

# The Sonographic Spectrum of Pathologically Proven Fibroadenoma of the Breast Among Women in Zaria, Northern Nigeria

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## Abstract

Fibroadenoma is the commonest solid benign breast tumor of adolescents and young women. However, they vary in sonographic appearances from typical to atypical. It is imperative to be familiar with these features because significant overlap occurs between fibroadenoma and other breast masses, including breast cancer which has serious therapeutic consequences.

This study examined the different sonographic appearances of histologically confirmed breast fibroadenomas in Ahmadu Bello University Teaching Hospital, Zaria.

It was a cross-sectional review of the sonograms of one hundred and seven women with biopsy-proven fibroadenoma over a period of two years; and three women with sonographic mimics. A typical fibroadenoma is described as having a round, oval or lobulated shape, homogenous internal echotexture, well-circumscribed margin, parallel orientation to skin and posterior acoustic enhancement. The diagnostic criteria for atypical fibroadenoma were one or more of the following features: non-circumscribed margin, irregular shape, heterogeneous internal echo-pattern, posterior shadowing, microcalcification, and cysts >3mm. Data were recorded, edited and analysed using the Statistical package for social sciences version 20 (SPSS, Inc. Chicago Illinois, USA).

A total of 147 fibroadenomas were seen in 107 women whose mean age was  $26.7 \pm 8.34$  years (range 13 to 53 years). The commonest presentation was a palpable mass. The predominant sonographic features were round (18.7%) or oval (69.2%) shape, a smooth or circumscribed contour (89.7%), hypo-echogenicity (72.9%), parallel orientation to the skin (85%) and posterior acoustic enhancement (83.2%). The features of atypical fibroadenomas were: irregular margins in 11.2%, heterogenous echotexture in 7.4%, cysts in 2.8% and posterior shadowing in 4.7%.

We conclude that most fibroadenomas in our series were typical. However, patients with atypical fibroadenoma, multiple lesions or a family history of breast cancer warrant surveillance because of increased risk of malignancy.

Keywords: Fibroadenoma, complex, breast, ultrasound

## Introduction

Fibroadenoma is a benign proliferative tumor of breast tissue, which consists of stromal and epithelial elements. It can occur in women of any age however its peak incidence is within the reproductive age group, especially in the 2nd and third decades.<sup>1,2</sup> In our institution, it is the commonest benign breast disease detected on ultrasound and at breast biopsy.<sup>3</sup>

Fibroadenoma commonly presents as a firm, mobile, non-tender palpable mass. They generally show typical sonographic features characteristic of benign solid nodules described by Stavros et al.<sup>4</sup> However, atypical sonographic findings do occur, which could make the diagnosis difficult.<sup>5-9</sup> Dupont et al<sup>10</sup> defined a fibroadenoma in which one or more of the following histological features are present as complex: epithelial calcifications, apocrine metaplasia, sclerosing adenosis, and cysts larger than 3 mm. Women with fibroadenoma are said to be at elevated risk for breast cancer especially when the fibroadenoma is complex or multiple; when there is the presence of other proliferative diseases in the adjacent breast parenchyma or where there is a positive family history of breast cancer.<sup>10</sup>

In this report, we present the various sonographic appearances of biopsy-proven fibroadenoma in Zaria. With this knowledge, we hope to aid diagnosis and follow-up of patients since it is the first study in a Nigerian population, to the best of our knowledge.

## Materials And Methods

The ethical committee of Ahmadu Bello University approved this study, and the requirement for patient consent was waived due to its retrospective nature.

We examined our ultrasound database from January 2015 to December 2017 for breast masses that were diagnosed as fibroadenoma and were also histologically confirmed. After excluding all patients

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with either sonography alone or biopsy alone, we finally reviewed the images of 107 women who had 147 fibroadenomas. Also, we included three other cases that mimicked fibroadenoma but had other histologic diagnoses (2 benign lesions and 1 malignancy). The ultrasound scans were done using a 7- 12 MHz (Mindray DC-8, China) equipment.

Two of the authors ASO and FB (10 and four years' experience in breast imaging) retrospectively reviewed the breast sonograms in consensus. Greyscale ultrasound images were assessed for shape, margin, internal echotexture, the presence of calcifications, cysts, and surrounding tissue as well as skin changes.

A typical (simple) fibroadenoma was defined by a round, oval or lobulated shape, homogenous internal echotexture, well-circumscribed margin, parallel orientation to the skin and posterior acoustic enhancement. The diagnostic criteria for atypical (complex) fibroadenomas were an ill-defined margin, micro-lobulated or irregular shape, heterogeneous internal echo-pattern, posterior shadowing, micro-calcification, and cysts >3mm.

