

## **Comparative Study between Mammography and Ultrasound in Diagnosis of Malignant Breast Masses in Correlation to Histopathology**

Mawahib Rizig<sup>1</sup>, Awadia Gareeballah<sup>1</sup>, Ragaah Ahmed Aburaida<sup>1</sup>, Ala M. A. Elgyoum<sup>2\*</sup>, Ahmed. Abd Elrahim<sup>1</sup>

<sup>1</sup>Faculty of Radiological Sciences and Medical Imaging, Alzaiem Alazhari University, Khartoum, Sudan

<sup>2</sup>National Ribat University, Faculty of Radiological and Nuclear Medicine Science, Diagnostic Radiology Department, Nile Street Burri, Postal Code 11111, Khartoum, Sudan

### **Original Research Article**

#### **\*Corresponding author**

*Mawahib Rizig*

#### **Article History**

*Received: 01.10.2018*

*Accepted: 13.10.2018*

*Published: 30.10.2018*

#### **DOI:**

10.36347/sjams.2018.v06i10.042



**Abstract:** This was descriptive, comparative study, done in Khartoum Oncology Hospital in the period from February 2015 to April 2017, to compare between ultrasound and mammography in diagnosis of malignant breast masses, the study done in 201 women suffering from breast mass and the confirm diagnosis it had malignant. The data was collected by data collection sheet specially design for this study and including all variables then analyzed by statistical package for social sciences (SPSS). The study found that most breast malignant masses occur in age group (41 to 70 years), the ultrasound features of malignant was mostly irregular, hypoechoic, speculated, punctate calcification and associated lymphadenopathy, the mammographic features was mostly hyperdense, irregular, calcification, lymphadenopathy and the biopsy reveal that the most common type of malignant was invasive ductal carcinoma 97.50%. The study concluded that ultrasound was more accurate and sensitive than mammography for diagnosis of malignant breast masses (97.98%, 83.08 % respectively).

**Keywords:** Breast, ultrasound, mammography and histopathology.

### **INTRODUCTION**

Breast cancer is the most common cancer diagnosed in women, accounting for more than 1 in 10 new cancer diagnoses each year, it is the most common type and second most common cause of death from cancer among women in the world[1,2].

The standard of care for breast diagnosis is known as the triple test – the combination of clinical assessment, breast imaging (usually mammography and/or ultrasound), and where indicated, needle sampling; this combination of these three separate methods of breast assessment provides a highly accurate means of dividing findings into normal, abnormal but benign, and malignant categories.

The aim of breast cancer screening is to reduce deaths from breast cancer by detecting and treating the disease at an earlier stage than that at which the disease would have presented clinically [3].

Mammography is the foundation of breast imaging and is used to screen asymptomatic women for breast cancer. Worldwide over one million women are diagnosed with breast cancer every year (10% of all new cancers); regular mammographic screening has been proven to reduce mortality from the disease, and the reduction was 24% in women over the age of 50 years invited for screening. The aim of routine screening by X-ray mammography is to decrease deaths from breast cancer by detecting and treating cancers when they are small and at an early stage, even the

sensitivity, or accuracy, of mammography is affected by the experience of the radiologist [1,3].

### **OBJECTIVES**

The aim of the study is to compare between Mammography and Ultrasound in Diagnosis of Malignant breast masses in correlation to Histopathology Results among Sudanese population.

### **MATERIALS AND METHODS**

This is a comparative and descriptive study done in Khartoum state Sudan in Khartoum Oncology Hospital in the period from February 2015 to April 2017, the study done in 201 Sudanese women with palpable breast lump came to the area of the study during the duration of the study with breast mammogram, ultrasound and histopathology results

confirm that it was malignant , any malignant mass feature by each of them and histopathology confirm it was benign must excluded , Permission from the hospital was taken for data collection, the Study was deal with the patients who was already perform ultrasound , mammography and histopathology. The data was collected by data sheet specially design for the study includes patient's demographic data then ultrasound features of mass, mammographic features and histopathology results, After data collection, the data sheets was symbolized, classified and analyzed by Statistical Package for Social Sciences (SPSS).

