

Correlation Between BIRADS Scoring and Histology in Women Undergoing Breast Surgery in our Institution

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Abstract

Developed in the early 1990s, the BIRADS classification has been used extensively as a surrogate to histopathological reporting of breast cancer. Prior to implementation of BIRADS there was a lack of uniformity in reporting of mammography findings and this often resulted in varied reporting and management strategies. This ambiguity had also led to increased difficulties in establishing performance standards across settings. This had been the main impetus in developing the BIRADS system and several research studies have shown the scoring system to be useful in predicting the likelihood of cancer. These results are also seen in this study and hence further show the value of BIRADS in effective management of breast cancer. In this study, a total of 50 patients aged between 15 and 73 years with mean age being 44 years were included. They underwent preoperative imaging with either ultrasound or mammogram after which they underwent surgery. And their Mammogram/ultrasound findings are compared with their final Histopathology report. The BIRADS categories 1, 2 and 3 are clubbed together and considered as "Benign", while categories 4, 5 and 6 were clubbed together as "Malignant". This was compared with the final histopathology report which was either benign or malignant and the correlation was established. Out of the 50 cases, 40 of them were correctly classified. Breast lesions evaluated for malignancy using BIRADS scoring had Sensitivity of 75%, Specificity of 83.3%, Positive predictive value of 75% and Negative predictive value of 83.3%.

The standardized terminology of the BI-RADS lexicon allows quantification of the likelihood of carcinoma in a breast lesion. In experienced hands, the BIRADS system can be a very useful predictor of malignancy. However, Imaging should not be used in isolation due to chance of missing malignancy. Imaging should always be done in conjunction with clinically examination and FNAC/Biopsy (Triple Test) to get a comprehensive perspective prior to surgery [25].

Keywords: BIRADS; Prediction; Breast cancer; Mammogram; Histopathology; Correlation.

Introduction

Breast carcinoma is the most common type of malignancy diagnosed in women worldwide. In majority of the developed countries it is the most frequently encountered malignancy and one of the major causes for cancer related deaths. Breast carcinoma has been extensively studied in the modern medicine era and with the availability of vast evidence based data and literature, various treatment modalities have been introduced to treat this life threatening disease. Majority of the breast carcinomas are usually asymptomatic and the usual mode of presentation is an incidental palpable lump or pain and rarely, they present with nipple discharge and skin changes [1,25]. Breast carcinomas have varying levels of invasion and aggressiveness irrespective of the duration with a few patients having metastatic symptoms at the time of presentation itself. Even though extensive screening programs and clinical tests are available for early detection of this disease, the turnover and outcome still remains poor in developing countries. There is a lack of self-awareness of this life threatening malignancy in our country. The

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general approach in case of breast carcinoma is by "triple assessment" combining the clinical finding with that of the radiological and pathological correlation remains as a standard guideline for breast carcinoma [2].

Liver function tests, Chest X-Ray, Abdomen ultrasonography and bone scan aid in staging the disease. Histo-pathological correlation along with immunohistochemistry analysis has introduced another modality of treatment. The usual routine of management in breast carcinoma is with surgery, radiotherapy and chemotherapy depending on the stage of the disease [25]. Though each modality of treatment has its own pros and cons, combined approach is the therapy of choice leading to less toxic therapy with a good outcome and better prognosis. Breast carcinoma management is reaching new heights with its vast research interest and data availability. Numerous centres throughout the world are promoting screening programmes and Breast self examination to detect the disease as early as possible. Due to increase in awareness and screening programmes, the number of women presenting to the hospital with a breast lump has increased substantially. Prior to conducting invasive biopsies or fine needle aspiration cytology, non-invasive imaging needs to be performed. Mammography and sonomammogram are the usual imaging modalities of choice for diagnosis of a breast lump [15]. They can be used both for diagnostic and screening purposes.