Data were recorded, edited and analysed using Statistical package for social sciences software for Windows version 20 (SPSS, Inc. Chicago Illinois, USA).

Table 1: clinical features of the patients

Clinical feature	Frequency (%)
<b>Age group</b>	
Less than 35 years	87(81.3)
Greater than 35 years	20(18.6)
<b>Palpability of the mass</b>	
Palpable	88(82.2)
Non-palpable	19(17.8)
<b>Multiplicity</b>	
Single	77(72)
Multiple	30(28)
<b>Laterality</b>	
Ipsilateral	96(89.7)
Bilateral	11(10.3)
	[right side 61 (57); left side 35(32.7)]
<b>Family history of breast cancer</b>	
Present	12(11.2)
Absent	95(88.7)
<b>History of previous breast disease</b>	
None	81(75.7)
Benign breast disease	24(22.4)
Breast cancer	2 (1.9)

Table 3  
Frequency of atypical sonographic findings in 21 women

Ultrasound finding	n (%)
Irregular margins	11(52.4)
Posterior shadowing	5(23.8)
Presence of cysts	3(14.3)
Intra-tumoral calcification	8(38.1)
Heterogenous internal echogenicity	8(38.1)

Student's t-test was used to assess the relationship between age and complexity of fibroadenoma while Chi-square was used to assess the relationship between family history of breast cancer and the complexity of fibroadenoma. The statistical level of significance was set at  $p < 0.05$

## Results

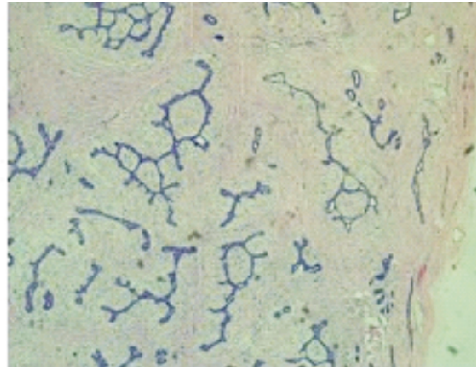
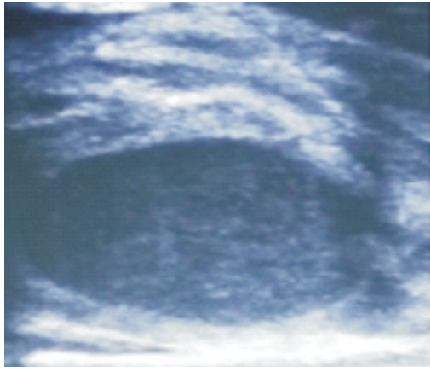
There were one hundred and seven women with a mean age of  $26.7 \pm 8.34$  years (range 13 to 53 years). Eighty-seven (81.3%) women were less than 35 years old, while twenty (18.6%) were above 35 years old. Table 1. The commonest presentation was a palpable mass, seen in 88/107 (82.7%) women. There were 19/107(17.8 %) women who had non-palpable lesions. Out of these, 3 patients presented for routine evaluation and sixteen patients only complained of breast pain. Also, thirty women with multiple lesions, out of which nineteen were ipsilateral while eleven were bilateral. Table 1.

Overall, the sonographic features were those of typical fibroadenoma (Figures 1a and 1b) in 86 (80.4%) of the women (mean age  $26.8 \pm 8.6$ ) years. Atypical sonographic features were seen in 21(19.6 %) women whose mean age were  $26.2 \pm 7.0$  years. Figures 2a & 2b; 3a & 3b. There was no statistically significant

Table 2. Frequency of different sonographic descriptors

Sonographic descriptor	frequency	percentage
<b>Shape</b>		
Round	20	18.7
Oval	74	68.2
Lobulated	13	12.1
<b>Margin</b>		
Circumscribed	96	89.7
Non-circumscribed	11	11.2
<b>Echogenicity</b>		
Isoechoic	10	9.3
Hypoechoic	78	72.9
Hyperechoic	11	10.3
Heterogenous	8	7.4
<b>Orientation to skin</b>		
Parallel	91	85
Antiparallel	16	15
<b>Calcifications</b>		
Present	8	7.5
Absent	99	92.5
<b>Posterior features</b>		
Enhancement	89	83.2
Shadowing	5	4.7
Combined	2	1.9
None	11	10.3

