Original Article

Screening Mammography for Breast Cancer in Women Using Bi-RADS Scores

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Abstract

Background: Breast cancer is third order malignancy in women among other malignancies. Various studies showed that incidence of breast cancer can be lower down by early detection of breast cancer. Mammographic screening is considered more effective modality in detecting early stage breast cancer in women who are at elevated risk for breast cancer. The aim of this study is to report the results of mammographic screening of women based on the Breast Imaging Reporting and Data System (BI-RADS) for breast cancer.

Methods: Five hundred four women aged >40 years with no history of breast cancer, no complaints of breast symptoms during any self or clinical examination were underwent breast cancer screening using MAMMOMATE 1000 (Siemens). Descriptive analysis is performed for imaging finding and risk factors.

Results: The mean age of 504 women was 51±9.18 years. No family history of breast cancer was present in 418 women (82.9%: 95% CI, 79.4-86.1%). No cancer (negative & benign) was found in 469 women (93.1%: 95% CI, 90.47-95.12%) with R1/R2 scores. For breast imaging scores, 71.62% of all women were R1, 21.42% were R2, 2.38% were R3 while 4.58% were R4 and above. No association (P>0.05) was found between BI-RADS imaging scores and risk factors.

Conclusion: In spite of low prevalence of breast cancer in our participants, still there is a need to educate the women at country level about the risk of breast cancer and significance of screening as a tool of early detection of breast cancer.

Keywords: Breast Neoplasm; Breast imaging; Mammography; Screening; BI-RADS

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Introduction

Breast cancer is third order malignancy among all other malignancies and second common cause of deaths due to cancer in women and leading cause of death among women between 40 and 55 years of age, worldwide[1]. In Pakistan 33% women have breast cancer among all types of cancer and 51 out of 1000, 00 women develop breast cancer every year [2]. Many factors can influence a woman's risk of getting breast cancer but the exact cause of breast cancer is still unknown. Doctors are often unable to explain the reason why one woman develops breast cancer and other why not [3]. Chances of developing breast cancer in every woman are different, depending on several factors. Various studies showed that women with certain risk factors, increasing age (age >40 years), personal history of breast cancer, family history, certain breast changes, genes changes, reproductive and menstrual history, breast density, obesity after menopause and lack of physical activity, Previous breast biopsy showing benign conditions, Previous radiation therapy and unbalanced diet are more likely to develop breast cancer than others [4]. Providentially, the death rate due to breast cancer has reduced in recent years in the consequences of better and effective adjuvant treatment [5-7] and early detection of breast cancer [8]. In the US, incidence of breast rose slightly between 1987 and 2001 and then became stable, with some indication of decline through 2003. In contrast, death rates from breast cancer have been falling since 1990 [9]. Now, it is well established that screening and early detection has a significant role in providing advantages to women in reduction the risk of mortality and morbidity associated with breast cancer [10-11]. Various studies showed that

approximately 20% to 40% lives can be saved of women with breast cancer by mammographic screening [12-13]. A Swedish study documented its results as mortality due to breast cancer can be reduced up to 30 % by mammographic screening [14]. According to Laurie Barclay (a well known reviewer) added in his paper "More evidence to justify mammographic screening for breast cancer" that breast cancer death increased on the average 0.30% per annum until widespread screening begun, and then decreased by 1.7% per annum in women aged 55 to 74 years and 1.2% in women aged 45 to 54 years. These results are also supported by two other studies [15-16].

Mammographic Screening for breast cancer is considered advantageous when carry out at recommended intervals [17]. Unfortunately, many women do not receive screening to an equal extent due to financial barriers, lack of awareness and education, being limited physical status, belonging to rural areas, lack of encouragement by Doctors [18-19]. Various studies were conducted in different regions of Pakistan such as Karachi, Lahore Islamabad on Knowledge and awareness about mammographic screening; most of women are not well aware about mammographic screening and risk factors associated with breast cancer [20-21]. The aim of this study was to report the results of mammographic screening of women with breast cancer and to evaluate the association between risk factors and screening findings.

What is Mammography?

A mammogram is simply an x-ray image taken of each breast. The breasts are compressed while the x-ray is taken, to increase the radiologist's ability to see abnormal masses. Mammograms expose the breasts to a relatively small amount of radiation, typically less than 20% of average yearly background radiation [22]. Mammography is of two type, screening and diagnostic, a screening mammography is the standard screening test for breast cancer today. A "screening" exam is a test used for routine check-ups, to make sure that presumably healthy people do not have a specific disease. Other examples of screening tests are colonoscopies to evaluate for colon cancer, or yearly blood tests to evaluate men for prostate cancer. These tests are performed on all people within a certain age group to evaluate for common diseases, so that they can be recognized and treated early. Once a mass is found on a screening mammogram, the patient will often return to have a diagnostic mammogram, which consists of specialized, close-up views of the mass with extra compression. This will help the mammographer better characterize the mass as either benign or malignant.

