



Radio Diagnosis

ROLE AND DIAGNOSTIC ACCURACY OF MAMMOGRAPHY AND SONOMAMMOGRAPHY VERSUS HISTOPATHOLOGICAL EXAMINATION IN PALPABLE BREAST LESIONS: A COMPARATIVE STUDY.

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ABSTRACT Main purpose of our study is to characterize the breast lesions according to BI-RADS on mammographic and sonographic findings and to assess the improvement in accuracy of diagnosis while combining both modalities and comparing with the gold standard histopathology. The study included 50 women between 35-75 years of age with palpable breast mass and were evaluated by mammography, sonomammography and followed by histopathological examination. This study revealed 37 benign and 13 malignant cases on histopathological analysis. 1 out of 37 benign lesions detected on mammogram were malignant. 12 out of 13 malignant lesions on mammography were correctly diagnosed as malignant, resulting in sensitivity, specificity, PPV and NPV of 92%, 91%, 80% and 97% respectively. On ultrasound, 12 cases out of 13 were correctly graded as malignant. However, a single case graded as benign turned to be a malignant lesion and only 2 cases graded as malignant were diagnosed as benign lesions, resulting in sensitivity, specificity, PPV and NPV of 92%, 94%, 85% and 97% respectively. Combined USG and Mammography yielded more accurate results than either method alone and can be advocated as a screening modality to detect malignancy and treat the patient earlier.

KEYWORDS : mammography, sonomammography, BIRADS

INTRODUCTION:

A palpable breast lump, either self-detected or presented incidentally on clinical examination, is a common problem affecting females, demanding attention towards their workup, early diagnosis, and treatment. Breast lumps range from benign cyst to malignant lesions. Differentiation of benign from malignant is the most important aspect for patient care and proper management.

According to the National Cancer Registry Programme (2001–2003), around 25% of the total cancer cases among Indian women constitute breast cancer. The crude incidence rate of breast cancer is nearly 85 per 100,000 women per year, and about 52,000 women develop breast cancer in India per year¹, making it one of the primary causes of death related to cancer.

Although a majority of the breast masses are benign in nature, carcinoma of the breast is the most common malignancy among Indian women as reported by Gupta et al.² in 2016 and a second leading cause of cancer-related deaths among women, which has recently overhauled the mortality rates of cervical malignancies as stated via The National cancer registry of India.

Numerous advanced imaging modalities are now available in breast radiology. Mammography is a cost-efficient and accepted technique for evaluating clinically suspected breast lesions; High-resolution sonography is a useful modality that helps to evaluate breast lesions and characterise a mammographically non detected palpable abnormality in dense breast.

OBJECTIVES:

To study the mammographic and sonographic characteristics of breast lesions in patients.

To categorise the detected breast lesions according to BI-RADS.

To assess the sensitivity, specificity, and accuracy of Mammography and Ultrasonography and to identify the effectiveness of the BIRADS mammography and BI-RADS-ultrasound descriptors for differentiation of benign and malignant lesions of the breast with histopathological findings.

To assess the improvement in accuracy of diagnosis while combining both modalities and comparing with the gold standard histopathology

MATERIALS AND METHODS:

This is a retrospective study conducted on a total of 50 patients in the Department of Radiodiagnosis, Alluri Sitarama Raju Academy of Medical Sciences, for duration of 18 months (October 2018 to March 2020). Fifty women, age ranging between 35-75 years of age with palpable breast mass, who were evaluated by mammography, sonomammography and followed by histopathological examination were included in the study. Diagnostic accuracy was calculated in terms of sensitivity, specificity, positive predictive value and negative predictive value.

INCLUSION CRITERIA:

- Women more than 35 years, who underwent routine breast screening and found to have BI-RADS 2 and above.
- Women more than 35 years with chief complaints of pain/lump in the breast.
- Women with a history of nipple discharge.

EXCLUSION CRITERIA:

Women <30 yrs, women with breast implants, Male patients were excluded in the study.

The patients in whom complete workup was not done (mammogram, sonomammogram and FNAC/HPE) were excluded from the study.

RESULTS:

All 50 patients had a complaint of palpable breast lump, whereas few of these had other associated complaint like pain (10%) and nipple discharge (2%) and nipple retraction in 2% of them. 20% (10 cases) of the study population had a family history of breast cancer, while the rest of them had no first degree relative who had similar history or breast cancer. Out of these 10 cases who underwent the sonomammogram and H.P.E. only 2 patients reports were proven malignant on H.P.E. On ultrasound, 12 cases out of 13 were correctly graded as malignant. However a single case graded as benign turned to be a malignant lesion and only 2 cases graded as malignant were diagnosed as benign lesions.

