

# Ultrasonographic Review of Pediatric Breast Masses among Nigerian Children in a Tertiary Hospital

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## Abstract

**Background:** Breast masses occur infrequently in children and adolescents. Most of these masses have proved that benign and conservative approach is the management of choice. Consequently, imaging has become crucial. The knowledge of the ultrasonographic features of childhood and adolescent breast masses is needed for age appropriate medical care. **Aim:** The aim of this study was to describe and document the ultrasonographic spectrum of breast masses in children and adolescents (0–19) years seen in the Ahmadu Bello University teaching hospital, Zaria. **Materials and Methods:** A 2-year retrospective review of breast sonograms of 25 consecutively presenting children and adolescents (3 males and 22 females) who had palpable breast masses. Ultrasound scans were performed with a Mindray Machine DC-8 using the linear transducer at 7.5–12 MHz transducer frequency. Histopathological confirmation of the solid masses was also obtained. The statistical analysis of the data collected was done using the SPSS software version 20 (SPSS Inc., Chicago, IL, USA). **Results:** The patients were between 40 days and 19 years old (mean 14.8 years and standard deviation 4.1). The ultrasonographic findings were those of infections, benign tumoral lesions and pubertal endocrine changes. Overall, fibroadenoma was the most common mass, seen in 14 (56%) of the patients. Other findings were simple cysts, non-puerperal and puerperal mastitis, juvenile papillomatosis and normal glandular pubertal breast tissue. The three male patients had gynaeomastia, pseudogynaeomastia and cystic lymphangioma of the chest wall presenting as unilateral breast masses, respectively. There was no malignancy recorded in any of the patients. **Conclusion:** Ultrasonographically, benign masses predominate which is concordant with surgical findings. Familiarity with these features would obviate the need for unnecessary invasive procedures which should be reserved for only deserving cases.

**Keywords:** Breast, children, masses, palpable, ultrasonographic

## INTRODUCTION

The heightened level of awareness of breast cancer among adult population has increased the conspicuity of childhood breast conditions. Although breast masses are still less frequently encountered in children and adolescents,<sup>[1-4]</sup> it could be associated with significant patient and parental distress. The prevalence of adolescent masses in a previous report is 3.25%.<sup>[3]</sup> Luckily, in the pediatric population, breast cancer is rare, occurring in 0.1% of cases.<sup>[5-8]</sup> The few Nigerian literature on childhood and adolescent breast masses is clinicopathological.<sup>[2,4-7]</sup> We believe that the paucity of ultrasonographic data could be because breast ultrasound services were not available in some hospitals until recently<sup>[6]</sup> or simply due to a low threshold for biopsy by some surgeons.

Ultrasound is non-invasive which makes it central to the diagnosis, treatment, follow-up and intervention in paediatric

patients. The advantage of this technique is minimal disruption of the sensitive growing breast buds which could impair breast development and breastfeeding later in life.

This presentation illustrated the ultrasonographic differential diagnoses of breast masses seen in children and adolescents in our centre.

## MATERIALS AND METHODS

This study was a retrospective review of patients who underwent breast ultrasound scan during the 2-year study period. Two hundred and thirty-eight out of a total of

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433 patients had palpable breast masses, of which only 25 patients (0.11%) were younger than 20 years of age. There were 3 males and 22 females that constituted our study population. The clinical notes and ultrasound images were reviewed for each patient. The ultrasound scan was performed in two orthogonal planes using a single Mindray DC-8 ultrasound machine (2008), at a probe frequency of 7.5–12 MHz. The findings recorded were side and number of the lesion, shape, margin, and echogenicity, presence of calcification, posterior acoustic features and vascularity. Histopathological confirmation of solid masses was also obtained. Data were recorded and analyzed using the SPSS software version 20 (SPSS Inc., Chicago, IL, USA).

## RESULTS

### Patient demographics

A total of 22 female and 3 male patients who were < 20 years old were studied, as shown in Table 1. The youngest patient was a 40-day-old infant, whereas the oldest patient was 19 years old. Three of the females were yet to attain menarche; only 1 patient had achieved parity. There was no history of oral contraceptive use among the female patients. Family history of breast cancer was present in only two patients.

