ORIGINAL ARTICLE

Diagnostic Accuracy of Mammography in Symptomatic Patients at Civil Hospital, Karachi

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ABSTRACT

Objective: To analyze the diagnostic accuracy of mammography in symptomatic patients by using histopathology as a gold standard.
Material and Methods: This was a Descriptive Cross-Sectional Study, done in the Radiology Department, Dow University of Health Sciences/Civil Hospital Karachi, over a period of one year. This study includes 140 patients with sign/symptoms of breast disease referred to our department for mammography. Patients were selected according to study criterion. Mammography was performed after taking detailed history and breast examination. Mammograms were interpreted by consultant radiologist and final diagnosis of the lesion on mammography had made which was compared with the histopathology. The primary performance outcomes of diagnostic mammography like sensitivity, specificity, accuracy, positive and negative predictable values were calculated.
Results: Mean age of the patients was 48.42 ±10.5years. Out of 140 patients, 91 (65%) showed malignant lesions while 49 (35%) having benign lesions. 85 patients out of 91 (93.4%) who labeled as malignant on mammography were proven malignant on histopathology and 41 patients out of 49 (83.6%) who labeled as benign on mammography were came out benign on histopathology. This study showed the sensitivity of 91.3%, specificity of 87.2% and accuracy of 90% when mammographic diagnosis was compared with gold standard histopathology.
Conclusion: Breast cancer is the most common and potentially curable disease, and the mammogram is an important tool for its diagnosis so there is dire need of mammographic set up all over the Pakistan to detect breast cancer early and reduce mortality.

Key words: Mammography, Breast Lumps, Nipple discharge, Breast pain, Histopathology, Breast cancer.

How to cite this article: Shaikh R, Khan A A. Diagnostic Accuracy of Mammography in Symptomatic Patients at Civil Hospital, Karachi. J Dow Uni Health Sci 2017; 11 (2): 41-45.

INTRODUCTION

Breast diseases are showing a rising trend worldwide. About one-fourth of women suffer from breast disease in their lifetime after puberty[1]. Among them benign breast diseases are the most common cause of breast problems but breast cancer is also the most frequently diagnosed malignancy in women. In Pakistan there is no proper tumor registry so exact prevalence of breast cancer is difficult to describe, appro ximately presented as one in five female patients.[2] It is the second most common cause of malignancy-related mortality in female[3] so with such a potential fatal malignancy, early diagnosis is the key for better survival. Majority of the patients present either with a palpable mass, pain or nipple discharge or any combination of these, but the common presentation is with palpable breast mass which is usually benign but proper evaluation is necessary to exclude the malignant lesion. A cross sectional and cohort study[4] on breast disease showed fibroadenoma (19.46%) to be the most common benign problem while breast cancer was 11.75%.

The baseline radiological investigations for breast include mammography or ultrasonography or combined both[5] but the mammography can detect the non palpable breast lesion before these apparent clinically. Mammographic sensitivity is decreased in detecting breast lesions in young patients (less than 35years) due to increased breast density[6,7]. Diagnostic mammography has higher sensitivity and lower specificity than screening mammography due to presence of signs and symptoms as well as usage of additional views like spot compression and magnification views. The

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sensitivity and specificity of diagnostic mammography reported in various studies for diagnosing breast lesions varies from 72 to 93.2% and 84 to 87% respectively. One study published in October 2005 in The New England Journal of Medicine, that shows there is abrupt decrease in incidence of about 28-65% of breast cancer deaths during the period of 1990 to 2000 was due to use of mammograms[8].

Mammography is soft tissue x-rays of the breast requires special techniques and film, and a radiologist skilled in its interpretation[9]. The main role of diagnostic mammography is to the exact localized the breast lesion, to assess the size, to evaluate the adjacent tissue, local lymph nodes as well as contralateral breast for unsuspected cancer[9].