Table 1: Distribution of patients based on the mammographic grade of lesion (BI-RADS)

BIRADS grade	Number	Percentage(%)
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2: benign	23	46%
3: probably benign	12	24%
4: suspicious of malignancy	5	10%
5: highly suspicious of malignancy	10	20%

Table 2: Distribution of patients based on sonography grade of lesion (BI-RADS)

BI-RADS grade	Number	Percentage(%)
2: BENIGN	24	48%
3: PROBABLY BENIGN	12	24%
4: SUSPICIOUS OF MALIGNANCY	4	8%
5: HIGHLY SUSPICIOUS OF MALIGNANCY	10	20%

Present study revealed 37 benign and 13 malignant cases on histopathological analysis. 1 out of 37 benign lesions detected on mammogram were malignant

Table 3: Distribution of patients based on H.P.E. report

H.P.E. report	Number	Percentage(%)
Benign	37	74%
Malignant	13	26%

12 out of 13 malignant lesions on mammography were correctly diagnosed as malignant, resulting in sensitivity, specificity, PPV and NPV of 92%, 91%, 80% and 97% respectively.

Table 4: Comparison of mammographic BI-RADS with H.P.E. reports

Parameter	
PPV	80
N.P.V.	97
SENSITIVITY	92
SPECIFICITY	91

On ultrasound, 12 cases out of 13 were correctly graded as malignant. However, a single case graded as benign turned to be a malignant lesion and only 2 cases graded as malignant were diagnosed as benign lesions, resulting in sensitivity, specificity, PPV and NPV of 92%, 94%, 85% and 97% respectively.

Table 5: Comparison of SONOLOGICAL BI-RADS with H.P.E. reports

Parameter	
PPV	85
N.P.V.	97
SENSITIVITY	92
SPECIFICITY	94

Both the modalities (mammography & ultrasonography) combined with HPE yielded the best results with the sensitivity of 92% for benign lesions and 95%. The specificity & sensitivity was more precise when both the modalities were combined in our study group.

DISCUSSION:

Out of 50 cases, 13 were diagnosed as malignant and 37 as benign. Fibroadenoma was the most common benign finding. Pathologically malignant lesions included ductal carcinoma in situ (DCIS), infiltrating ductal carcinoma, papillary carcinoma and, mucinous carcinoma. On pathological correlation, 1 out of 37 benign lesions detected on mammogram were malignant. 12 out of 13 malignant lesions on mammography were correctly diagnosed as malignant. 3 cases graded as malignant on mammogram were diagnosed as benign on H.P.E.

The highest percentage of cases with lesions positive for malignancy

belong to the age group ranging from 41-60 years. Predominant of the lesion were found in upper outer quadrant (38%) followed by retroaxillary, i.e. central accounting for 30%. Family history of breast cancer was present in 10 patients, absent in 40 patients. This could be attributed to the fact that the study was conducted in a rural region and the awareness of early detection is just starting to pick up among early post-menopausal woman and those with risk factor-family history

In our study, the PPV was 85 and the negative predictive value was 97 for lesions on mammography. Mammographic BI-RADS with H.P.E. was 92% sensitive and 94% specific. Positive predictive value (PPV) was 80% for ultrasonographic categorization of BI-RADS lesions with HPE correlation with NPV of 97% Ultrasonographic BI-RADS with HPE was 92% sensitive and 93% specific.

This is comparable with quite a few other studies where Positive Predictive Value of BI-RADS 4 lesions stretched from 16-52.7% and PPV of BI-RADS 5 ranged from 68-100%. Zonderland et al.³ reported Positive Predictive Value of BI-RADS category 4 as 52.7% and a BIRADS category 5 as 100% in a screening population Another study by Taplin et al.⁴ reported a PPV of BI-RADS category 4 as 16.7% & a PPV of BI-RADS category 5 as 68.4%. In a latest study by Timmers et al., Positive Predictive Value of BI-RADS 4 was 39.1% & BI-RADS 5 was 92.9%.⁵

Sensitivity of mammography is low for benign lesion especially in dense breasts and very small lesions. This challenge was faced during our study in interpreting ACR type III and IV. Ultrasound had a major advantage here. However, sensitivity and specificity for malignant lesions are high because microcalcifications are better detected on Mammogram in comparison with Ultrasound. Similar observations were seen study by Prasad et al.⁶ and Sabine M et al., Sensitivity of sonomammography in detecting benign lesions was high because small cysts and fibroadenomas are better seen even in dense breasts and USG differentiates cyst from solid lesions. Specificity of USG in detecting malignant lesions was less as microcalcifications were not well seen in USG. These observations are similar to Prasad et al.,⁶ Teixidor HS et al.,⁸

Both the modalities (mammography & ultrasonography) combined with HPE yielded the best results with the sensitivity of 92% for benign lesions and 95%. The specificity & sensitivity was more precise when both the modalities were combined in our study group.

CONCLUSION:

Imaging has an important role in the management of palpable breast masses. Combined USG and Mammography yielded more accurate results than either method alone and can be advocated as a screening modality to detect malignancy and treat the patient earlier. USG is better in cystic lesions, ectasias and small fibroadenomas. Mammography is better in detecting microcalcifications and early detection of occult malignancies and its infiltration. Ultrasonography and Mammography cannot replace each other. No single investigation is 100% accurate but combination of mammography and ultrasonography can yield near better results.

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