To make the reporting uniform, BIRADS (Breast Imaging Reporting and Data Systems) was created by the American College of Radiology (ACR). It has six categories, 1-denotes negative study, 2-denotes benign lesion, 3-denotes probably benign lesion, 4-denotes suspicious abnormality, 5-denotes lesion is highly suspicious of malignancy and 6-denotes previously biopsy proven malignancy [8]. This scoring system was designed to standardize the interpretation and reporting of mammogram and sonomammogram. But despite this, there is a lot of variability in the reporting according to several studies. In this study, we seek to assess the predictive value of BIRADS score with final histological report in our institution. The objective was to correlate between the BIRADS Score and the Histopathological finding in women undergoing Breast Surgery in our institution, and to check Sensitivity, Specificity, Positive and Negative predictive value of BIRADS scoring in predicting malignancy.

Materials and methods

The Cross sectional study was conducted between the year 2015 and 2016, at the PSG Institute of Medical Sciences and Research, Coimbatore, Tamil Nadu, India, where 50 patients with breast cancer, with the following criteria (a) Women of all ages (b) Preoperative mammogram /sonomammogram with BIRADS scoring (c) Undergone Breast surgery in our institution (d) Conclusive histopathology report and (e) Well documented clinical record were included in the study, and women with (a) history of previous breast surgery (b) surgery done elsewhere, were excluded. All women who present to the OPD with a breast lump, will as per department protocol, undergo "triple assessment", which includes Physical Examination, FNAC/ Biopsy. Mammogram/Ultrasound breast and only those who eventually need surgical intervention are followed up and their Mammogram/ultrasound findings are compared with their final Histopathology report. The BIRADS categories 1,2 and 3 are clubbed together and considered as "Benign" while categories 4,5 and 6 were clubbed together as "Malignant". This was compared with the final histopathology report which was either benign or malignant and the correlation was established.

Results and analysis

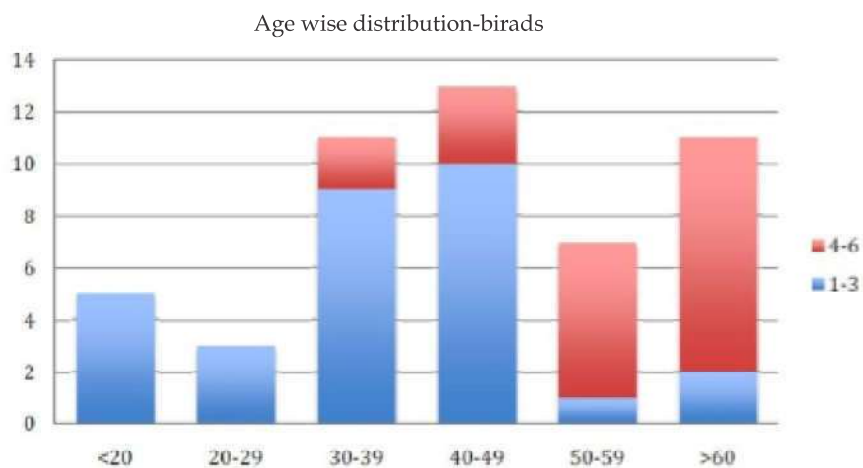
A total of 50 cases were included in the study. The most common BIRADS score was 3 with 18 patients. BIRADS score of 2 and 4 had 12 patients each. There were no patients with BIRADS category 1 in our study.

In this study, the average age was 44 yrs with the oldest being 73 yrs and the youngest being 15 yrs. After age wise breakdown, the largest number of patients were in the 5th decade of life with 13 cases, with the 4th decade coming a close second with 11 cases. Women above 60 yrs of age made up more than 20% of our study. 19 women in the study were below 40 yrs of age which could be attributed to education and increased awareness.

