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Original Research Article

Evaluation of Diagnostic Accuracy of Mammography in Patients with Palpable Breast Lump by Using Birads Score

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Abstract:

Background: It is easy to find breast lesions that are suspect for breast cancer using a variety of radiography modalities. Mammography is still a valuable radiological tool for early breast cancer detection. The purpose of this study was to assess the diagnostic efficacy of mammography in assessing palpable breast masses.

Methods: The current cross-sectional study was carried out on a total of 72 eligible women who presented with a palpable breast lump at the Department of Obstetrics and Gynecology, SKMCH, Muzaffarpur, Bihar, from November 2021 to April 2022.

Results: 34.7% of the patients in the current study were between the ages of 46 and 60, and nipple discharge was present in 52.7% of those cases. In 40.27 percent of patients, the lesion's form was globular, and 59.7 percent of patients had soreness. In 29.16% of the patients, the nipple examination revealed retracted nipples. In 63.88% of the patients, the breast lump had a hard consistency. Clinically, 19.44% of the women had palpable axillary lymph nodes. 43.05% of the patients had grade 3 breast lumps as detected by mammography. While 72.23% of the female patients had benign lesions, 27.77% of the patients had malignant lesions.

Conclusion: On mammography, 17 of the 20 patients with malignant lesions on histopathology/cytology results and 2 of the patients with benign lesions also had malignant lesions. Mammography has an 85% sensitivity compared to histopathology/cytology at predicting malignant lesions, a 96.15% specificity, and a 93.50% diagnostic accuracy.

Keywords: Breast cancer, Cytology, Histopathology, Mammography, Palpable breast lump.

Introduction

A lump is frequently caused by a benign breast ailment. It might or might not feel delicate. During routine actions, one could discover it. The likelihood that a single breast lump will be benign increases with age. The most frequent benign breast lumps are fibroadenomas and fibrocystic alterations, which are a combination of fibrosis and cysts. In surgical practice, it happens frequently [1]. No matter the woman's age, lumps and other changes in the breast need to be thoroughly examined and evaluated to be sure they are not cancerous. Even in younger women, there is always a chance that a single lump could be breast cancer even though the majority of lumps aren't. Breast cancer is the cancer in women that is most frequently diagnosed worldwide and is the main reason why women die from cancer [2]. It is the leading cause of mortality for women between the ages of 40 and 59 in the United States, and it is the second most frequent malignancy among all female age groups. One in six people may acquire breast cancer in their lifetime, and one in eight will have invasive disease [3]. Due to the severity of the condition, its psychosocial effects, and the accompanying morbidity and mortality, early diagnosis screening continues to be a crucial component of the fight against this malignancy.

Since 1975, there has been a decrease in breast cancer mortality [4], which may be attributed to both early detection by screening mammography and advancements in adjuvant therapy [5].

Breast lumps must be taken into account along with any other symptoms a woman may be experiencing. The majority of them necessitate a triple assessment, including histopathological analysis, radiographic analysis, and clinical analysis. Mammography mass screening programs

that focus on early detection have the potential to lower mortality.

Mammography continues to be the principal radiological technique for breast cancer screening, despite the fact that a number of radiographic modalities are easily accessible to identify lesions that are suspect for breast cancer. Due to its ability to shed light on the characteristics of a suspected lesion, the breast sonogram's use is primarily restricted to the diagnostic follow-up of a mammographic anomaly. Magnetic resonance imaging (MRI) is still being developed as a breast cancer screening tool; at the moment, only high-risk women are screened using MRI in conjunction with mammography.

The preferred test for breast cancer is mammography. Since 1960, it has been applied to the investigation of breast lumps. Before it can be felt by the lady or her doctor, a mammography anomaly is the first indicator of breast cancer. The patient feels a breast lump, which is typically painless, when breast cancer has progressed to the point that physical signs and symptoms are present. Numerous researchers have assessed the diagnostic reliability of mammography. The reported range for diagnostic precision is 60% to 90%. With increasing breast density, mammographic sensitivity for breast cancer decreases dramatically, and it is also independently higher in older women with thick breasts. Independent of breast density, hormonal state does not significantly affect the efficacy of screening [6].

Materials and Methods

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from November 2021 to April 2022. 72 women patients with palpable breast lump attending OPD/admitted at Department of Obstetrics and Gynaecology, SKMCH were studied.

