

CLINICO-RADIOLOGICAL AND PATHOLOGICAL CORRELATION OF BREAST LESIONS IN PATIENTS PRESENTING TO A TERTIARY HOSPITAL IN WESTERN NEPAL

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ABSTRACT

INTRODUCTION:

Breast masses are frequently encountered problem, especially in females. Mammography and ultrasound are considered the standard imaging techniques for detection and evaluation of breast disease. The study was done to discuss the role of mammography and ultrasound in evaluation of breast masses with cytological correlation and to compare the sensitivity, specificity, positive predictive value and negative predictive value of ultrasonography with mammography in breast masses in different age groups and in patients with different breast density.

MATERIAL AND METHODS:

It was a non randomized prospective study carried out in Manipal Teaching Hospital, Pokhara. The data for study was collected from patients with breast lump who attended the department of Radiology during the period from October 2013 to October 2014. Mammography and ultrasonography were performed on all cases presented with breast lump. A Fine needle aspiration cytology correlation was then performed which formed the basis for definitive judgment.

RESULTS:

The study analyzed 50 total numbers of patients presented to Radiology department who had breast lumps. Patients were aged between 20 and 75 years. Maximum number of patients were between 40 and 49 yrs constituting 40%. The mean age was 39.8 years \pm 12.85yrs. Ultrasound was significantly more sensitive than mammogram in age less than 40 years. Mammogram had a significantly higher sensitivity than ultrasound in age group of more than 40 yrs. By using combined modalities (ultrasonography combined with mammogram), all benign cases were diagnosed correctly. For malignant breast masses, 10% were diagnosed as false negative but no cases were diagnosed false positive by combined modalities. Ultrasound was more sensitive than mammography in dense and heterogeneously dense breast whereas mammography was more sensitive than ultrasound in predominantly fatty breast.

CONCLUSION:

Combination of ultrasound and mammogram is more sensitive than either modality alone.

KEYWORDS: breast lump, ultrasonography, mammography, breast cancer, Nepal.

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INTRODUCTION

Breast masses are frequently encountered problem, especially in females. Approximately 10% of breast masses ultimately lead to a diagnosis of breast cancer¹. It is one of the leading causes of cancer morbidity and mortality among women.² Breast cancer is more common in women with increasing age. Important risk factors for female breast cancer include early age at onset of menarche, late age at onset of menopause, and a history of premenopausal breast cancer in mother or a sister. A confident diagnosis can be made in 95% of the cases through a combination of clinical examination, imaging and fine needle aspiration cytology. Mammography and ultrasound are considered the standard imaging techniques for detection and evaluation of breast disease^{3,4}

Aims and objectives:

- To investigate the differences in features between benign and malignant breast lumps.
- To compare sensitivity, specificity, positive predictive value, negative predictive value of ultrasonography with mammography in breast masses in different age groups and in patients with different breast density.

MATERIAL & METHODS

It was a non randomized prospective study carried out in Manipal Teaching Hospital, Pokhara. The data for study was collected from a total of 50 patients with breast lump who attended the department of Radiology during the period from October 2013 to October 2014. Mammography and ultrasonography were performed on all cases presented with breast lump. A FNAC correlation was then performed which formed the basis for definitive judgment. Informed consent was obtained from each patient and the protocol conformed to the ethics committee guidelines. All the observations during the study of each subject were recorded in an individual case proforma. Detailed history was taken in regards to the location, size and number of breast lumps, duration, any other breast symptoms including pain, nipple retraction or inversion, nipple discharge or skin changes, any risk factors for breast cancer, use of hormone replacement therapy, taking medications, particularly use of hormonal medications, menstrual history. A clinical examination was assessed for size, shape, consistency, mobility and tenderness of the breast lump, nature of the breast tissue and the presence of any palpable lymph nodes. Chi square test was used to calculate the p value.

