ORIGINAL ARTICLE

Accuracy of Ultrasound based BI-RADS Scoring System to Predict Malignancy in Patients with Breast Lump

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ABSTRACT

Objective: To determine the diagnostic accuracy of BIRADS in diagnosing malignant breast lesions in patients with palpable breast lump.

Patients and Methods: A total number of 100 patients presenting with Palpable breast lump were included in this study. The study was conducted in radiology unit of Lahore General Hospital Lahore from August-2021 to April-2022. Data regarding baseline study variables such as age, living area and socioeconomic status was collected for each patient. Ultrasound examination of the breast masses was done by an expert radiologist for calculation of BI-RADS score. Diagnosis of malignancy on histopathological findings was also made.

Results: Mean age of patients was 41.04±11.00 years. There were 43 (43.0%) from rural areas and 57 (57%) from urban areas. Malignancy on BI-RADS was found in 42 (42%) patients. On evaluation of diagnostic accuracy of BI-RADS, BI-RADS was 92.5.0% sensitive, 88.3% specific having 84.1% PPV and 94.6% NPV (Table 1).

Conclusion: When compared to histopathologic diagnosis, the findings of our study demonstrated that BIRADS is an accurate and trustworthy method for diagnosing breast lumps.

Key Words: Palpable breast lump, BI-RADs Scoring, Histopathology.

INTRODUCTION

Breast cancer continues to be the most frequent cancer and the top cause of cancer death among women globally.[1] Pakistan has the highest breast cancer incidence rate in Asia. The prognosis of young women with breast cancer is negatively impacted by the disease's advanced stage.[2] Breast cancer affects one in nine Pakistani women at some point in their lives.[3,4]

The most common sign of a breast mass, whether benign or malignant, is a lump in the breast. As a result, it's critical for patients and their doctors to know the difference between a benign and cancerous bump.[5] The judicious utilisation of a complete history, clinical breast examination, imaging modalities and tissue diagnosis is required in the evaluation of breast masses. Because as many as 80% of breast lumps are benign, the gold standard for determining whether or not a lump is cancerous is cytological or histological study of the removed tissue.[6,7]

Sonomammography is a highly approved and cost-effective screening method for clinically suspected breast cancer lesions. The Breast Imaging Reporting and Data System was created by the American College of Radiology to improve mammography reporting reliability and repeatability (BI-RADS).[8] BIRADS is now commonly utilised as a preliminary examination to confirm the diagnosis of breast masses.

The aim of the present study is to determine the diagnostic accuracy of mammography based on BI-RADS scoring system in determining the presence of malignant breast lesions taking histopathology as gold standard.

MATERIALS AND METHODS

A total of 100 female patients of age 25 to 65 years who were referred to the department of histopathology with diagnosis of breast lump fulfilling the inclusion criteria of the study were included in current validation study. The study was conducted in radiology unit of Lahore General Hospital Lahore from August-2021 to April-2022. A written consent was taken from each patient by explaining her the objectives of study. Pregnant females, lactating mothers or those having history of chemotherapy or radiotherapy were excluded.

Data regarding baseline study variables such as age, living area and socioeconomic status was collected for each patient.

An experienced sonologist from the radiology department performed an ultrasound examination on the breast lumps. The results of the examination were negative. Information pertaining to the following four aspects of the breast was included in the scans: I

Shape: Round/Oval or irregular. (ii) Margins, which can either be circumscribed or non-circumscribed. (iii) Width: AP ratio must be greater than or equal to 1.4 (iv) The echogenicity, which can be either hyperechoic, isoechoic, or hypoechoic. The BI-RADS score was generated by taking into account these characteristics. Patients having BI-RADS 4a or less were labelled as having benign lesions while those having BIRADS 4b or more were labelled as having suspicious/suggestive of malignant lesions.

Biopsy samples of all patients were sent to the histopathology unit. Patients having cytomorphological features, suggesting malignancy, includes dyscohesiveness, high nuclear to cytoplasm ratio, hyperchromasia, prominent nucleoli, eosinophilic sytoplasm and infiltrating growth pattern were labelled as having malignancy.

Data was entered and analyzed using SPSS version 23.0. Mean and standard deviation was used for quantitative variable such as age. Qualitative variables such as living area, socioeconomic status, diagnosis of malignancy on BI-RADS, FNAC, and histopathology reporting were measured in percentages and frequencies. 2×2 contingency table was formulated to determine the sensitivity, specificity, PPV and NPV of BI-RADS and FNAC taking histopathology reporting as gold standard.

RESULTS

Mean age of patients was 41.04±11.00 years. There were 43 (43.0%) from rural areas and 57 (57%) from urban areas. There were 30 (30%) poor, 50 (50%) from middle class and 20 (20%) from upper class.