**RESULTS AND DISCUSSION**

The study found that the higher incidence of malignant breast masses was found in age group (41-55 years and 56-70 years) respectively (41.79% and 25.87%), the mean age of 51.61 years, this results agree with H Hasni, MMed who state that malignancy occurs in age 39-66 years as shown in table 1[4].

The study reveal that more than halve of breast masses occurs in left side (50.75%) then in the right side (45.77%) and least occurs bilateral as shown in table 2, this results agree with Raga A. Abouraida who found that 54.6% of malignant breast masses are located in the left breast[5].

The study demonstrate that more common and more than halve of breast lesion involved UOQ (54.23%), followed by central (22.98%) in mammography as shown in table 3, this results go online with this results agree with Raga A. Abouraida who found that (54.6%) of malignant breast are located in UOQ[5] and also agree with literature[6].

Concerning mammographic finding of malignant breast mass the study reveals that (92%) had irregular outline, (85.07) had ill-defined margin, speculated (43.3% ) most of them hyperdense (80.1%), L N are detected in 31.8% of cases mammographic feature in (83.1%) were malignant feature, (13.4%) suspicious and ( 3.5% ) diagnosed as benign breast mass. Concerning sonographic finding of malignant breast mass the study reveals that (55.7%) had irregular

outline, this results similar to H Hasni, M Med [4]. speculated (26.9%), most of them hypoechoic (98%), L N are detected in (67.7% ) of cases those results generally similar to Stavros *et al.* 1995[7]. But disagrees with them in that LN in our study absent in 67% [7]. Table 4 and figure 1. Regarding the final diagnose by ultrasound feature and mammography (97.99%) were diagnosed as malignant feature of breast masses and( 2.01% ) diagnosed as benign breast mass (figure 1) this results agree Stavros *et al.* 1995 whom state that ultrasound diagnose two case only as malignant by histopathology (98.4% sensitivity)[7].

According to histopathology results the study found that most of them had IDC (97.5%), these results agree with Stavros *et al.* 1995 whom state that the most common one was IDC [7]. and all of other tumors had (2.5% ) from all malignant with incidence 0.5% for each. Concerning grading of IDC the study reveal that most of them was grade III (84.1%) followed by II (10.4%) and least of them was grade I. table 5and 6.The study found that there was significant correlation between histopathology results sonographic feature and final diagnostic feature by ultrasound and mammography for malignant breast masses as it diagnosed 195 cases as malignant and only 4 cases as benign (one of them phyllodies tumor, one poorly differentiated carcinoma and two IDC) p value <0.01, most of them hypoechoic in feature, in mammography most of IDC diagnosed as malignant (165 cases ) 25 cases diagnosed as suspicious and 7 case diagnosed as benign p<0.01 ,table 7- 8 and 9.

Finally the study found that both ultrasounds was more sensitive and accurate than mammography for diagnosis of malignant breast mass it had sensitivity and accuracy of (97.98%) (83.08%) for ultrasound and mammography respectively, table 10. These results agree with Wei T se Yang *et al.* whom was state sensitivity of ultrasound was 97% and with H Hasni, M Med who state that Ultrasound had a high a sensitivity of 100%, specificity of 85.7% for distinguishing a malignant mass. Although agree with Tan K P *et al.* whom found that a sensitivity of USG was higher compared with MMG (82% versus 49%)[4,8,9].