### Patient presentation

Twenty-nine breast masses were recorded in the 25 patients. Seven patients (28%) had multiple masses, whereas bilateral masses were seen in 4 (16%) patients. The mean duration of symptoms before the presentation was 6.2 months. Right sided masses predominated (60%).

### Ultrasonographic findings

The most common abnormality was fibroadenoma, seen in 14 (56%) of the patients [Figure 1 and Table 2]. Normal developmental (pubertal) breast tissue presenting as palpable masses was seen in a 7-year-old female child [Figure 2] and an 11-year-old male child. Other findings included breast cysts, one of which was complicated [Figure 3]; breast abscess [Figure 4]; juvenile papillomatosis [Figure 5]. In patient with a negative scan, the palpable concerned was the patient's rib.

Gynaecomastia, pseudogynaecomastia [Figure 6] and congenital chest wall cystic lymphangioma [Figure 7] constituted the male abnormalities.

No histological confirmed malignancy was recorded in this study.

## DISCUSSION

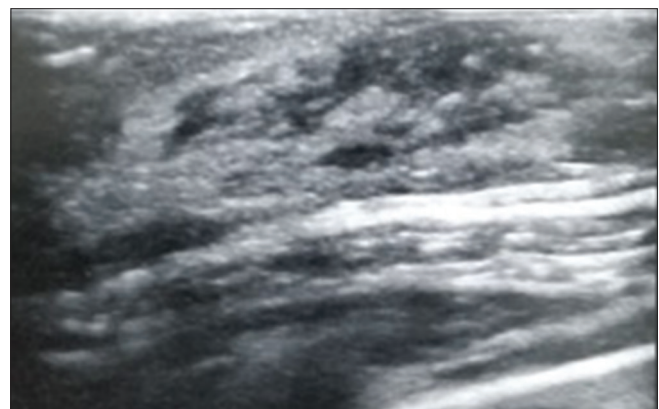
The paediatric and childhood masses documented in this study were all benign, and they include congenital, developmental, infective and benign neoplastic conditions. The mean age of the presentation is  $14.8 \pm 4.1$  years. This is slightly lower than a study in Southern Nigeria,<sup>[6]</sup> but similar to the study in America.<sup>[9,10]</sup>

### Developmental lesions

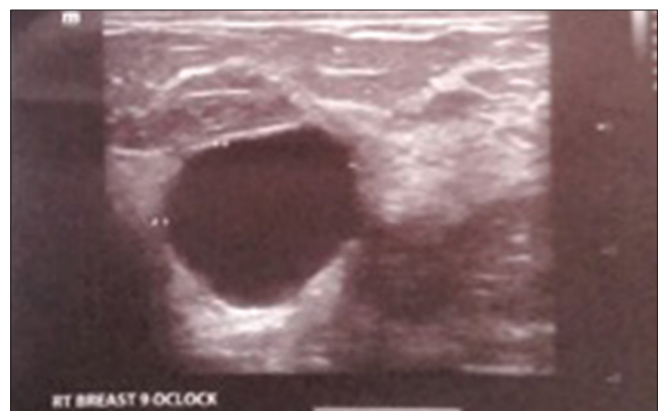
Normal development of the breast (thelarche) occurs across an age spectrum, appearing earlier in African girls (7 years)



**Figure 1:** A 17-year-old female with a right breast mass of 5 weeks duration. Ultrasound shows a well-defined oval-shaped hypoechoic mass At 6 o'clock position, 3 cm from the nipple. There is posterior acoustic enhancement with edge shadowing. Biopsy revealed fibroadenoma



**Figure 2:** A 7-year-old female with asymmetric right breast mass. Ultrasound shows an echogenic breast tissue with central hypoechoic areas. Diagnosis: normal pubertal breasts (Tanner stage 3)