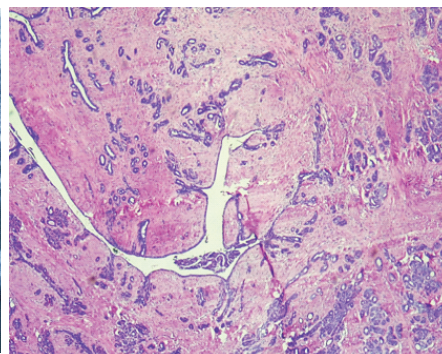
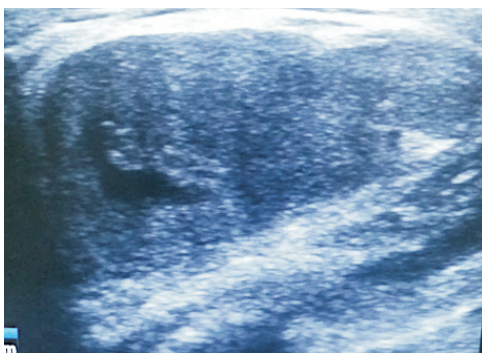




1a. Transverse ultrasound scan of the breast showing typical features of a simple fibroadenoma: oval shape, well defined, homogeneously hypoechoic and posterior acoustic enhancement.

1b. Histologic section (H&E X40) reveals distortion of lobular architecture by an encapsulated tumour composed of compressed slit like glands and stroma.

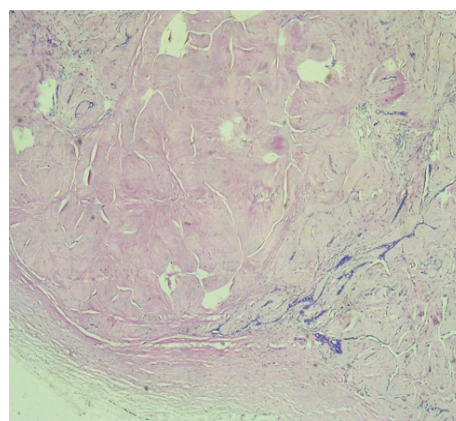
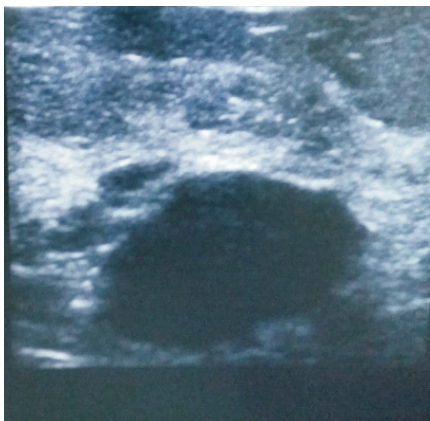
Figures 1a and 1b: Diagnosis was a fibroadenoma



2a. Ultrasound scan shows a lobulated hypoechoic mass showing linear clefts and cystic space. The internal echotexture is heterogenous. Features are those of complex fibroadenoma.

2b. Histologic section (H&E X40) reveals partial distortion of lobular architecture by a lesion composed of proliferating glands and stroma, adenosis, epithelial hyperplasia and cystic changes.

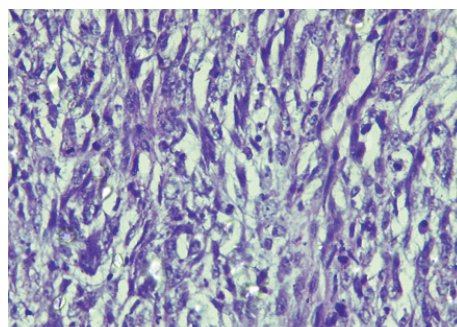
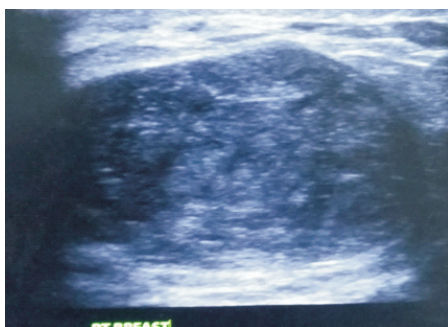
Figures 2a and 2b: : Diagnosis was a fibroadenomatoid hyperplasia



3a. Ultrasound image showing intensely hypoechoic mass with irregular margins and posterior acoustic shadowing.