**Table-1: shows frequency distribution of age**

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
25-40 years	44	21.9	21.9	21.9
41-55 years	84	41.8	41.8	63.7
56-70 years	52	25.9	25.9	89.6
71-85 years	19	9.5	9.5	99.0
more than 85 years	2	1.0	1.0	100.0
Total	201	100.0	100.0	
Minimum =26, maximum= 90, means=51.61,Std.Deviation =13.265				

**Table-2: shows frequency distribution of side of mass**

Site of mass	Frequency	Percent	Valid Percent	Cumulative Percent
UOQ	109	54.2	54.2	54.2
LOQ	14	7.0	7.0	61.2
UIQ	16	8.0	8.0	69.2
LIQ	13	6.5	6.5	75.6
CENTRAL	46	22.9	22.9	98.5
Central and LLO	3	1.5	1.5	100.0
Total	201	100.0	100.0	

**Table-3: Shows frequency distribution of site of mass**

Side of mass	Frequency	Percent	Valid Percent	Cumulative Percent
right	92	45.8	45.8	45.8
left	102	50.7	50.7	96.5
both	7	3.5	3.5	100.0
Total	201	100.0	100.0	

**Table-4: Shows main features of mass by ultrasound and mammography**

Outline	Regular	irregular			
Mammography	8%	92%			
Ultrasound	55.7%	7.5%			
Shape	Round	Oval	Speculated	Lobulated	Others ( multifocal )
Mammography	24.4%	6.5%	43.3%	17.9%	-
Ultrasound	-	-	26.9%	9.5%	0.5%
Margin	Ill defined	Well defined			
Mammography	85.1%	14.9%			
Ultrasound					
Echogenicity	Hypodense	Hyperdense	Hypoechoic	Hyperechoic	Mixed multi-septated
Mammography	13.9%	80.1%	-	-	
Ultrasound	-	-	98%	1%	1%
LN	Present	Absent			
Mammography	36.4%	63.6%			
Ultrasound	67.7%	32.3%			

**Table-5: Shows frequency distribution of histopathology results**

Histopathology	Feature us		Total
	Benign	Malignant	
IDC	2	192	194
lobar carcinoma	0	1	1
phyloddies tumor	1	0	1
poorly differentiated carcinoma	1	0	1
myxoid liposarcoma	0	1	1
Papillary carcinoma	0	1	1
Total	4	195	199

P value =0.000

**Table-6: Shows frequency distribution of grading malignant breast mass**

Grading of IDC carcinomas	Frequency	Percent	Valid Percent	Cumulative Percent
1	5	2.5	2.6	2.6
2	21	10.4	10.8	13.3
3	169	84.1	86.7	100.0
Total	195	97.0	100.0	
Not mention	6	3.0		
Total	201	100.0		

**Table-7: Shows cross tabulation between ultrasound final diagnosed and histopathology results**

Histopathology results	Frequency	Percent	Valid Percent	Cumulative Percent
IDC	196	97.5	97.5	97.5
lobar carcinoma	1	.5	.5	98.0
phyloddies tumor	1	.5	.5	98.5
poorely differentiated carcinoma	1	.5	.5	99.0
myxoidliposarcoma	1	.5	.5	99.5
papillarycarcinoma	1	.5	.5	100.0
Total	201	100.0	100.0	

**Table-8: Shows cross tabulation between mammography final diagnosed and histopathology results**

Histopathology	Feature by mammography			Total
	Benign	Malignant	suspicious	
IDC	6	165	25	196
lobar carcinoma	0	1	0	1
phyloddies tumor	0	0	1	1
poorly differentiated carcinoma	1	0	0	1
myxoid liposarcoma	0	0	1	1
Papillary carcinoma	0	1	0	1
Total	7	167	27	201

P value =0.000

**Table-9: Shows cross tabulation echogenicity of mass and tumor type**

Echogenicity	histopathology						Total
	IDC	lobar carcinoma	phyloddies tumor	poorely differentiated carcinoma	myxoid liposarcoma	papillarycarcinoma	
Hypoechoic	189	1	1	0	1	1	193
Hyperechoic	2	0	0	0	0	0	2
Multiseptated	1	0	0	1	0	0	2
Total	192	1	1	1	1	1	197

P value =0.000

**Table-10: Shows comparative study for US and Mammography in sensitivity and accuracy for diagnosis of malignant breast lesion**