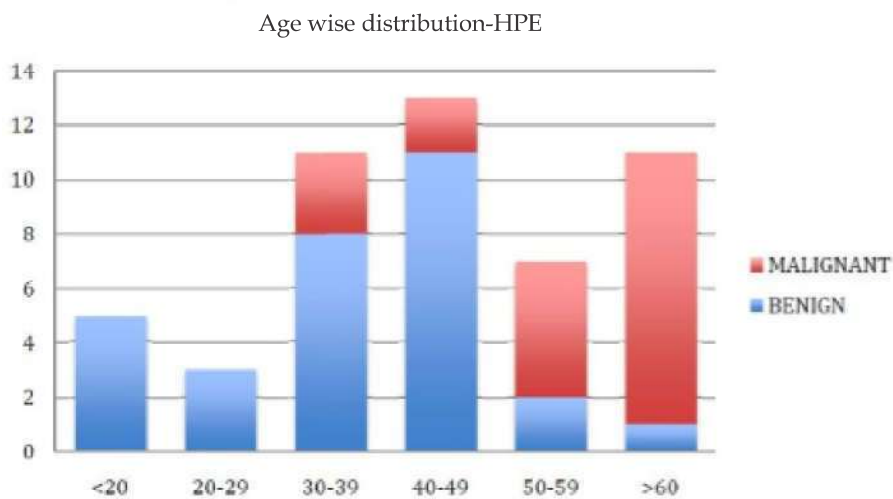
The Age wise distribution of BIRADS score is shown in Figure 1. The BIRADS scoring tended to show more benign pathology in women less than 40 yrs of age. Only 2 women less than 40 yrs of age had a BIRADS score of 4. Older patients tended to have higher BIRADS SCORE (4 and above) indicating malignancy. 15 out of 18 patients above 50 yrs of age had a BIRADS score of 4 or more 9 out of 11 patients

above 60 yrs of age had a BIRADS score of 4 or more. The Age wise distribution of Histopathology

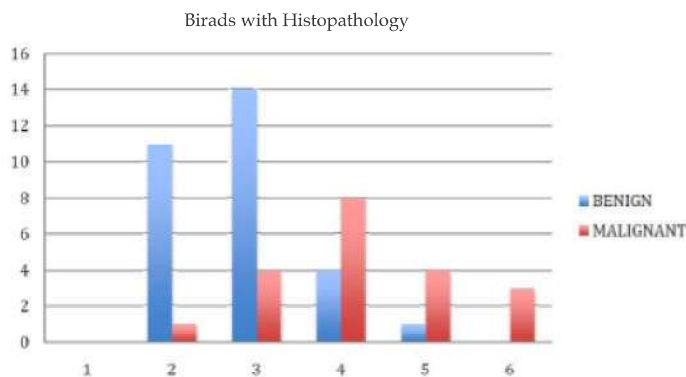
report is shown in Figure 2. The final histopathology followed a similar pattern to the BIRADS scoring. All patients less than 30 yrs of age had benign



x-axis – Age of patients in years, y-axis – number of patients
Blue – BIRADS score 1 to 3, Red – BIRADS score 4 to 6
Fig. 1: Age wise distribution of BIRADS score



x-axis – Age of patients in years, y-axis – number of patients
Fig. 2: Age wise distribution of Histopathological report



x-axis – BIRADS score, y-axis – number of patients
Fig. 3: Comparison of BIRADS with Histopathological report

Table 1: Frequency of benign and malignant lesions

BI-RADS Category	Frequency in All Masses	Frequency in Benign Masses	Frequency in Malignant Masses
2	12/50 (24.0%)	11/30 (36.67%)	1/20 (5.0%)
3	18/50 (36.0%)	14/30 (46.67%)	4/20 (20.0%)
4	12/50 (24.0%)	4/30 (13.33%)	8/20 (40.0%)
5	5/50 (10.0%)	1/30 (3.33%)	4/20 (20.0%)
6	3/50 (6.0%)	0/30 (0%)	3/20 (15.0%)

Table 2: Comparison of BIRADS classification with histopathologic findings to detect malignant lesions

BIRADS	Total no.	Histopathology Findings		Total no
		Malignant	Benign	
Malignant (4,5,6)	20 (12+5+3)	15 (True positive)	5 (False positive)	20
Benign (1,2,3)	30 (0+12+18)	5 (False negative)	25 (True negative)	30
Total		20	30	50

lesions. However, 10 out of 11 patients over 60 yrs of age had a malignancy. The youngest patient with malignancy was 37 yrs old who had an infiltrating ductal carcinoma.