Various studies show that majority of the patients in Pakistan with breast cancer who present with breast lump is predominantly in a locally advanced disease. This is due to lack of education; the women disregard the lump and report to doctor when it is no longer possible to neglect it either due to its size or other features such as pain etc. So the breast units should be established in the hospitals for consultation, management and developing awareness of breast diseases in the public. And these units should include the diagnostic mammogram as an important tool to detect the breast cancer at an earlier stage, have the best prognosis. This will help in reducing the mortality from breast cancer. The objective of this study is to analyze the diagnostic accuracy of mammography in symptomatic patients to differentiate benign and malignant breast lesions.

MATERIALS & METHODS

This was a Descriptive Cross-Sectional study done in Radiology Department, Dow University of Health Sciences/Civil Hospital Karachi over a period of one year. The sampling technique was non probability consecutive. Inclusion criteria were female patients of age more than 35years having one or more than one symptoms like breast lump, nipple discharge (bloody or non-bloody) and breast pain. Female patients with diagnosed breast carcinoma, benign diseases, residual cancer after surgery, chemotherapy and radiotherapy or those patients in which mammography had reduced efficacy due to increased breast density as seen in younger patients (<35years) and during lactation were excluded from the study.

One hundred forty patients with sign/symptoms of breast disease referred to Radiology Department, Dow University of Health Sciences/Civil Hospital Karachi for mammography were selected who fulfill the inclusion criteria. Informed consent was taken and permission was sought from institutional/hospital ethical committee. Detailed history and breast examination were done in each and every case.

Mammography was performed in all cases with "Planned Sophie Classic RFH 40822". Standard views such as mediolateral oblique (MLO) and craniocaudal (CC) views were taken, additional views like spot compression and magnification views were also taken where needed. All the mammograms were reported according to BIRADS system. The BIRADS 2 and 3 categories were considered as benign and BIRADS 4 and 5 categories as malignant. Then mammographic diagnosis was compared with the histopathological diagnosis. Each mammogram was classified as true positive (TP), false negative (FN), true negative (TN) and false positive (FP). From malignancy point of view, a positive mammogram is one which was assigned as BIRADS 4 or 5 categories and negative mammogram included BIRADS 2 or 3. When a positive mammogram shows a malignancy on histopathology was labeled as true positive (TP) while all other positive mammograms were considered as false positive (FP). When a negative mammogram shows benign lesion (no malignancy) on histopathology was considered as true negative (TN), while when they showed the malignancy were considered as false negative (FN).

Collected data entered and Statistical analyses were carried out on SPSS version 20. Mean and standard deviation were calculated for age. Frequency and percentages were calculated for qualitative variable like mammographic and histopathologic diagnosis. The primary performance outcomes of diagnostic mammography like sensitivity, specificity and accuracy were calculated.

Operational Definitions

Benign breast lesion: Presence of any one or more than one of the following mammographic finding will be labeled as benign lesion: Circumscribed soft tissue mass density with coarse calcification, encapsulated lucent lesions, encapsulated mixed density lesions, cysts with calcified walls, multiple round densities, lucent centered calcifications, diffusely scattered calcification, large rod shaped calcifications, bean shaped lymph nodes with smooth margins and/or intact hilum.

Malignant breast lesion: Presence of any one or more than one of the following mammographic findings will be labeled as malignant lesion: Spiculated mass, fine linear branching calcification, mass with indistinct margins, architectural distortion, pleomorphic clustered microcalcifications, asymmetric ductal dilatation, skin thickening, nipple retraction, enlarged axillary lymph nodes with irregular fuzzy margins or/and loss of fatty hilum.

BIRADS: It stands for Breast Imaging Reporting and Data System was developed by the American College of Radiology (ACR). It is used to standardize the mammographic reporting and facilitate outcomes monitoring.

BIRADS Categores:

Category 0: Assessment incomplete- needs additional imaging evaluation or prior mammogram for comparison.

Category 1: Negative- no mass, architectural distortion or suspicious calcification, continue routine screening.

Category 2: Benign finding- no mammographic evidence of malignancy. Calcified soft tissue mass, multiple secretory calcifications, fat-containing lesions, mixed-density lesions, intramammary lymph nodes, vascular calcifications, implants or post surgical architectural distortion all have characteristically benign appearances, continue routine screening.