RESULTS:

The study analyzed 50 total numbers of patients presented to

Radiology department who had breast lumps. Patients were aged between 20 and 75 years. Maximum number of patients were between 40 and 49 yrs constituting 40%. The mean age was 39.8 years \pm 12.85 yrs. (Figure 1)

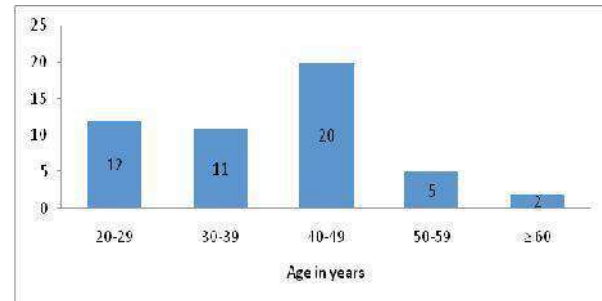


Figure No 1: Age distribution of patients with breast mass.

In total, 40 patients (80%) had benign breast lump and 10(20%) were malignant breast lump which were cytologically proven. Frequency of malignant breast lump was more common in elderly patients (more than 40 years age group). (Figure 2)

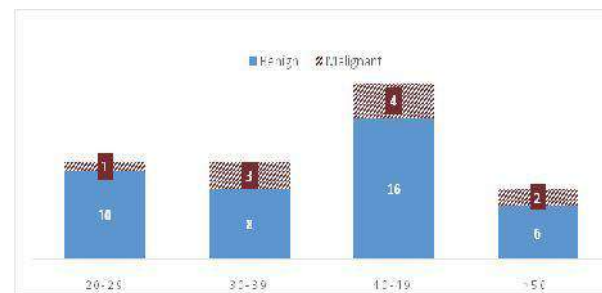


Figure No. 2: Frequency of breast lump in different age groups.

Among the benign breast lumps, the maximum number of patients had benign breast disease accounting for 40 % followed by fibroadenoma (22%), fibrocystic disease with (12%), mastitis (8%), abscess (8%), benign cyst (7%) and lipoma (3%).

Among the malignant breast lumps, maximum number of cases were invasive ductal carcinoma accounting (60%) followed by ductal carcinoma in situ (10%) and 30% were suspected for malignancy. Around 45% of postmenopausal age group had malignant breast mass while only 15% of premenopausal age group had malignant breast mass.

Majority of cases in our study had mastalgia with lump accounting for 70%, out of which 95% of cases were benign. Painless lump constituted 20% of cases, out of which 60%

were malignant. Nipple discharge constituted 80% of total patients, out of which 75% was present in malignant cases. Retraction of nipple was found in 2% of cases and that too only in malignant cases. Among the benign breast lumps, 40% had an average duration of symptom for 1 month. Among malignant breast lumps, 40% cases presented late with symptoms lasting for 3 months or more duration.

Among the benign cases in age less than 40 years, false positive result for ultrasound and mammography were 11% and 16% respectively. Ultrasound showed one case as benign for which FNAC proved to be suspicious for malignancy. Similarly, mammography showed three cases as benign which proved to be ductal carcinomas and suspicious for malignancy by FNAC respectively. Ductal carcinomas missed by mammography were picked up by ultrasound. Ultrasound showed 25% as false negative and mammography revealed 75% as false negative. (Table 1) Ultrasound was significantly more sensitive than mammogram in age less than 40 years. (Table 2) Among the benign cases in age more than 40 years, cytologically diagnosed case of abscess and two cases of benign breast disease were diagnosed suspicious by ultrasound. A case of FNAC proven benign breast disease was given as positive for malignancy by mammogram. Thus 13.6% and 4.5% were false positively diagnosed as malignant by ultrasound and mammography, respectively. Mammography detected a case of invasive ductal carcinoma missed by ultrasound. False negative result for malignancy by ultrasound was 33.3% whereas by mammography was 16%. A case of invasive ductal carcinoma was missed by both imaging modalities; however on the basis of positive clinical examination FNAC was planned which showed positive results (Table 3). Mammogram had a significantly higher sensitivity than ultrasound in age group of more than 40 yrs (Table 2).