Comparison of BIRADS with Histopathological report is shown in Figure 3. BIRADS 2 had 11 benign cases and 1 malignant (Figure 2), which was a case of Ductal Carcinoma In Situ. BIRADS 3 had 14 benign cases and 4 malignant cases. BIRADS 4 had 4 benign and 8 malignant cases. BIRADS 5 had 1 benign case and 4 malignant cases.

Table. 1 shows the frequency of benign and malignant lesions. The most common BIRADS category in this study was 3. Amongst benign lesions, the most common BIRADS category in this study was also BIRADS 3 with 14 out of the total 30 benign cases coming from this category (46.67%). Amongst malignant lesions, the most common BIRADS category in this study was BIRADS 4 with 8 out of the total 20 malignant cases coming from this category (40%).

The comparison of BIRADS classification with histopathologic findings to detect malignant lesions is denoted in Table. 2.

Thus, breast lesions evaluated for malignancy using BIRADS scoring had a Sensitivity of 75%, Specificity of 83.3%, Positive predictive value of 75% and Negative predictive value of 83.3.

Discussion

Developed in the early 1990s, the BIRADS scoring method has been used extensively as a surrogate to histopathological reporting of breast cancer. In BIRADS, mammograms are categorized from 0–6, with category 0 - requiring further investigation and category 6 - being biopsy proven malignancy. Categories 1 to 5 are further broken down into negative, benign finding, probably benign finding, suspicious and highly suggestive of malignant lesion respectively [8]. Prior to implementation of BIRADS there was a lack of uniformity in reporting of mammography findings and this often resulted in varied reporting and management strategies. This ambiguity had also led to increased difficulties in establishing performance standards across settings. This had been the main impetus in developing the BIRADS system and several research studies have shown the scoring system to be useful in predicting the likelihood of cancer. These results are also seen in this study and hence further show the value of BIRADS in effective management of breast cancer. In this study, a total of 50 patients were included. They underwent preoperative imaging with either ultrasound or mammogram after which they underwent surgery. These patients were aged between 15 and 73 years with mean age being 44 years. The majority of the participants (36%) had breast lesions classified into BI-RADS category 3 that corresponds to likely benign finding. Category 2 and 4 were the next most common (24%)

corresponding to benign lesion and suspicious abnormalities respectively. Amongst benign lesions, the most common BIRADS category in this study was also BIRADS 3 with 14 out of the total 30 benign cases coming from this category (46.67%). Amongst malignant lesions, the most common BIRADS category in this study was BIRADS 4 with 8 out of the total 20 malignant cases coming from this category (40%). Out of the 50 cases, 40 of them were correctly classified. There were 5 cases which were benign on imaging but turned out to be malignant on histopathology and similarly, there were 5 cases which were suspicious of malignancy on imaging but eventually turned out to be benign. Breast lesions evaluated for malignancy using BIRADS scoring had a Sensitivity of 75%, Specificity of 83.3%, Positive predictive value of 75% and Negative predictive value of 83.3%.

Conclusion

The standardized terminology of the BIRADS lexicon allows quantification of the likelihood of carcinoma in a breast lesion. In experienced hands, the BIRADS system can be a very useful predictor of malignancy. However, Imaging should not be used in isolation due to chance of missing malignancy. Imaging should always be done in conjunction with clinical examination and FNAC/ Biopsy (Triple Assessment) to get a comprehensive perspective prior to surgery[2].

Limitations of the study

As multiple radiologists were used to interpret the images, we were not able to effectively capture inter and intra-rater reliabilities. This study only included surgically proven lesions. Hence the study does not inform on predictive value of BIRADS on benign appearing lesions that were interpreted as definitely benign or were recommended for follow-up only (BIRADS 1, 2 and 3) and thus did not undergo surgery.

Compliance with Ethical Standards

Ethical approval: "For this type of study formal consent is not required."

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