The sample size was calculated based on the formula as below.

$$n = 4Z2 \times p \times q / d2$$

Where,
n: Sample size
Z: 1.96 ~2 (taking confidence as 95%)
p: Sensitivity
q: 100 – p
d: Relative error that is 10%

The sample size was determined to be 72 women with palpable breast lumps using the formula above. However, 72 women met the requirements for enrollment throughout the study period and were therefore included in the investigation. During patient interviews, demographic information including age and currently present symptoms was recorded. Additionally, these patients underwent complete clinical examinations. The results of a chest exam included evaluations of the axillary lymph node, discharge, size, form, pain, and consistency. These findings were recorded on a predesigned and pretested Proforma. Patients underwent the investigations such as mammography and biopsy**.**

Data was collected, coded, and input into a Microsoft Excel spreadsheet. The chi-square test was used to compare the categorical data, which were reported as rates, ratios, and percentages. The mean and standard deviation were used to represent continuous data. Sensitivity, specificity, positive predictive value, and negative predictive value were used to assess the diagnostic efficacy of mammography in identifying breast lumps. The agreements between diagnoses were correlated using kappa agreement. A "p" value of 0.05 or less was regarded as statistically significant.

Results

In the current study, 50% of the female participants were between the ages of 46 and 60, followed by those who were 60 or older (34.72%), 31 to 45 years (15.28%), and no one under the age of 30 (Table 1).

Table 1: Age distribution of the study subjects

Age groups	No. of patients	Percentage
≤30	0	0%
31-46	11	15.28%
46-60	36	50.0%
≥60	25	34.72%

Nipple discharge was present in 52.78% of the patients (Table-2).

Table 2: Distribution of study subject who had nipple discharge at the time of presentation

Nipple discharge	No. of patients	Percentage
Present	38	52.78%
Absent	34	47.22%

Shape of the lesion was globular in 40.27%, irregular in 22.22%, oval in 16.66%, peanut in 11.11% and spherical in 9.72% (Table-3).

Table 3: Distribution of study subject presenting with lumps of the various shapes

Lumps of the various shapes	No. of patients	Percentage
Irregular	16	22.22%
Globular	29	40.27%
Spherical	7	9.72%
Oval	12	16.66%
Peanut	8	11.11%

In this study the nipple examination revealed retracted nipples in 29.17% of the patients (Table-4).

Table 4: Distribution of study subject presenting with retraction of the nipple

Retraction of the nipple	No. of patients	Percentage
Normal	51	70.83%
Retracted	21	29.17%

Tenderness was present in 59.72% of the patients (Table -5).

Table 5: Distribution of study subject who had tenderness

Tenderness	No. of patients	Percentage
Present	43	59.72%
Absent	29	40.28%

The consistency of the breast lump was firm in 63.89% of the patients while hard in 36.11% (Table-6).

Table 6: Distribution of study subject who presented with breast lump of different consistencies

Breast lump of different consistencies	No. of patients	Percentage
Firm	46	63.89%
Hard	26	36.11%

The axillary lymph nodes were palpable in 19.44% of the patients (Table-7).

Table 7: Distribution of study subject who had palpable axillary lymph nodes

Palpable axillary lymph nodes	No. of patients	Percentage
Present	14	19.44%
Absent	58	80.56%

In this study, the clinical diagnosis of a breast lump based on breast inspection was malignant in 16.67% of subjects and benign in 83.33% of patients, although the results of mammography revealed a BIRADS grade 3 breast lump (probably benign) in 43.05% of patients (Tables 8 & 9).

Table 8: Distribution of study subject representing the type of lesion

Type of lesion	No. of patients	Percentage
Malignant	12	16.67%
Benign	60	83.33%

Table 9: Distribution of study subject found to have various BIRADS grades of mammography

Grades	No. of patients	Percentage
1	5	6.94%
2	14	19.44%
3	31	43.05%
4	11	15.27%
5	8	11.11%
6	3	4.16%

Based on histo-pathological examination, it was determined in the current study that 27.78% of patients had malignant lesions whereas 72.22% of the women had benign lesions (Table 10).

Table 10: Distribution of study subject representing diagnosis on histopathological examination

Type of lesion	No. of patients	Percentage
Malignant	20	27.78%
Benign	52	72.22%

20 patients in the current investigation had histopathologically confirmed malignant lesions.