Malignancy on BI-RADS was found in 42 (42%) patients (Figure 1).

On evaluation of diagnostic accuracy of BI-RADS for diagnosing malignant lesions takin histopathology as gold standard, BI-RADS was 92.5.0% sensitive, 88.3% specific having 84.1% PPV and 94.6% NPV (Table 1).

Table 1. Diagnostic Accuracy of BIRADS.

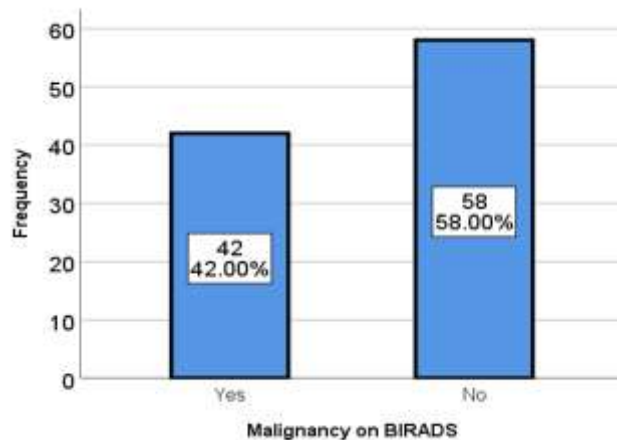| Malignancy on BI-RADS	Malignancy on Histopathology	
	Yes	No
Yes	35	07
No	05	53
Sensitivity: 87.5% Specificity:88.3% PPV:83.3% NPV:91.4%		

Figure 1. Frequency of Malignancy Using BIRADS Score.

DISCUSSION

The objective of the current study was to evaluate the usefulness of ultrasonography in the diagnosis of breast cancer by contrasting the findings with those of a histological diagnosis in order to identify the degree to which it is accurate. The screening and detection of breast lesions at an early stage, as well as the classification of breast pathology into its various subtypes, might be beneficial in achieving an accurate diagnosis and management of breast lesions.[9]

When combined with clinical examination and either diagnostic (symptomatic) or screening (asymptomatic) mammography, ultrasound can identify malignancy in some cases that would otherwise go unnoticed. This is because the sensitivity of mammography decreases as the density of glandular breast tissue increases, and ultrasound is more sensitive at lower densities.[10,11] When it comes to ultrasound descriptors based on published research, the criterion of tumour change orientation has the best level of impartiality and agreement among the numerous clinicians doing the examination. Shape, surrounding tissue, and posterior phenomena are in the middle of the spectrum between the two extremes in terms of agreement, while change contour and its echogenicity (nonechogenic and hyperechogenic are benign, while hypoechogenic, isoechogenic changes, and complex lesions can be seen in both types of changes, but they are more suspicious of malignant nature) are the two areas where there is the least agreement.[12]

The research done by Rahman et al. demonstrated that BIRADS had an accuracy of 88.39 percent, a sensitivity of 82.76 percent, a specificity of 90.36 percent, a PPV of 75 percent, and a NPV of 93.75 percent.[13]

A study by Pandia et al. on the diagnostic accuracy of BI-RADS in diagnosing malignant breast lesions taking histopathology as gold standard reported that BIRADS is 88.57% sensitive and 82.46% specific for diagnosis of malignant lesions. They reported malignant lesions in 38.0% of total patients.[14]

Xiao et al. reported that BI-RADS is 77.9% sensitive and 88.9% specific for the diagnosis of malignant breast lesions. while they reported malignant lesions in 55.53% patients.[15]

According to the findings of a study that was carried out by Shrestha and colleagues, the sensitivity of sonomammography was 78.9 percent, while its specificity was 95 percent when it came to distinguishing benign lesions from malignant ones using the BIRADS score.[16]

According to the findings of the research conducted by Shumaila et al., mammography was positive in 66 (or 90 percent) of the 73 instances, and sonomammography was positive in 68 (or 93 percent) of the cases.[17]

According to the findings of a study conducted by Stavros and colleagues, ultrasonography can be utilised to identify between benign and malignant lesions with a negative predictive value of 99.5 percent, a specificity of 67.8 percent, and an overall accuracy of 72.9 percent.[18]

In a study that Emine D and colleagues conducted on 546 breast lesions and analysed using histopathology, they found that the sensitivity and specificity of sonomammograms were, respectively, 72.6 and 88.5 percent.[19]

Using the BIRADS lexicon system, we were able to achieve comparable results in this study, with a sensitivity of 87.5 percent, specificity of 88.3 percent, PPV of 83.3 percent, and NPV of 91.4 percent in differentiating benign from malignant masses in sono-mammography.

CONCLUSION

When compared to histopathologic diagnosis, the findings of our study demonstrated that BIRADS is an accurate and trustworthy method for diagnosing breast lumps.

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