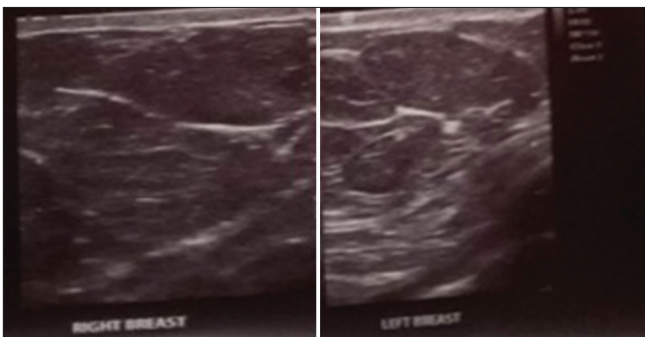
**Figure 3:** A 15-year-old female with painless right breast mass of 6 months duration. Ultrasound shows a well-circumscribed anechoic mass with a thin wall and no internal septations. There is through transmission. Diagnosis simple breast cyst



**Figure 4:** A 13-year-old female with a week history of painful right breast swelling and fever. Ultrasound shows an irregular anechoic area with internal debris. Ultrasound-guided per cutaneous drainage yielded pus. Diagnosis breast abscess



**Figure 5:** A 13-year-old female with sudden rapidly enlarging right breast mass of 5 months duration. Ultrasound shows a heterogeneous mass with numerous cystic spaces within it. Biopsy revealed juvenile papillomatosis



**Figure 6:** A 15-year-old obese male child with bilateral breast enlargements. Ultrasound revealed excessive deposition of fatty tissue in both breasts, without proliferation of glandular breast tissue. Diagnosis: Pseudogynaecomastia



**Figure 7:** A 40-day-old child with asymmetric swelling of the right chest wall and axilla. Ultrasound shows multiple anechoic cystic spaces just beneath the skin. Histology showed congenital cystic lymphangioma of the chest wall

than caucasian girls (8 years).<sup>[11]</sup> Sometimes, thelarche can occur earlier than expected, and it may be worrisome to parents, especially when it is asymmetric as it was in both cases presented. In the absence of precocious puberty, it is considered a variation of normal development. The use of ultrasound is to confirm normal developing breast tissue and to rule out other masses to avoid unnecessary procedure which could damage the breast bud or even cause iatrogenic amastia.<sup>[12]</sup> The pelvis should also be assessed to rule out early sexual development.

### Gynaecomastia

Two out of the three male patients had gynaecomastia and pseudogynaecomastia. Gynaecomastia is the excessive proliferation of the glandular tissue in the male breast. It is usually bilateral, but it was unilateral and painful in the patient presented. In the pediatric age group, physiologic gynaecomastia occurs in the neonatal period and during puberty. Pubertal gynaecomastia occurs in about 60% of boys, with a peak age between 10 and 13 years.<sup>[13]</sup> Pseudogynaecomastia was seen in a 15 years old who was being managed at the endocrine clinic for obesity. In this case, the bilateral breast enlargement was due to increased deposition of subareolar adipose tissue without glandular proliferation. This differentiates it from gynaecomastia. Ultrasound findings

demonstrate normal glandular breast tissue or fatty tissue as the case may be and excludes any other mass.

### Infections (mastitis/abscess)

Paediatric mastitis has a bimodal occurrence; in infants under 2 months old and in children 8–17 years. The older group could be puerperal or non-puerperal. Patients present with painful breast swelling erythema and fever. The diagnosis is usually clinical; however, ultrasound is useful to confirm mastitis or abscess formation and to guide per cutaneous drainage procedure. Ultrasonographically, mastitis appears as an irregular hypoechoic or hyperechoic area with surrounding hyperaemia. This area becomes anechoic when abscess has formed or it appears as a complex cyst with reduced flow centrally. There may also be enlarged reactive lymphadenopathy.