	FNAC		Total
	Malignant	Benign	
USG			
Malignant	3	2	5
Percentage	60 %	40%	100%
Benign	1	16	17
Percentage	5.9%	94.1%	100%
Total	4	18	22
Mammogram			
Malignant	1	3	4
Percentage	25 %	75%	100%
Benign	3	15	18
Percentage	16.7%	83.3%	100%
Total	4	18	22

Table 1: Ultrasound and mammography diagnosis compared with cytology in less than 40 years age group.

Age less than 40 years		Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	P value
	USG	75 %	88.9%	60%	94%	0.0058
	Mammogram	25%	83.3%	25%	83.3%	0.0078
Age 40 years and above						
	USG	66.7%	86.4 %	57.1%	90.5%	0.0078
	Mammogram	83.3%	95.5%	83.3%	95.5%	0.0002

Table 2: Comparison of sensitivity, specificity, positive predictive value and negative predictive value of ultrasound with mammogram in two age groups.

	FNAC		Total
	Malignant	Benign	
USG			
Malignant	4	3	7
Percentage	57.1%	42.9%	100%
Benign	2	19	21
Percentage	9.5%	90.5%	100%
Total	6	22	28
Mammogram			
Malignant	5	1	6
Percentage	83.3%	16.7%	100%
Benign	1	21	22
Percentage	4.5%	95.5%	100%
Total	6	22	28

Table 3: Ultrasound and mammography diagnosis compared with cytology in 40 years and above age group.

By using combined modalities (ultrasonography combined with mammography), all benign cases were diagnosed correctly. For malignant breast masses, 10% were diagnosed as false negative but no cases were diagnosed false positive by combined modalities. A case of infiltrating ductal carcinoma was falsely diagnosed as benign by the combined modality. The combined ultrasound and mammography had a significantly higher sensitivity and specificity than either modality alone (p value <0.001).

In heterogeneously dense breast, ultrasound and mammogram showed false positive results as 8.3% each. No cases were diagnosed as false negative on ultrasound whereas mammogram showed 100% false negative result. Among patients with dense breast, ultrasound and mammogram showed false positive results of 10% and 20%, respectively.

Ultrasound had 25% as false negative whereas mammogram showed 50% as false negative result for malignancy.

In patients with scattered fibroglandular parenchyma of breast, 90% and 80% were true positive benign cases diagnosed by ultrasound and mammogram, respectively. Ultrasound and mammogram showed false positive malignant disease with results of 10% and 20%, respectively. Ultrasound had 25% as false negative whereas mammogram showed 50% as false negative for malignancy. Among predominantly fatty breast, ultrasound showed 12.5% false positive result for malignancy. False negative result for malignancy by ultrasound was 50%. No cases were diagnosed as false positive or false negative by mammogram.

Ultrasound was more sensitive than mammography in dense and heterogeneously dense breast whereas mammography was more sensitive than ultrasound in predominantly fatty breast (Table 4).

	Sensitivity	Specificity	P value
Heterogeneously dense breast:			
USG	100%	91.7%	0.0146
Mammogram	0%	91.7%	0.7630
Dense breast:			
USG	75%	90%	0.0150
Mammogram	50%	50%	0.2612
Scattered fibroglandular breast			
USG	66.7%	80%	0.1241
Mammogram	66.7%	90%	0.0411
Predominantly fatty breast:			
USG	50%	87.5%	0.2352
Mammogram	100%	100%	0.0015

Table 4: Comparison of sensitivity, specificity in patients with different breast density.

DISCUSSION:

Patients were aged between 20–75 years. Maximum number of our patients were between 40–49 years, similar to finding of Ohlinger R et al⁵. In a study conducted by, Disha ED et al⁶, the most common finding was pain in the breast followed by nipple retraction. Asfar AB et al⁷ in his study reported that the most common symptom was mastalgia. Mastalgia with lump was observed more frequently in our study. In accordance with Asfar AB et al, 60% of our patients had symptoms for less than 3 months duration⁷.

