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Breast Masses: Sonographic Criteria of Invasive Ductal Carcinomas and Fibrodenoma

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Abstract **Original Research Article**

This is a descriptive study conducted in khartoum state, Sudan, during the period from September 2011 to March 2012. The objective of the study was to evaluate breast masses using ultrasonography and to determine sonographic features of invasive ductal carcinoma and Fibroadenomas. The study is conducted on 500 female patients sent with request for breast ultrasonography in the area of the study, then the data is collected from 110 female in different age with positive breast ultrasound findings, histopathology results are taken to confirm the diagnosis. The data were analyzed using SPSS. The analysis of the results showed that the incidence of breast masses was (22%); (4.4%) from the total sample were malignant, with (17.6%) as benign. Ductal carcinomas represents (91%) of all malignant breast masses. (33.6%) of patient with ductal carcinoma are between 31-40 years, fibroadenoma is most common benign mass represent (53.4%). The sonographic features of IDC mostly hypoecoic (95%), irregular (75%), ill-defined (100%) and have AP to width ratio> 1 (80%) and the sonographic features of fibroadenoma are mostly hypoechoic (95.7%), oval (87.23%), well defined (97.9%) and have AP \width ratio <1 (89.4%).

Keywords: Breast masses, Sonographic criteria, Ultrasound. IDC.

INTRODUCTION

Breast masses are common in women from 40% to 70%. Women can detect it herself, on the screening test and by clinician; it may lead to breast cancer in women, irrespective of age. Breast malignancy is the fifth most frequent reason of mortality after Lung and GI cancers [1]. Ultrasound is a useful diagnostic tool for breast cancer, especially for younger patients. Most of the time breast ultrasound is used as a way to distinguish solid from cystic masses and often to determine the extent of cancer in known or suspected cases. For young women (younger than 30) ultrasound imaging may be the first step which a clinical exam reveals either a palpable mass or nipple discharge. But sonography can help establish the differentiation between benign and malignant solid tumors as well. A lack of circumscribed margins, heterogeneous echo patterns, and an increased anteroposterior dimension can indicate a higher probability of malignancy in solid breast nodules [2]. The incidence of breast lumps was highest in the age group of 20-29 years. The ultrasound features that most reliably characterized breast masses as benign were round or oval shape, circumscribed margins, and width: AP ratio > 1.4. Features that characterized masses as malignant were irregular shape, non-circumscribed margins, and width: AP ratio 1.4 [3]. Sonographic characteristics commonly seen in benign lesions of the breast: Smooth and well circumscribed, Hyperechoic, isoechoic or mildly hypoechoic, Thin echogenic capsule, Ellipsoid shape, with the maximum diameter being in the transverse plane, Three or fewer gentle lobulations, Absence of any malignant findings. Malignant lesions are commonly hypoechoic lesions with ill-defined borders. Typically, a malignant lesion presents as a hypoechoic nodular lesion, which is 'taller than broader' and has spiculated margins, posterior acoustic shadowing and microcalcifications [4]. Sonographic characteristics that suggested breast masses as either benign or malignant are can be noted that most reliably characterized breast masses as malignant were irregular shape, taller than wide[5]. Fibroadenomas are the most common solid breast masses. The classic description of a fibroadenoma is that of an oval, circumscribed, hypoechoic mass with its long axis oriented parallel to the breast tissue. A macrolobulated (i.e., a few large lobulations) contour may be seen. The peak age for detection is ages 20 to 30 years, but they can be seen well into the eighth and

ninth decades of life. Solid masses often have overlapping features, thus making the exclusion of a different entity, particularly breast carcinoma, difficult. Biopsy is often needed to obtain a diagnosis. Certain characteristics of a solid mass such as recurrence following removal, postmenopausal enlargement and >2 cm of growth in a year are atypical findings which raise the suspicion for the presence of a mass other than a benign fibroadenoma [6].

Malignant breast massses can appear different with variations in tissue density and echogenicity. Masses associated with an illdefined border, an echogenic halo, margins that are sharp and angular, spiculation, posterior acoustic shadowing or adjacent architectural distortion are suspicious for malignancy. Also, any solid mass seen within a duct is suspicious and should be further evaluated. Subtle changes in the architecture of the breast (i.e., thickening of the adjacent Cooper's ligaments) are often the best clues that an aggressive, malignant process is ongoing, but detection of such findings often requires an experienced examiner with a discriminating eye [6].

OBJECTIVE

To evaluate breast masses using ultrasonography, to determine sonographic criteria of IDC and fibroadenomas.

