7%. About 91.3% of cases were hypoechoic in the ultrasound evaluation. Lobulated masses were in 28.3% of the cases. 8.7% of the masses were spongy whereas 9.8% and 2.2% of them had calcification and heterogenic appearance, respectively. **Conclusion:** The most frequent features include a hypoechoic mass with a circumscribed border; however, complex presentations that overlap malignant masses are also detectable including noncircumscribed margin, lobulation, presence of a posterior shadow, heterogenicity, and micro calcification.

**Keywords:** Breast, fibroadenoma, ultrasonogram

### Introduction

Breast masses are classified as either malignant tumors or benign growths and masses. Assessment of pathology is the golden standard in diagnosing a breast mass; however, other less invasive evaluations are also available that save the time and resources for both the patient and the health systems. The use of routine physical examinations and imaging studies are powerful descriptive tools to narrow down the number of patients who undergo pathologic sampling;<sup>[1-3]</sup> therefore, it is imperative to define the expected findings in these studies for different mass types so that enough sensitivity can be achieved for these methods to be a proper alternative for the screening and pathologic assessments in breast masses.<sup>[1,4]</sup>

Malignant tumors are uncommon among younger women.<sup>[5]</sup> Fibroadenoma is a form of benign breast mass. It consists of both stromal and epithelial elements.<sup>[6]</sup> They are more prevalent in younger patients and

incidence drops with aging. Fibroadenoma as a benign breast mass has been found to increase the risk of breast cancer when compared to healthy individuals within the same age groups. Imaging studies are often used for early detection and evaluation of these masses.

Mammograms are limited to differentiate fibroadenoma masses from other pathologies, i.e., cysts and carcinomas, as the quality of mammogram decreases in younger patients with denser breast tissues. Ultrasound is a useful alternative for mammographic studies. Cysts and carcinomas are better distinguished from fibroadenoma by ultrasound imaging; however, overlapping findings in nonhomogeneous fibroadenomas along with occasional calcification and noncircumscribed margins may mimic the findings in several other types of breast masses.<sup>[7]</sup> Here, we described the ultrasonographic findings of a group of patients whose fibroadenomas were previously established through pathologic

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assessments. We aimed to describe less common findings in a case of breast fibroadenoma.

## Materials and Methods

We conducted a cross-sectional study from 2011 to 2012 in Isfahan, Iran. We consecutively enrolled the referred female patients who had undergone tissue sampling of their breast masses; either it was because of suspicious palpable mass or imaging findings that suggested pathologic examinations. Only the patients whose pathologic diagnosis were positive for fibroadenoma of breast were included and other pathological reports or women who did not have an appropriate pathologic report of their mass, due to either insufficient tissue sample or discordance were excluded. Informed consents were taken from enrolled participants.

The data collected from the participants included their age, the confirmed pathologic report of each patient's breast mass as fibroadenoma, and also ultrasound reports. All ultrasound studies were performed by GE Voluson Pro 730 (United States), ultrasonographic equipment with 7.5–10 MHz probes by a skilled radiologist. All reports had to have the site, size, and appearance of the mass. The overall shape of the mass, margin definition, and its content features were reported in all cases. We also registered the category of the masses based on the established Breast Imaging-Reporting and Data System (BIRADS) scale through ultrasound imaging.<sup>[8]</sup>

Statistical analysis of the collected data was performed using the SPSS software, version 20, (Chicago, IL, USA). We used descriptive measures to represent the categorical data. ANOVA test was used to compare the means.  $P < 0.05$  was considered statistically significant.

## Results

In the present study, 92 patients were enrolled. The mean  $\pm$  standard deviation (SD) of age was  $40.4 \pm 9.2$  years. The mean  $\pm$  SD for size of the fibroadenomas was  $167.4 \pm 101.4$  mm<sup>2</sup>. Average size of fibroadenoma masses was compared between patients and across all four quadrants of both breasts. No significant difference was detected ( $P > 0.05$ ). Data are presented in Table 1.