3b. Histologic section (H&E X40) reveals an encapsulated lesion composed of slit like glands compressed by abundant hyalinised intralobular stroma

Figures 3a and 3b.: Diagnosis was an ancient Fibroadenoma.



4a. Transverse Ultrasound image showing a Hypoechoic mass with multiple linear clefts and heterogenous internal architecture.

4b. Histologic section (H&E X40) shows an infiltrative tumor disposed in fascicles, composed of spindle cells with elongated vesicular nuclei, scanty cytoplasm and scanty fibro-collagenous stroma. Note the brisk mitotic figures.

Figures 4a and 4b : Diagnosis was a malignant Phyllodes Tumor.

difference between the patients' age and complexity of the fibroadenoma.

The sonographic descriptors in Table 2 show that regarding the shape of the masses, 74(69.2%) were oval, 20(18.7) were round and 13(12.1%) were lobulated. When assessed for margin, 96(89.7) had well circumscribed, while 11(10.2%) were non-circumscribed. Regarding echogenicity, 10(9.3%) were isoechoic, 78 (72.95) were hypoechoic, 11(10.3%) were hyperechoic. However, 8 patients (7.4%) had heterogeneous echogenicity.

The posterior features were of acoustic enhancement 89(83.2%), while acoustic shadowing occurred in 5(4.7%). Combined or no posterior features were seen in 2 (1.9%). Calcifications were present in 8 (7.5%) of the patients, and 91(85%) of the masses were oriented parallel to the skin.

The atypical sonographic findings in 21 women were: irregular margins (n=11), posterior shadowing (n=5), presence of cysts or cleft (n=3) intra-tumoral micro-calcification (n=8) and heterogenous echo-pattern (n= 8) figures 2a&2b; 3a&3b; Table 3

Two women had a previous history of breast cancer. A family history of breast cancer was present in 12 women: (9 patients with simple fibroadenoma and 3 patients with complex fibroadenomas). There was no significant relationship between family history of breast cancer and the complexity of the fibroadenoma. The histologic subtypes of fibroadenoma identified among the patients were: ancient fibroadenoma; n=1 (figures 3a and 3b), fibroadenomatoid hyperplasia; n=8 (figure 2a). juvenile fibroadenoma n=3 and giant fibroadenomas (n=4)

In 3 different cases, the lesions were initially misdiagnosed as a fibroadenoma. They constituted sonographic false positives, and they were: an oil cyst, granular cell tumour, and a malignant phylloides tumour. Figures 4a and 4b.

## Discussion

Fibroadenomas present a variety of ultrasound features which reflects the spectrum of stromal and epithelial histologic changes that vary with time and patient's age.<sup>5</sup>

In our study, (80.4%) women had typical fibroadenomas; while 19.6% had atypical fibroadenomas. This is consistent with other reports where atypical (complex) fibroadenomas were less frequent, constituting 21.2%<sup>5</sup>, 15.7%<sup>8</sup>, and 22%<sup>10</sup> respectively. However, Jackson et al<sup>7</sup> differed significantly where the majority 50 (65.7%) were atypical fibroadenomas, and only 12(15.7%) out of 76 were typical. We believe that the young age of our patients (mean  $26.7 \pm 8.34$ ; range 13 to 53) years could explain why the main ultrasound finding in our study was typical, since atypical features are said to occur in the older age group.

Overall, the mean age the patients presenting with fibroadenoma in previous studies are also higher than in our patients: Cole et al<sup>6</sup> (mean 32, range 13-71yrs); Alireza et al<sup>11</sup> (mean  $40.4 \pm 9.2$  years); Arno et al<sup>12</sup> ( $33.4 \pm 12.1$  years), Skaane 39 yrs<sup>13</sup> (18-81). Multiple lesions were found in 28% of the women in this study which is rather higher than 10-15% previously documented.<sup>9</sup>

The main clinical presentation was a palpable mass. In a few patients (17.8%) however, the lesion was only detected on ultrasound examination either for routine evaluation or for symptom other than a breast mass.

The major ultrasound finding was a round or oval mass which is well circumscribed with posterior acoustic enhancement. This describes the characteristics of benign solid nodule purported by Stavros et al<sup>4</sup> and it was found to be histologically concordant with all eighty-six of our patients with typical fibroadenomas. The atypical features which were documented in 21 women were: irregular margins seen in most 11(52.4%) women. A heterogeneous echotexture occurred in 8(38.1%) women, posterior shadowing in 4(23.8%) women, while cysts were present in 3 patients (14.3%). Shin et al<sup>5</sup> reported that out of 43 lesions, 15 (35%) cases had ill-defined margins or irregular shape, 27 (63%) heterogeneous echogenicity, 9(21%) posterior shadowing and cysts in 7(16%) cases. They found that Ill-defined margins corresponded histologically to inter-digitation of normal parenchyma around the mass; while heterogeneity represented either dilated ducts, collagen bundles, phylloides features or calcifications.