### Fibroadenomas

Fibroadenoma is the most common adolescent breast tumor,<sup>[10,11]</sup> occurring more frequently in blacks.<sup>[12]</sup> Among

**Table 1: The patients' demographics**

Characteristic	Frequency	Percentage
Total number of patients	25	100
Females	22	12.0
Males	3	88.0
Age	40 days	
Minimum	19 years	
Maximum	14.8 (4.1)years	
Mean (SD)		

**Table 2: Ultrasound findings in pediatric patients with complaints of breast mass**

Ultrasound findings	Frequency	Percentage
Normal/negative (rib)	1	4
Developmental	2	8
Fibroadenoma	14	56
Simple cyst	1	4
Complex cyst	1	4
Mastitis/abscess	2	8
Juvenile papillomatosis	1	4
Gynaecomastia/pseudogynaecomastia	2	8
Congenital	1	4

Nigerians females, it is also the most common adolescent breast mass.<sup>[2,4,5,7]</sup> In our study, it constituted more than half (56%) of all the childhood palpable abnormalities. In a 10-year study in Benin, fibroadenomas accounted for 54.8%, while in a 7-year study in Delta state, it was 75.4% of all adolescent masses.

Ultrasonographically, they may exhibit varying features. However, they are predominantly hypoechoic oval-shaped masses which are well defined. From our study, the ultrasonographic distribution of the Birads descriptors which include shape, echogenicity, margin, acoustic features, and vascularity were documented. Hypoechoic was demonstrated in 12 (86%) of the cases. Iso-echogenicity and heterogeneous echogenicity were seen only in one 1 case each. Nine (9) of the masses were oval in shape, whereas three were lobulated. Calcified fibroadenoma was seen in three patients. All cases were well defined and had no increased vascularity on Doppler interrogation.

About 10% of paediatric fibroadenomas are expected to regress spontaneously; therefore, short-term ultrasound follow-up is recommended.<sup>[13]</sup>

### Juvenile papillomatosis

Juvenile papillomatosis is a benign proliferative tumour, which is rarely seen in children. It is similar in clinical presentation as fibroadenoma. The patient presented was a 14-year-old female who had a rapidly enlarging breast mass which was initially thought to be a juvenile fibroadenoma. Pathologically, the tumour is composed of numerous cysts and dilated ducts within a dense stroma hence appearing like a Swiss cheese.<sup>[14]</sup>

The sonographic features are those of a heterogeneous mass with multiple small anechoic areas which represents the cysts

distributed peripherally. Juvenile fibromatosis constitutes a marker for both personal and family history of breast cancer.<sup>[10]</sup>

### Simple cysts

Simple cysts are more common in adults; however, they still occur among adolescents. Historically, ultrasound was the main discriminatory imaging tool between cystic and solid masses. On ultrasound, a simple cyst appears anechoic, with well-defined wall, no internal echogenicity, and it shows posterior acoustic enhancement. When complicated by infection or haemorrhage, it may contain internal debris.

### Rib

Sometimes, patients could mistake a rib for a palpable mass. However, US will reveal that a rib is located posterior to the linear striae of the retro mammary pectoralis muscle. It is hypoechoic and circular on cross-section while becoming tubular on longitudinal section. A rib is also associated with dense posterior shadowing.

### Congenital chest wall abnormality

The youngest patient in our study was a 40-day-old male infant who had a congenital cystic lymphangioma involving the chest wall and axilla since birth. Ultrasound demonstrated multiseptated anechoic avascular lesions in the right hemithorax. He had ultrasound-guided sclerotherapy with bleomycin and surgery subsequently.

### Malignancy

Primary breast malignancy is extremely rare in childhood, and it accounts for about 0.1% of all breast cancers.<sup>[15]</sup> Breast cancer tends to occur at a younger age group in adult Africans;<sup>[16]</sup> however, it is still a rarity among children. Only 1 case of primary breast cancer was documented by Umanah *et al.*<sup>[2]</sup> in Benin city, while Onuigbo<sup>[7]</sup> documented a metastatic ovarian cancer presenting as a breast mass in an Igbo community. No malignancy was encountered in our study.

### CONCLUSION

The spectrum of childhood and adolescent masses in our environment has been presented. Ultrasound with clinical correlation will help triage patients for appropriate management.

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### Conflicts of interest

There are no conflicts of interest.

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