Mammography showed to be accurately positive (true positive) in 17 patients of these patients with biopsy-proven malignancy, but it was mistakenly negative in 3 women who had benign lesions (Table 11). Mammography has 85% sensitivity and 96.15% specificity for identifying malignant lesions when compared to histology. Mammography's negative predictive value was

found to be 94.33, while its positive predictive value was found to be 89.47%.

The mammography had a diagnosis accuracy of 93.5 percent.

Table 11: Accuracy of mammography in comparison to histopathology

Mammography	Histopathology		Total
	Malignant	Benign	
Positive for malignancy	17	2	19
Negative for malignancy	3	20	53
Total	20	52	72

Discussion

Most of the women in the current study were between the ages of 46 and 60. Women aged 60 or older made up 34.7% of the population, while 15.3% of people were between the ages of 31 and 45, showing the great prevalence of the fifth and seventh decades of life. This is consistent with a research by Chopra et al., which found that disease incidence peaked between the ages of 40 and 60, with a peak proportion occurring between 45 and 49 years [7].

In 52.70 percent of the instances involving palpable lumps, there was a nipple discharge. In 40.27% of patients, the lesion was determined to be globular, in 29.16% of patients, retracted nipples were discovered, and in 36.11% of patients, the breast lump's substance was hard. 19.44% of the women had an axillary lymph node, and these characteristics allowed us to make a clinical diagnosis of cancer in around 17% of patients.

In our study, BIRADS grade 4 or higher breast lesions were found in 30.54% of the patients' mammograms. Standard histopathological/ cytological testing was performed for a positive confirmation, and studies indicated that while 72.22% of the women presented with benign histology changes in the lesions, 27.77% of the patients were identified with malignant lesions.

Of the 20 patients with malignancies identified by histology, 17 had lesions identified on mammography as malignant, while 3 women had benign lesions. This is according to a correlation between the two types of evidence. Therefore, mammography has a statistically significant sensitivity compared to histology of roughly 85% with a realistic specificity of 96.15% in predicting malignant lesions. Consequently, the mammography had a diagnosis accuracy of 93.05%. In other words, the likelihood of a mammogram being positive in a patient with breast cancer is determined to be 85%, demonstrating the test's high sensitivity. However, the likelihood that a benign lesion will result in a negative mammogram is approximately 96%, demonstrating the excellent specificity of mammography. A patient's likelihood of having a malignant breast lump is 89.47% if a BIRADS grade 4 or higher lesion is discovered on mammography. The likelihood that a patient with a BIRADS Grade 3 or lower lesion on mammography will have a benign lesion on histopathology is approximately 93%, indicating that mammography has a high negative predictive value. This suggests that the positive predictive value of mammography is relatively high.

However, in addition to other restrictions that affect mammography's accuracy, such as patient age, breast density, the size of the lump in relation to the size of the breast, and the breast's history of radiation and surgery, the observer's diagnostic prowess determines the mammogram's overall accuracy and propensity for prediction.

Mammography-based screening approaches are the most effective at detecting breast cancer early and facilitating early intervention among the many imaging modalities [8]. Mammography's sensitivity to find breast cancer has been reported to range from 63% to 98%, but it has also been found to be as low as 30% to 48% in thick breasts [9]. In order to determine the severity of the disease within the breast(s), several groups have examined the preoperative use of supplemental magnetic resonance (MR) imaging [10–12], ultrasonography [8,13], or both[14,15] after mammography and clinical breast examination. As a result, it has been discovered that mammography can be used to diagnose breast masses and prescribe a course of therapy with some degree of accuracy [9]. Despite the fact that mammograms can identify malignancy as small as 0.5 cm, 10% to 20% of cancers are immune to mammography's detection, even when they are much larger. The main goal of a mammography in a patient with a solid, dominant mass (suspicious mass) is to check the opposite breast and the normal breast tissue around it for non-palpable malignancies, not merely to help with the diagnosis of the palpable lump. A negative mammogram is not a guarantee that there is no cancer, despite the fact that mammography has been determined to have a good sensitivity and specificity. This is because mammography has a number of limitations that reduce its accuracy. As a result, a mass that resists aspiration or collapses must be assumed to be malignant and biopsied [16].

Conclusion

The current study demonstrates that mammography is an effective method for detecting breast cancer, particularly in areas with limited access and high costs.

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