Cole-Beuglet et al<sup>6</sup> while reviewing one hundred and eighteen fibroadenomas found in 17% weak echoes and 25% irregular margins. These were all interpreted as suspicious for malignancy but biopsy confirmed them to be fibroadenomas except for one fibroadenoma in which there was associated in-situ lobular carcinoma.

A posterior acoustic enhancement was seen 89 (83%) of our patients and shadowing in 5 (4.7 %). Fibroadenomas in young patients, mostly show enhancing posterior acoustics because of rich cellularity and sparse fibrous elements.<sup>14</sup> Posterior enhancement, although it is a feature of benign nodule, it can also occur in malignant tumours.<sup>6</sup> Conversely, posterior shadowing which is a feature of malignancy could also occur in other benign nodules, including a fibroadenoma when calcification, hyalinization, stromal sclerosis is present.<sup>15</sup> This was the case in a 49-year old patient who had an intense hypoechoic mass with irregular margins and posterior shadowing diagnosed histologically as ancient fibroadenoma with hyalinization. Another case of posterior shadowing was initially thought to be a heavily calcified fibroadenoma.



However, histology revealed a granular cell tumour.

The masses with cysts (n=3) in our study were confirmed as fibroadenomatoid hyperplasia (n=2) and phylloides tumour (n= 1). All the seven cases showing cysts reported by Shin et al<sup>5</sup> revealed phyllodes features (57.1%) and dilated ducts (42.1%).

Due to significant overlap between fibroadenoma and other breast masses, we recorded three masses that were initially diagnosed as fibroadenoma but had other diagnoses at histology.

In one of the patients, a circumscribed homogenous hypoechoic mass, the posterior acoustic shadowing (previously mentioned) was diagnosed histologically as granular cell tumour. Other sonographic mimics were fat necrosis and a malignant phylloides tumour. The distinction between fibroadenoma and the phylloides tumour may be difficult on ultrasound therefore it should be sought at histology. This is because phylloides tumor has greater recurrence rate which may exhibit a higher grade than the primary tumour.<sup>16</sup>

In the review by Arno et al<sup>12</sup>, other benign masses which may be difficult to differentiate from fibroadenoma even at histology include a phylloides tumour, sclerosing lobular hyperplasia, hamartoma, tubular adenoma, pseudoangiomatous stromal hyperplasia, adenomyoma, epithelioma and normal breast tissue.

Similarly, the diagnosis of fibroadenomas may be difficult to make in special cases like cystic fibroadenoma<sup>17</sup>, Infarcted fibroadenoma which could mimic carcinoma<sup>18,19</sup> and intraductal fibroadenoma.<sup>20</sup>

Dupont et al<sup>10</sup> documented that the risk for carcinoma in patients with fibroadenoma is 2.17 times; the relative risk of simple versus complex fibroadenoma is 3.10; risk with family history of breast cancer is 3.72 while the risk when there is associated proliferative disease in adjacent parenchyma is 3.88. Carcinoma within a fibroadenoma or malignant transformation of a fibroadenoma is rare.<sup>12,21-25</sup>

The management of fibroadenoma is influenced by the age of the patient, tumor size, multiplicity, complexity, a rate of growth and family history of breast cancer.<sup>11,12,26-29</sup>

The natural history of fibroadenoma varies with each patient.<sup>27</sup> While some may remain dormant, others increase slowly in size. But majority of fibroadenoma decrease in size. However, in patients greater than 35 years old, excision is advocated thereby solving the risk of epithelial progression.<sup>12</sup> Surveillance is recommended for women with a positive family history of breast cancer, patients diagnosed with complex fibroadenoma or patients with simple fibroadenoma and hyperplasia in adjacent tissue.<sup>12</sup>

## Conclusion

Fibroadenoma of the breast is a frequent diagnosis encountered at breast imaging. Attention should be paid to the presence of atypical findings because of its associated breast cancer risk, which would warrant patient follow-up. High-resolution ultrasound is useful in defining the tumor margin, echotexture, intra-tumoral lesions like cysts and calcifications.

Nonetheless, where there is a diagnostic challenge due to overlying sonographic features with other breast masses, histology remains the gold standard.

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