Diagnosed	TN	TP	FN	FP	Total
Us	0	195	4	0	199
Mammography	0	167	34	0	201
Sensitivity	97.98% ultrasound		83.08% Mammography		
Accuracy	97.98% ultrasound		83.08 % mammography		
Total	199 US		201 mammography		

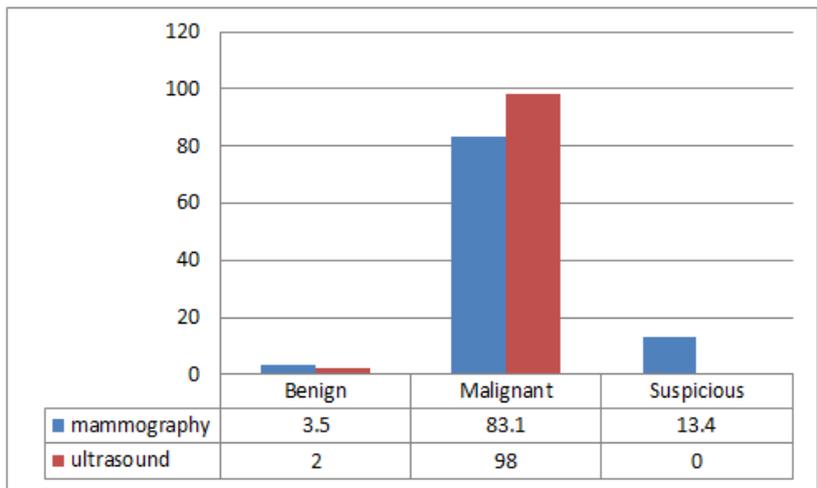


Fig-1: Shows final diagnosed of mass by ultrasound and mammography

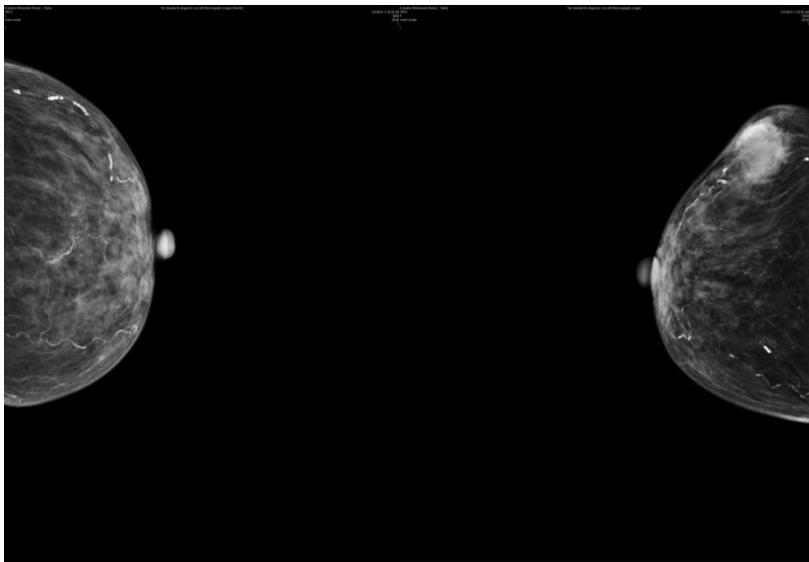
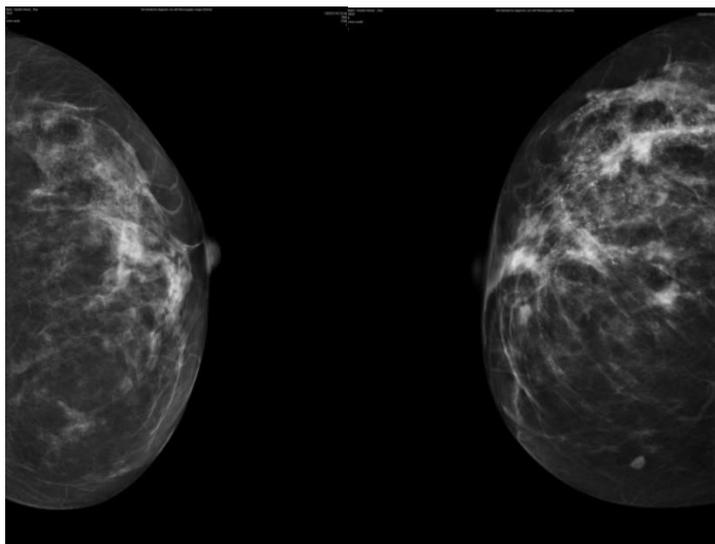