Reinikainen HT et al⁸ stated size for malignancy by ultrasonography to be in the range of 10 to 43 mm. Our finding for malignant breast lump was in the same range (2cms). Buchberger W et al⁹ and Kolb T et al¹⁰ also observed the similar finding.

Our study has shown higher sensitivity of ultrasound (75%) as

compared to mammography (25 %) in age group less than 40 years. Houssami N et al.¹¹ Devolli-Disha E et al¹² have also observed similar findings. Devolli-Disha E et al¹² showed sensitivity of mammography increased substantially in women older than 50 years. Our study also confirmed the similar findings. The sensitivity and specificity of mammography compared with histology in two age-groups was assessed by Davies RJ et al¹³ Sensitivity of mammography was 3% greater in the under-50 age-group. Mammographic specificity was 1% greater in the over 50 age group. Our study showed sensitivity was 58% greater and specificity was 12% greater in above 40 years age group due to the fatty nature of breast and due to the presence of micro calcification. With comparison to Davies RJ et al¹³ our sensitivity and specificity were higher likely due to smaller study population. In a prospective trial conducted by Zonderlandet al¹⁴ mammograms with supplementary ultrasonography increased the sensitivity from approximately 83% to 91%. Ultrasound has significantly higher sensitivity than mammography in detecting malignancy among discrete breast masses. A study by Lister et al¹⁵ illustrated the same. In our study, ultrasound had higher sensitivity of 70% compared to mammography which was 60% on an average. Mammography is more sensitive in breasts with dominant fat tissue and in breast with scattered fibro glandular density. With the increase of fibro glandular density, the level of sensitivity with mammography decreases, while with the ultrasound the level of sensitivity increases to the higher breast density and heterogeneously dense breast. Devolli-Disha E et al¹² also demonstrated similar result. Our study also confirmed the similar finding. In women of 45 years or younger age, ultrasound has a significantly greater sensitivity than mammography¹². Sonography is used as an adjunct to mammography to further evaluate palpable masses, especially in women with mammographically dense breasts. Several authors have proved that it is feasible to use ultrasonography for the detection of early breast cancer of less than one centimeter which were mammographically occult.^{9,10,16,17}

In our study, mammography showed 75% false negative in age less than 40 years and 16% in age more than 40 years. According to data from the Breast Cancer Detection Demonstration Project, the false-negative rate of mammography is approximately 8-10%. Kopans DB et al¹⁸ reported possible causes for missed breast cancers include dense parenchyma obscuring a lesion, poor positioning technique, perception error, incorrect interpretation of a suspect finding, subtle features of malignancy, and slow growth of a lesion. In our study, causes for false negative cases in mammography were due to dense fibroglandular parenchyma, overlapping structures obscuring the visualization of masses and lactating and pregnant mother

were not adequately evaluated. L Ma et al¹⁹ also illustrated the similar causes for false negative results as our study. In our study sonography showed 11% false positivity in age less than 40 years. In age more than 40 years, 13.6% had false positive results. False positive findings by ultrasound is also stated by Rizzato G et al.²⁰ Mammography showed negative predictive value of 90%. Similarly ultrasound showed negative predictive value of 92.1% in our study. The findings were in accordance to findings observed by Jackson VP²¹ with negative predictive value of 99% by mammography and 98% by sonography. Shumaila SM et al²² showed combined ultrasound and mammogram revealed 3 more cases of breast cancer. He reported sensitivity of 90% with the use of combined modalities, similar to the finding of our study. We were able to detect five more cases of malignancy with the combined approach. Ultrasound missed two cases of malignancy which were detected by mammogram. Similarly, mammogram missed three cases of malignancy which were detected by ultrasound. Mann BD et al stated that normal mammograms should not preclude biopsy of a breast mass²³.

CONCLUSION:

Combination of ultrasound and mammogram is more sensitive than either modality alone.

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