Category 3: Probably benign finding (<2% risk of malignant), three specific findings are described as being probably benign (the non calcified circumscribed solid mass, the focal asymmetry and the cluster of round calcifications), Short term follow up mammogram at 6 months, then every 6 to12 months for 1 to 2years to establish its stability.

Category 4: Suspicious abnormality (2-95% risk of malignant)- reserved for findings like a palpable partially circumscribed mass, a partially indistinctly marginated mass, an ill-defined irregular mass or a cluster of fine pleomorphic calcifications, perform biopsy.

Category 5: Highly suggestive of malignancy (>95% risk of malignant), appropriate action should be taken—biopsy and treatment, as necessary.

Category 6: Known biopsy proven malignancy, reserved for lesions identified on the imaging study with biopsy proof of malign

RESULTS

In this study one hundred and forty (140) patients were enrolled to analyze the diagnostic accuracy of the mammography in symptomatic female patients with breast lump, nipple discharge (bloody or non-bloody) and breast pain using histopathology as gold standard. The patients were above 35 years with mean age of 48.42 years with standard deviation of 10.5years. The youngest age of patient was 35 years and eldest was of 75 years. The mean age of patients with malignancy was recorded 52 years ± 9.99 with mean lump duration of 16.6months. The most common presenting symptom was lump in the breast reported by 135 (96.4%) patients with mean lump duration of 16.6 months, of which 101 (74.8%) patients had lump only while other (25.1%) had lump with other symptoms like pain or nipple discharge. Three patients out of 140 (2.1%) had nipple discharge only and 2 patients (1.4%) presented only with breast pain. The duration of lump was ranged from 0.25month (1 week) to 300months (2.5years) with mean duration of 15.25 months. More lumps were seen in left breast (54.4%) as compared to right breast.

Out of 140 patients, 91 patients (65%) showed malignant lesions (67 were in BIRADS 4 and 24 in BIRADS 5) and 49 patients (35%) were having benign lesions (21 were in BIRADS 2 and 28 in BIRADS 3) on mammogram (Graph1). 85 patients out of 91 (93.4%) who labeled as malignant on mammography were proven malignant on histopathology while other (6.6%) were came out to be benign. 41 patients out of 49 (83.6%) who labeled as benign on mammography were came out benign on histopathology while other (16.3%) were falsely placed in benign category and proven to be malignant on histopathology (Graph2).

This study showed the sensitivity of 91.3%, specificity of 87.2% and accuracy of 90% when mammographic diagnosis was compared with gold standard histopathology (Table 1).

DISCUSSION

Diagnostic mammogram is an important tool for evaluating the patient who presents with symptoms and/or signs of breast lesion. In this study malignancy was the most common lesion detected on mammogram, making 66.4% of the cases. The reason of high percentage of the carcinoma was the advanced age of the symptomatic patients who underwent to the mammogram, in my study mean age of patients with malignancy was 52 years ± 9.99 standard deviation which is comparable to Jalali et al[10] that showed mean age of patients with malignancy was 52 years and according to Moskowitz et al[11], the risk of developing carcinoma breast is highest for women over the age of

40 and growth rate of cancer is also rapid in the 5th decade of life as compared to later years of life as in my study. The youngest age of patient with malignancy recorded was 35years. The duration of lump in patients with malignancy was ranged from 0.25month (1week) to 300 months (2.5years) with mean duration of 16.60 months. As compared to west, in Pakistan majority of the patients with breast cancer report late, either due to decreased education as well as awareness of the breast disease and lack of availability of screening facility at public tertiary hospitals. So there is great desire to establish the breast clinics that give awareness of the disease and usage of radiological investigation to diagnose the malignant breast lesion at early stage to reduce the breast cancer related mortality.