Image (1) a- 80 yrs. C\O: Rt breast lump + pain \ 5 months O/ E: Rt breast small lump 3X3 CM with free AX, speculated hyperdense mass



Image (1) b- 80 yrs. C\O: Rt breast lump + pain \ 5 months O/ E: Rt breast small lump 3X3 CM with free AX , RT UOQ suspicious mass



**Image (2) a. 32 yrs. nulliparous C\O: RT nipple bloody discharge + pain \ 2 weeks EX: no lumps only bloody nipple discharge with free axilla BIL, Mammo: RT br UOQ speculated ill-defined lesion**



**Image (2) b. 32 yrs. nulliparous C\O: RT nipple bloody discharge + pain \ 2 weeks EX: no lumps only bloody nipple discharge with free axilla BIL, US: RT BR multiple malignant lesion**

## CONCLUSION

The study found that the higher incidence of malignant breast masses was found in age group (41-55 years and 56-70 years), occurs in left side more than right side, more commonly involved UOQ and central region. Concerning mammographic finding of malignant breast mass the study reveals that had irregular outline, had ill-defined margin, speculated lobulated, most of them hyperdense with presence of LN in some cases. Concerning sonographic finding of malignant breast mass it irregular outline, speculated, L N are detected in most of cases. According to histopathology results the study found that most of them had IDC. Concerning grading of IDC the study reveal that most of them was grade III. The study found that there was significant correlation between histopathology results and final suggesting feature by

ultrasound for benign and malignant, although between histopathology results and final suggesting feature by mammography for benign and malignant. Finally the study found that ultrasound was more sensitive and accurate than mammography for diagnosis of malignant breast mass it had sensitivity and accuracy of (97.98%) versus (83.08%) for mammography.

## RECOMMENDATION

Further studies in benign and malignant breast masses using ultrasound, histopathology and elastography.

## REFERENCES

1. Niederhuber JE, Armitage JO, Doroshow JH. *Abeloff's clinical oncology*. Elsevier Health Sciences. 2013.

2. Cameron JL, Cameron AM. Current surgical therapy. Elsevier Health Sciences. 2013.
3. Michell MJ, ed. Breast cancer. Cambridge University Press. 2010.
4. Hasni H, Meah FA, Norlia A, Sharifa NA, Zolifiqar A. Ultrasound in the Assessment of the Palpable Breast. *Med J Malaysia*. 2004; 59(4):486-94.
5. Raga Ahmed Abouraida, Effectiveness of ultrasound in diagnosis of breast masses, AAU, Khartoum, Sudan. 2012
6. Bassett, Mahoney, Apple, D'Orsi. Breast Imaging. Saunders, an imprint of Elsevier Inc. 2011; ISBN: 978-1-4160-5199-2
7. Stavros TA, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA. Solid breast nodules: Use of sonography to distinguish between benign and malignant lesions. *Radiology*. 1995;196:123-134.
8. Yang WT, Mok CO, King W, Tang A, Metreweli C. Role of high frequency ultrasonography in evaluation of palpable breast masses in Chinese women: alternative to mammography?. *J Ultrasound Med*. 1996;15(9):637-44.
9. Tan KP. Comparative accuracy of ultrasound and mammography in detection of breast cancer. *Med J Malaysia*. 2014;69(2):79-85.