**Table 1: Comparison of the mean size of breast masses between the four quadrants**

Location	n	Mean $\pm$ SD of size (mm <sup>2</sup> )	Minimum	Maximum
Upper outer lobe	56	176.7 $\pm$ 108	36	420
Upper inner lobe	14	148 $\pm$ 89.6	66	325
Lower outer lobe	13	144 $\pm$ 96.7	70	420
Lower inner lobe	5	150 $\pm$ 88.6	66	299
Other	4	203 $\pm$ 73.1	136	294
Total	92	167.4 $\pm$ 101.4	36	420

SD: Standard deviation

When assessed for the BIRADS categorization, 88% of the masses were concerned as 4a class. 8.7% and 3.3% of the masses were categorized as 4b and 4c, respectively.

The distribution and frequency of fibroadenoma in different areas of each breast are presented in Figure 1. The most frequent site for fibroadenoma was the upper outer lobe of each breast. About 64.4% and 57.4% of the masses were located in the upper outer quadrant of the left and right breast, respectively.

The ultrasound features of fibroadenomas in all enrolled patients were gathered and reported in Figure 2, across three main categories. Regarding the shape of the masses, almost all the masses were round with only 2.2% reported oval. When assessed for the margin definition, 57.8% were reported circumscribed. Noncircumscribed masses were reported in 21.7% of the cases. 18.2% of the cases were reported with noncircumscribed margins among all the cases with 4b or 4c BIRADS categorization. Content evaluation of the masses revealed that 91.3% of cases were hypoechoic in the ultrasound evaluation. Lobulated masses were reported in 28.3% of the cases. 8.7% of the masses were spongy whereas 9.8% and 2.2% of them had calcification and heterogenic appearance, respectively.

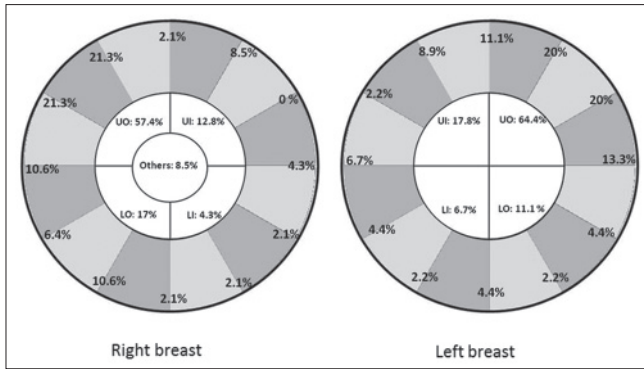
## Discussion

Breast masses, as one of the most common indicators of probable breast cancers, particularly in female patients, are the subject of studies that try to define new measures of screening for a faster and safer detection of underlying etiology.<sup>[1,2,9]</sup> Here, we evaluated the ultrasound features of fibroadenoma to report the frequent findings of such masses.

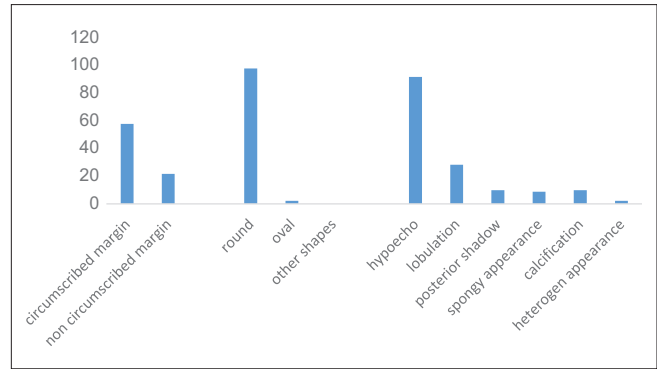
It has been established in the literature that clinical diagnosis of fibroadenoma does not exclude malignancies.<sup>[6]</sup> Ultrasound imaging in young patients and its combination with mammogram in older patients provides further evidence for a more accurate diagnosis; however, there are reports of overlapping features in the results with other diagnosis.<sup>[1,2]</sup>