BI-RADS

Mammographic risk evaluation provides an indication of the odds of women developing breast cancer. A number of mammographic image based classification methods have been developed, such as Wolfe, Boyd, BI-RADS and Tab´ar based assessment [23]. The Breast Imaging Reporting and Data System (BI-RADS) was developed in 1993 by the American College of Radiology (ACR) to standardize mammographic reporting, to improve communication, to reduce confusion regarding mammographic findings, to aid research, and to facilitate outcomes monitoring[24]. Mammographers use the characteristics of a mass to determine whether it looks benign or malignant, and they give it a rating on the BI-RADS (Breast Imaging Reporting and Data System) scale. Table 1 the classification system of BI-RADS. Descriptive analysis is performed for imaging finding and risk factors [25].

Materials and Methods

This is a retrospective and hospital based study of 504 women who attended FMH-Hospital for mammographic screening during year 2008-2009. Data was acquired from women on a pre-designed self administrative questionnaire containing demographic factors like age, family history, and self history. The only inclusive criteria was the disease free (asymptomatic) women aged more than (aged >40) years and only first time the woman underwent the procedure. All women were with no history of breast cancer, no complaints of breast symptoms such as breast pain or tenderness, abnormal nipple, skin change, lump and discharge during any self or clinical examination. The machine used was MAMMOMATE 1000 (Siemens) for breast cancer screening mammography. Screen mammograms were reviewed by two independent radiologists and mammogram findings were scored on 6-points scale using ACR (American College of Radiology) Breast Imaging Reporting and Data System (BI-RADS) and categories are shown in (Table 1). The women who needed further investigation were referred to clinical Lab of FMH-Hospital.

Statistical Analysis

Statistical analysis was carried out using SPSS v-16 (Statistical Package for Social Sciences, V.16, SPSS Inc., Chicago Ill USA), categorical variables were expressed in frequency and percentage, and

Table 1. Bi-RADS Classification System

BI-RADS Category	Assessment	Recommendation(s)
0	Assessment incomplete	Need to review prior studies and/or complete additional imaging
1	Normal	Continue routine screening
2	Benign finding	Continue routine screening
3	Probably benign finding	Short-term follow-up mammogram at 6 months, then every 6 to 12 months for 1 to 2 years
4	Suspicious abnormality	Perform biopsy, preferably needle biopsy
5	Highly suspicious of malignancy	Biopsy and treatment, as necessary.
6	Known biopsy-proven malignancy, treatment pending	Biopsy confirms presence of cancer before treatment begins

Table 2. Demographic characteristics of 504 women

	Factor with description	Frequency (%)
1	Family history of cancer	
	1. Positive family history	82(16.26)
	2. Negative family history	418(82.95)
	3. Unknown	4(0.79)
2	Previous breast surgery	
	1. Yes	28(5.56)
	2. No	472(93.65)
	3. Not known	4(0.79)
3	Age	
	1. <50 years	287(56.94)
	2. ≥ 50 to <60 years	129(25.59)
	3. ≥ 60 years	88 (17.47)
4	Working status	
	1. Housewives	412(81.74)
	2. Workers	92(18.26)

Chi-square test was used to determine the association among categorical variables. Continuous variable (age) was expressed as Mean ± Standard deviation. A $P \leq 0.05$ was taken as statistical significant value.

Results

504 women were enrolled in this study; the demographic characteristics are displayed in table 2. The majority of women (344, 68.25%) were from urban and well-off families. Out of 504 women 412 (81.74%, 95% C.I, 78.10% to 85.0%) were housewives. The mean age of women is 51±9.18 years with range 40- 81 years. According to marital status, almost 98% were married. Eighty two (16.26%, 95% C.I, 13.20% to 19.80%) women were with positive family history, 5.96% (28) had previous breast surgery history. Majority of women (56.94%, 287) were between 40 -49 years ($P<0.05$) (Figure1).

For the BI-RADS scores 284 (56.34%) were R1, 108 (21.42%) were R2, 77 (15.3%) were R3, 22 (4.36%) were R4, 9 (1.78%) were R5 and 4 (0.793%) were R0 (Table 3). The BI-RADS sores were combined as R1R2, R3R0, and R4R5. The reason to combine R1 and R2 was that they were considered benign and no further test were needed. For R3 and R0, the reason was they needed another investigation. For R4 and R5, the rationale was that the suspicion of malignancy was the highest, requiring these women to undergo other tests [26]. No cancer (negative and benign) was found in 392 women (77.77%: 95% CI, 73.90 % - 81.30%) with R1/R2 scores (Table 4). Association between risk factors (increasing age, family history) and BI-RADS scores were measured using Chi-square at 5% level of

significance. Results revealed an insignificant association.