MATERIALS AND METHODS

This was descriptive study done in Sudan, during the period from September 2011 to March 2012. The data collected from 500 female patients sent with request for breast ultrasonography in the area of the study. All patients are informed,both by the candidate and by their referring physician,that the result of examination form a part of this study. selection of participation through simple random sampling on Saturday, Sunday, Monday, Tuesday, and Wednesday weekly, then the data is collected from the female patients with positive breast ultrasound findings (breast mass: cystic, complex, or solid). After collecting , the data sheets were symbolized, classified and analyzed by SPSS. An U/S machine, having the same probe (linear) with the same frequency (7.5-10 MHz): Shimadzu, SBU 200. Aloka, prosound SSD 3500 plus. Siemens, sonoline G60S. Toshiba, Nemio 20. A pillow is placed along the supine patient's side, or the patient can be scanned in the erect or seated position with the breast resting on a platform. The breast scanned in a radial fashion scanning from outer margin toward the nipple in a series of scans done in a clockwise order, transverse and sagittal scans are also done, and then labeling of the scans is performed. Additional views running parallel to the axilla use for the axillary tail. Other method the patient lies supine with the ipsilateral hand raised above her head. Medial quadrant lesions scanned in this position. She is then rolled into a contralateral posterior oblique position to a degree which minimizes breast thickness in the quadrant being scanned.

RESULTS AND DISCUSSION

The study found that the incidence of malignant breast masses is (4.4%), whereas the benign is (17.6%) Table (1).

Table-1: Incidence of breast masses

Type	Frequency	Percent
Malignant	22	4.40%
Benign	88	17.6%
Normal	390	78.0%
Total	500	100%

The study illustrate that (33.6%) of patients with breast masses are between 31-40 years followed by (30.9%) are less than 30 years age, this record agrees with Mubuuke Aloysius Gonzaga, he found that of the 80 women, 40% were in the age group of 30-39 years followed by 20% in the age group of 20-29 years[5]. Table (2).

Table-2: Age group for patients with breast masses

Age group in (years)	Frequency	Percent
<30	34	30.9%
30-40	37	33.6%
41-50	19	17.3%
51-60	12	10.9%
61-75	8	7.30%
Total	110	100%

The study revealed that (51.8%) of the breast masses locates in the upper outer quadrant of the breast , this record agrees with study done by Kailash Singh, Tariq Azad, Ghanshyam Dev Gupta, they found that 54% of the lumps were present in outer upper quadrant of the breast[3] Table 3.

Table-3: Location of masses in the breast

Location	Frequency	Percent
UO	57	51.8%
UI	26	23.6%
LO	12	10.9%
LI	9	8.2%
Diffused	6	5.50%
Total	110	100%

According to histopathologic features the study found that 80% of them are benign while only 20% are malignant this results similar to Stavros TA, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA 1995 whom found 83% are benign and 17% are malignant[7].

Table-4: Classification of masses according to sonographic histopathologic features

Type	Frequency	Percent
Malignant	22	20%
Benign	88	80%
Total	110	100%

The study showed that the ductal carcinomas represented (18.2%) of all breast masses whereas fibroadenomas are (42.73%).Table (5)

Table-5: Classification of breast masses

Types	Frequency	Percent
Ductal carcinoma	20	18.2%
Lobar carcinoma	1	0.91%
Phylloids sarcoma	1	0.91%
Fibro adenomas	47	42.73%
Lipoma	1	0.91%
Lipoma with fibro adenoma	1	0.91%
Fibro adenoma with simple cyst	2	1.80%
Benign phylloids tumor	1	0.91%
Abscess	2	1.80%
Glactocele	5	4.6%
Fat necrosis	1	0.91%
Fat necrosis with fibro cystic changes	1	0.91%
Fibro cystic changes	4	3.60%
Simple cyst	21	19.1%
Calcified nodule	2	1.80%
Total	110	100%

The ductal carcinomas represented (91%) of all malignant breast masses which was the commonest malignant one, Stavros TA, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA 1995 also stated that it was 81.6% of all malignant type[7] Table (6).

Table-6: Classification of malignant breast masses

Type	Frequency	Percent
Ductal carcinomas	20	91.0%
Lobar carcinomas	1	4.5%
Sarcomatous phylloids tumor	1	4.5%
Total	22	100%

The study found that the most common benign condition are Fibroadenomas representing (53.4%) from all benign breast masses , this results agree with Stavros TA, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA 1995 whom stated the percentage of it 54%. [7] Table (7)

Table-7: Classification of benign breast masses

Benign breast masses	Frequency	Percent
Fibroadenoma	47	53.40%
Simple cyst	21	23.86%
Glactocele	5	5.68%
Fibro cystic changes	4	4.55%
Breast abscess	2	2.27%
Fat necrosis	1	1.14%
Lipoma	1	1.14%
Benign phylloids tumor	1	1.14%
Calcified nodule	2	2.27%
Rt. breast lipoma with Lt. breast fibro adenoma	1	1.14%
Rt. fibro adenoma with Lt. simple cyst	2	2.27%
Rt. Fat necrosis with Lt. fibro cystic changes	1	1.14%
Total	88	100%

The study clarified that (75%) of ductal carcinoma are irregular in shape, whereas (25%) are lobulated. All cases of ductal carcinomas have ill-defined margin, (80%) taller-than-wide (height/width ratio are more than one), (95%) are hypoechoic and (10%) have microcalcification. The fibro-adenomas sonographic features are oval in (87.23%), well-defined (97.9%), with width /Height (AP) ratio more than one (wider than taller) (89.4%), hypoechoic (95.7%) and (4.3%) of fibroadenomas have macrocalcification. All these findings agrees with the study done by Guita Rahbar, he found that the most reliable ultrasound

features characterize masses as benign were a round or oval shape, circumscribed margins and a width-to–anteroposterior (AP) dimension ratio greater than 1.4[8]. The study also agrees the literature which suggests that the classic appearance of fibroadenomas is an oval, hypoechoic solid mass .The mass is wider than it is tall [7, 9]. Table (8).