As other benign lesions are seen in breast, fibroadenoma is usually seen as a round or oval mass with smooth margins and an either hypoechoic or isoechoic appearance. Although fibroadenoma is not a capsulated lesion, a thin layer of echogenicity surrounds it which is mainly due to the compressed normal breast tissue; any thickened echogenicity questions the diagnosis of fibroadenoma and could be suggestive of a potential malignant pathology.<sup>[10,11]</sup>

Smith and Burrows declared in their study that there were no discrepancies of diagnosis between ultrasound and biopsy samples for fibroadenoma; therefore, it is not indicated to investigate all cases through biopsy unless there are added abnormalities in the physical examination or patients' history.<sup>[10-12]</sup> Less commonly reported ultrasound



**Figure 1: The frequency of the masses, based on their placements on a clock-like grid**



**Figure 2: The frequency of the different features of fibroadenoma masses, when assessed by ultrasound**

features of fibroadenoma include noncircumscribed margin, calcifications, lobulations, and posterior acoustic shadows.

Alarming signs and symptoms that are usually seen in the cases of malignant breast masses, although rarely, but have been reported in the course of a fibroadenoma. Liu *et al.* reported a case with unilateral palpable breast mass and bloody discharge from the nipple in a 12-year-old girl. The histological report revealed the mass to be a fibroadenoma with the infarction as the cause of hemorrhage.<sup>[13]</sup> In a similar case, Arora *et al.* reported of a 37-year-old female, with painful, slowly growing, and hemorrhagic unilateral breast mass that was diagnosed through pathologic sampling as a benign case of infarcted fibroadenoma.<sup>[14]</sup>

Age range of the patients has also been a subject of dispute in the literature. Although young females are the most common cases of fibroadenoma, incidence is still expected well into the menopausal years. Shi *et al.* reported of fibroadenoma in a 16-month-old infant.<sup>[15]</sup> In all the mentioned cases, no regional lymphadenopathy or recurrence after follow-up was reported.

Although many cases of fibroadenoma are benign, factors such as older age, previous positive familial history for breast cancer, multiple lesions, micro calcifications, and heterogeneity should raise the suspicion of whether or not a lesion is a benign fibroadenoma or it needs further assessment for other diagnosis. The main reported differential diagnosis for such cases includes complicated cyst, cystosarcoma, fibromyxoid, phyllodes tumors, and breast malignancies.<sup>[16-20]</sup>

In our study, all of the 92 enrolled patients had benign pathologic results and were classified as different variants of category 4 on the BIRADS grading scale. This is supported by the literature that only a small fraction of the patients diagnosed with fibroadenoma may present with manifestations of a malignant tumor.

Regarding the size of the tumors, like it is seen in many of the breast malignancies as well, none of the four quadrants in a breast is predisposed to the development of bigger tumors; however, lesions were more frequently observed

in the upper outer quadrant of the breasts as it is evident in Figure 1. It is indicated by both the literature and our results that the size of fibroadenoma rarely exceeds 3 cm.

Our results were consistent with the literature regarding the ultrasound features. The shape of the majority of the cases was round. Their margins were well-defined with circumscribed borders; yet a fraction of the cases presented noncircumscribed margins. Interestingly, prevalence of noncircumscribed masses did not increase when we excluded 4a BIRADS category. Most commonly, we found the cases to be hypoechoic. Consistent with the previous studies, there were very few abnormal findings in comparison to the entire assessed data.

## Conclusion

Ultrasound features of fibroadenoma include a range of different presentations that most frequently are consistent with presentations seen in a benign mass. The most frequent features include a round hypo echoic mass with a circumscribed borders; however, complex presentations that overlap with complex or malignant masses such as calcification and heterogeneity are also detectable. When classified by the BIRADS system, in a fraction of the cases, moderate suspicion to malignancy was reported. Regarding the retrospective manner of the study, we were not blind about the pathological results of study, so this is a limitation for this work. Further study with prospective design is recommended.

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## Conflicts of interest

There are no conflicts of interest.

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