Table 3. Summary of screening mammography results

BI-RADS Category	N(%)
R_0 Incomplete	4 (0.793)
R_1 Normal (Negative)	284 (56.34)
R_2 Benign finding	108 (21.42)
R_3 Probably benign finding	77 (15.3)
R_4 Suspicious abnormality	22 (4.36)
R_5 Highly suspicious of malignancy	9(1.78)

Table 4. Combined BI-RADS scores

BI-RADS	N(%)	95% CI
R_1 R_2	392(77.77)	73.90 to 81.30
R_3 R_0	81(16.07)	13.00 to 19.60
R_4 R_5	30(5.95)	4.10 to 8.40

Discussion

The etiology of breast cancer is uncertain and primary prevention is not possible [27], however positive family history is considered a significant determinant of breast cancer in women of age <60 years [28]. In our study 16.26% women has positive family history which as results reported in article (What are the risk factors for breast cancer?) [29]. Twenty eight (5.56%) women had some previous history of breast surgery, which may cause breast cancer. Majority of women (287, 56.94%) were from age group 40-49 years, similarly supported by other studies [19] but relatively younger age group compared with industrialized countries. The occupation of women might be a risk factor for developing the breast cancer as some studies showed that women attach with agricultural might have association with breast cancer development [30], nevertheless none of our patients was involved in agriculture and majority were housewives. WHO has predicted 10 years ago, that an increase in life expectancy [31] and changing life style due to better socioeconomic conditions are expected to lead an epidemic of breast cancer in developing countries in next coming years. The only prevention from breast cancer is early detection by certain standard procedures, but majority of studies are agreed that early detection is rarely viable because lack of knowledge/awareness regarding Mammography among women or did not feel the need to perform them [32]. Our study revealed that there is no association between risk factors and BI-RADS scores, our results are not supported by other studies. Additionally, in our study women did not demonstrate or show any kind of anxiety [33]. Regarding descriptive epidemiology of breast cancer in Pakistan, environmental factors (poor quality of life, socio-psycho problems due to awful economic conditions, unhealthy environment) are considered as the significant cause of breast cancer rather than genetic factors like other developing countries [34].

Like other studies, our study has a few limitations, including the fact that we had conducted the study in a single centre where the women from relatively upper socioeconomic class come for treatment; women were not followed-up after screening to see any further possible development. Some important risk factors like obesity, personal history of cancer, number of child birth and place of residence. Separate studies should be conducted in younger females to determine the prevalence of breast cancer. Prospective studies are needed to investigate the influence of demographic and clinical factors on barest cancer epidemic.

In conclusion, our findings/results confirm those from previously published reports on mammography screening. Further programs/studies should be conducted so that to explain the differences in effectiveness of mammographic screening between of age < 50 years and those 50 years or older (age ≥50). ACR, s instrument BI-RADS is a very useful tool and helpful in identifying proportion of women with and without breast cancer accurately.

Recommendations

The following recommendations are suggested for physicians, women and wide-ranging public.

- Educational program conducted to all women would be an interesting thing to increase the awareness about breast cancer
- Screening programs should be initiated for all women of any age
- Surveillance program be developed in consultation with women's general practitioner and or specialist this might include regular clinical

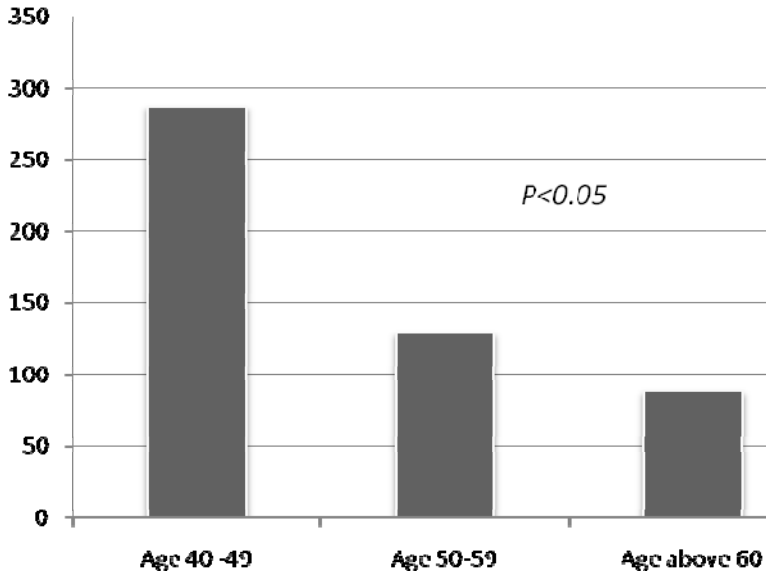

Figure 1. Age distribution of women

breast imaging with mammography and/or ultrasound

- Increase the physician's knowledge about breast cancer and early detection by educational program
- Annual mammograms and clinical breast examinations are recommended for women older than 40 years. Women older than 20 years should be encouraged to do monthly breast self-examinations and women between 20 and 39 years of age should have a clinical breast examination every three years. These guidelines are modified for women with risk factors, particularly those with a strong family history of breast cancer [26].

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Conflict of Interest

The authors have no conflict of interest.

Authors' Contribution

TMM designed, sketched the study and edited the paper, KS collected the data, IAB reviewed the literature and wrote the introduction, IM analyzed the data and wrote the paper.

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