Table-8: Sonographic criteria of IDC and fiboadenomas

Type	Echogenicity	Shape	Margin	AP\width	Calcification	Location
Invasive ductal carcinomas	Hypoechoic	Irregular	Ill defined	>1	Macro	UOQ
	95%	75%	100%	80%	0	54.6%
	Hyperechoic	Oval	Well defined	<1	Micro	UIQ
	5%	0	0%	15%	10%	13.6
	Mixed	Round		Spread	No	LOQ
	0	0		5%	90%	9.1
	Anechoic	Lobulated				LIQ
		25%				9.1
						Diffuse
						13.6
	Total	100%				
Fibroadenoma	Hypoechoic	Irregular	Ill defined	<1	Macro	UOQ
	95.7%	2.13%	2.1%	89.4%	4.3%	53.2%
	Hyperechoic	Oval	Well defined	>1	Micro	UIQ
	4.3%	87.23%	97.9%		0%	23.4%
		Round		=1	No	LOQ
		8.51%		10.6%	95.7	14.9%
		Lobulated				LIQ
		2.13%				8.5%
	Total	100%				

CONCLUSION

The study found that the prevalence of breast masses (benign and malignant) 22% , 4.4% for malignant and 17.5% for benign , the most common malignant is IDC and the most common benign are fibroadenomas. The sonographic features of IDC mostly hypoecoic, irregular, ill-defined and have AP to width ratio> 1 and the sonographic features of fibroadenoma are mostly hypoechoic, oval, well defined and have AP \width ratio <1.

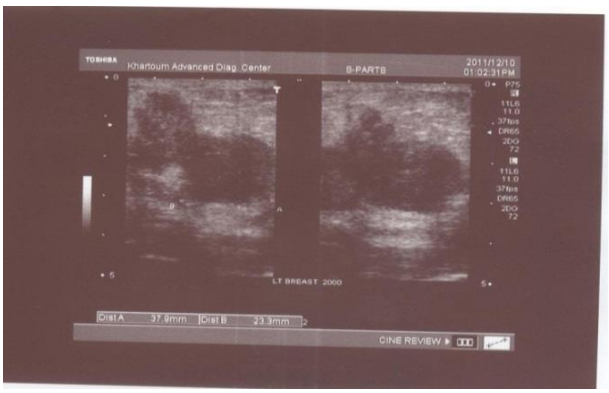

Image-1: breast ultrasound image of 65 years old female showed irregular, hypoechoic mass located in the left UOQ at 2:00 o'clock measured 3.8x2.3cm; the diagnosis was invasive ductal adenocarcinoma

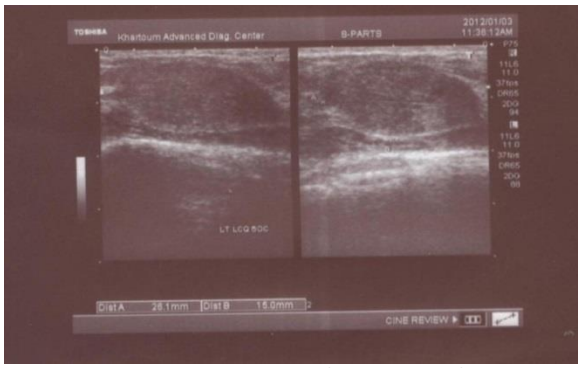

Image-2]: breast ultrasound image of 23 years old female showed hypoechoic mass with posterior enhancement located in left LOQ at 6:00 o'clock measured 2.6x1.5cm, the diagnosis was fibroadenoma

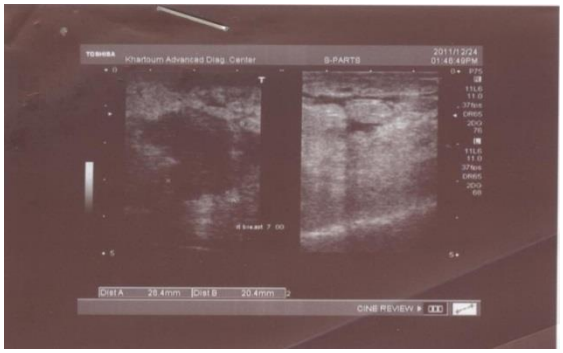

Image-3: Breast ultrasound image of 56 years old female showed irregular shape, hypoechoic mass with ill-defined margins and oedema located in the right LOQ at 7:00 o'clock measured 2.6x2cm, the diagnosis was ductal adenocarcinoma

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