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Efficacy of Mammography and Biopsy among Breast Cancer Patients in a Quaternary Care Hospital

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ABSTRACT

Breast cancer is one of the leading causes of cancer-related death worldwide. The present study aimed to assess the association between mammography findings and breast biopsy results in clinically suspected breast cancer cases. A total of 250 clinically suspected cases were initially included, of which 102 patients had paired mammography and biopsy data and were included in the comparative analysis. Among these 102 paired cases, 86 (84.3%) were biopsy positive and 16 (15.7%) were biopsy negative. Mammography was positive in 96 (94.1%) cases and negative in 6 (5.9%) cases. The BI-RADS category distribution was also assessed in relation to biopsy findings. The association between mammography BI-RADS category and biopsy result was statistically significant (Pearson's chi-square test, $\chi^2=24.13$, df=5, $p<0.001$). BI-RADS category 4 was the most frequent category among the paired cases. The findings indicate a substantial association between mammographic assessment and biopsy results in this study population.

Keywords: Breast cancer, breast biopsy, mammography

INTRODUCTION

Among non-communicable (NCD) diseases, cancer is considered one of the leading primary causes of death worldwide [1]. The estimate of 2018 showed that the global burden of cancer has risen to 18.1 million [new cases] and 9.6 million death cases. The 5-year prevalence rate of cancer worldwide is estimated to be 43.8 million. According to the cancer incidence rate, lung cancer, female breast cancer, and colorectal cancers bear the top three positions. Among these cancers, one of the cancer that is commonly diagnosed in women is breast cancer. Out of the 185 countries included in GLOBOCAN, 2018, 154 countries reported breast cancer as the most common cancer [2]. Breast cancer has a high incidence rate in developed countries; its relative mortality rate is more in less developed countries [3]. The median age range of breast cancer diagnosis in many of the Asian counties is 45-49 years while Western countries are in the age range of 50-55 years [4-6].

According to the epidemiology of breast cancer in Indian women, it seems to be in the first position [7]. According to GLOBOCAN, one in eight women in India are likely to develop breast cancer in their lifetime [8]. Early detection of breast cancer and getting cancer treatment are the most important strategies to prevent deaths from breast cancer. In Western countries, more than 75% of breast cancers present in stages 1 and 2, resulting in good survival; and there is an ever-increasing number of patients presenting with mammography-detected cancer, with no symptoms. India can achieve this goal only after an aggressive promotion of screening and awareness and proper treatment [9]. This study is aimed to detect the signification of screening of breast cancer in the routine diagnostic framework and try to get an average age range of breast cancer screening, thereby increasing the survival rate of breast cancer patients.

MATERIALS AND METHODS

Study area

The study was carried out at the histopathology and radiology department of a multispecialty hospital in Calicut, Kerala, based on the test done on patients consulted in the hospital and the case history available in the department

Study period

The study was conducted for a period of 6 months.

Sample size

The sample size was determined using the formula $n=4pq/L^2$, where p is the expected prevalence (12%), q is 1-p, and L is the allowable error (6%), giving a minimum sample size of 117. A total of 250 clinically suspected cases were initially included. However, paired mammography and biopsy results were available for 102 patients; therefore, the comparative analysis in this study was restricted to these 102 paired cases.

Study group

The study group comprised 250 clinically suspected patients initially included in the study. Paired mammography and breast biopsy results were available for 102 patients, and these 102 paired cases constituted the dataset for the comparative analysis. Mammography reports were collected from the radiology department and corresponding biopsy results from the histopathology department. The data were analyzed using appropriate statistical methods.

Test results of mammography were collected from the radiology department and the biopsy result of the particular patients was collected from the histopathology department of the hospital. The data were analyzed by using respective statistical methods

RESULTS

Of the 250 clinically suspected patients initially included, 102 had paired mammography and biopsy data and were included in the comparative analysis. These 102 cases were grouped according to mammography and biopsy results into: Group 1, mammogram positive and breast biopsy positive; Group 2, mammogram positive and breast biopsy negative; Group 3, mammogram negative and breast biopsy positive; and Group 4, mammogram negative and breast biopsy negative. Group 1 comprised 82 patients (80.4%), Group 2 comprised 14 (13.7%), Group 3 comprised 4 (3.9%), and Group 4 comprised 2 (2.0%). The majority of paired cases were in Group 1 (Table 1).

Table: 1 Distribution of patients based on mammography and biopsy.

Study group	No.	%
Mammogram +ve, biopsy +ve (Group 1)	82	80.4
Mammogram +ve, biopsy −ve (Group 2)	14	13.7
Mammogram −ve, biopsy +ve (Group 3)	4	3.9
Mammogram −ve, biopsy −ve (Group 4)	2	2.0
Total	**102**	**100.0**

Among the 102 paired cases, 10 patients (9.8%) were below 40 years, 71 (69.6%) were 40–60 years, and 21 (20.6%) were above 60 years. The largest age group was 40–60 years (Table 2).

Table: 2 Based on the distribution of patients with breast cancer in different age groups.