In this study most common presenting complaint was breast lump reported by 135 patients out of 140 (96.4%) and second common complaint was nipple discharge by 3 patients (2.1%), which is comparable with studies of Issac et al[12] and Sidharth et al[13]. The range of duration of lump was from 0.25 month (one week) to 300 months (2.5years), which is comparable with Issac et al[12]. Left breast was commonly involved as compared to right which is comparable to other studies[12,14]. BIRADS 4 category was most commonly assigned which comprises of 67 (47.9%) patients out of 140; 61 of these were proven malignant on histopathology and other were the benign lesions, making the sensitivity of BIRADS 4 as 91% with 9% false positive reporting. BIRADS 5 category was consisting of 24 (17.1%) patients, which were after histopathology confirmed to be malignant, making the sensitivity of 100% with BIRADS 5. The second common category assigned was BIRADS 3 with 28 (20%) patients; 8 of these showed malignancy on histopathology so making the specificity of 71.4% of BIRADS 3 category lesions. 21 (15%) patients were assigned as BIRADS 2 category, which were proved benign on histopathology so making the sensitivity of 100% for the lesions categorized as BIRADS 2.

Majority of the studies were done to assess the sensitivity and specificity of the screening mammography, while few studies are done on performance of the diagnostic mammography. This study assessed the overall performance of the diagnostic radiology in terms of sensitivity and specificity. The sensitivity of diagnostic mammography was 91.3% in this study which is comparable with the studies of Ohuchi et al[15] that found sensitivity of 91.1%, Duijm et al[16] showed sensitivity of 92.0%, Yankaskas et al[17] with the sensitivity of 91%, Eltahir et al[18] with result of 93.2% and Flobbe et al[19] with 89% sensitivity. This study showed 87.2% specificity of diagnostic mammography. Houssami et al[5] show the specificity of 87%, Zhi et al[20] 87%, Ohuchi et al[15] as well as Barlow et al[21] 87.7% and Yankaskas et al[17] 86%. My study is comparable with these studies in term of specificity.

This study had missed 8 malignant lesions and 6 lesions were overestimated as malignant due to dense breast parenchyma and young age of presentation of certain patients with positive family history of breast cancer. White et al[6] mentioned that breast density can influence the performance as well as accuracy of mammography and increased breast density misinterpret the mammogram resulting in false negative and false positive mammogram. And also Saarenmaa et al[22] state that sensitivity of mammography increased by age and with fattiness of the breast. Ma et al[7] states that the mammography was less likely to detect breast cancer in a dense breast.

Yankaskas et al[17] also found that diagnostic mammography has high sensitivity and low specificity as compared to screening mammography due to presence of sign and symptoms in the population.

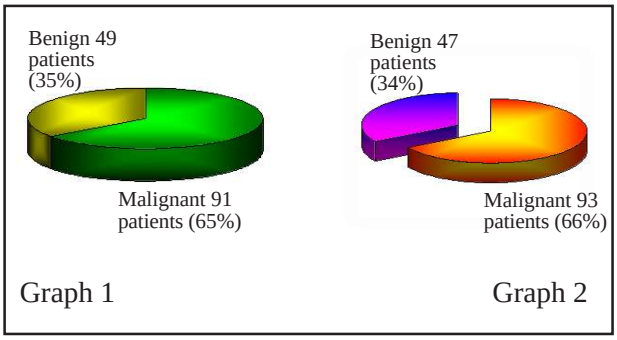
CONCLUSION

This study shows the accuracy of diagnostic mammography is quite satisfactory in our setup especially for detecting the more harmful breast lumps. In Pakistan majority of the patients with breast cancer report late, therefore it is necessary that mammographic facility should be established in all the hospitals to diagnose breast cancer at early stage.

GRAPH 1& 2

Mammographic and Histological Diagnosis

(n=140)



Graph 1 Graph 2

Table 1: Sensitivity and Specificity of Diagnostic Mammography
(Histopathological diagnosis taken as gold standard)

n = 140

Mammographic diagnosis	Histopathological Diagnosis		
	Malignant	Benign	Total
Malignant 91	85 (TP)	6 (FP)	91
Benign 49	8 (FN)	41 (TN)	49
Total	93	47	140

TP= True positive, FP= False positive
FN= False Negative, TN= True Negative

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