Age group (years)	No.	%
Below 40	10	9.8
40–60	71	69.6
Above 60	21	20.6
Total	**102**	**100.0**

Among the 102 paired cases, 86 (84.3%) were biopsy positive for malignancy and 16 (15.7%) were biopsy negative. Mammography was positive in 96 (94.1%) cases and negative in 6 (5.9%) cases. Among the 6 cases classified as negative on mammography (BI-RADS 0 and 1), 4 were biopsy positive and 2 were biopsy negative. Of the 13 BI-RADS category 2 cases, 7 were biopsy positive and 6 were biopsy negative. Of the 22 BI-RADS category 3 cases, 15 were biopsy positive and 7 were biopsy negative. Of the 26 BI-RADS category 4 cases, 25 were biopsy positive and 1 was biopsy negative. All 19 BI-RADS category 5 cases and all 16 BI-RADS category 6 cases were biopsy positive (Table 3).

Table: 3 The association between Biopsy and Mammogram (n=102)

BI-RADS category	Biopsy +ve, n (%)	Biopsy −ve, n (%)	Total, n (%)	P value
0 & 1 (Negative)	4 (4.7)	2 (12.5)	6 (5.9)	<0.001
2 (Benign)	7 (8.1)	6 (37.5)	13 (12.7)	
3 (Probably benign)	15 (17.4)	7 (43.8)	22 (21.6)	
4 (Suspicious)	25 (29.1)	1 (6.3)	26 (25.5)	
5 (Highly suggestive)	19 (22.1)	0 (0.0)	19 (18.6)	
6 (Known malignancy)	16 (18.6)	0 (0.0)	16 (15.7)	
Total	**86 (100.0)**	**16 (100.0)**	**102 (100.0)**	

Statistical test: Pearson's chi-square test; $\chi^2=24.13$, df=5, $p<0.001$.

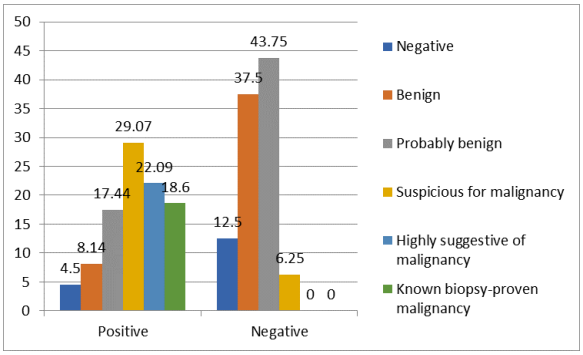


Figure: 3 The association between Biopsy and Mammogram

Mammography results were interpreted according to the BI-RADS categories. BI-RADS 0 and 1 were classified as negative, while categories 2–6 were classified as positive findings of increasing suspicion. Among the 96 mammography-positive cases, 13 were BI-RADS category 2, 22 were category 3, 26 were category 4, 19 were category 5, and 16 were category 6 (Table 4). BI-RADS category 4 was the most frequent category.

Table 4. Distribution of paired cases according to BI-RADS category.

BI-RADS Category	No.	%
0 & 1	6	5.9
2	13	12.7
3	22	21.6
4	26	25.5
5	19	18.6
6	16	15.7
Total	**102**	**100.0**

BI-RADS 0 & 1 = Negative; BI-RADS 2 = Benign; BI-RADS 3 = Probably benign; BI-RADS 4 = Suspicious for malignancy; BI-RADS 5 = Highly suggestive of malignancy; BI-RADS 6 = Known biopsy-proven malignancy.

The association between BI-RADS category and biopsy result was statistically significant (Pearson's chi-square test, $\chi^2=24.13$, df=5, $p<0.001$) (Table 3).

DISCUSSION

Breast cancer is the leading cancer among women. Detection of cancer in an early stage can reduce the rate of mortality due to breast cancer. The data acquired from the hospital were analyzed to get an average age group of patients diagnosed with breast cancer. The result obtained in this study reveals that the average age group of the breast cancer malignancy in both mammography and breast biopsy was 40-60 years. Similar age group incidence was reported in the study conducted among Chinese women by Yu Ji et al. In that study frequent age group of women diagnosed with breast cancer was 55-59 years [10].

In the present study, 102 patients had paired mammography and biopsy results. Of these, 86 were biopsy positive and 16 were biopsy negative. Mammography was positive in 96 cases and negative in 6 cases. Among the mammography-positive cases, BI-RADS category 4 was the most frequent category. Study by Shaomin Hu et al. suggested that BI-RADS categories 5 and 6 were predominant in their study [11]. BI-RADS categories 0, 1, 2 and 3 may show discordant results when compared with histopathology [11]. Patients with family history, presenting symptoms, and a history of breast cancer may need secondary imaging examination [11].

In this study, BI-RADS category 4 showed a high proportion of biopsy-positive cases: 25 of 26 patients were biopsy positive. All 19 patients in category 5 and all 16 patients in category 6 were biopsy positive. Similar observations have been reported in previous studies, in which BI-RADS categories 4 and 5 showed higher positive predictive value for diagnosis than screening indications [12]. Biopsy was considered the reference standard for the diagnosis of breast cancer in this study. The observed association between BI-RADS category and biopsy result was statistically significant.

CONCLUSION

In this study of 102 patients with paired mammography and biopsy data, the largest age group was 40–60 years. BI-RADS category 4 was the most frequent mammographic category, and the association between BI-RADS category and biopsy result was statistically significant. These findings support the value of correlating mammographic findings with histopathological examination in the diagnostic evaluation of clinically suspected breast cancer cases.

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