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ORIGINAL ARTICLE

Outcome of Screening Mammography for Women Attending Primary Healthcare Centers: One-Year Review

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Abstract

Background: Breast cancer is the most prevalent cancer in women globally and in the Kingdom of Bahrain. Studies have shown that screening mammography is an effective way to identify early stages of breast cancer in women and has decreased breast cancer mortality. Therefore, determining the outcome of breast cancer screening is essential for proper assessment and improvement of the screening program.

Objective: This study aims to assess the outcome of breast cancer screening by mammography for women attending Primary Healthcare Centers in the Kingdom of Bahrain.

Methods: This is a cross-sectional study of women who had screening mammograms in primary healthcare centers in the Kingdom of Bahrain for one year. The study included 2438 women aged 40 years and older. Data were extracted from electronic medical records.

Results: The most prevalent breast density level was scattered fibroglandular density (55.3%), while extremely dense breasts (5.3%) were the least common. The study showed that 68.3% of the reports were normal, while 31.7% of women were recalled for further imaging. The most common reasons for recalls were nodules/lumps in 34.2%. Additional imaging was done for 69.4% of the cases, while 30.6% of women missed follow-up appointments. Of the patients needing biopsies, the procedure was performed for 62.5% of the women; of these, there were histologically confirmed malignancies in 31.6%.

Conclusion: The breast cancer detection rate in this study is 0.5%. A recall rate of about 32% is higher than in other studies. This study also shows a high percentage of women who didn't follow up for the additional images and procedures requested by radiologists, which needs further studies to identify the

reasons. Educating women on the importance of compliance with the additionally requested workups and close monitoring and follow-up of the screened women by health facilities are crucial for the success of the breast screening program.

Keywords: Breast cancer, Mammogram, Screening, Outcome, Primary care

Introduction

Worldwide, breast cancer is the most common form of cancer among females.[1] Several studies have shown that breast cancer is the most prevalent type among women in the Gulf Cooperation Council (GCC) countries.[2] In Bahrain, breast cancer is by far the most common female cancer and accounted for 40.2% of all incident cancer cases in Bahraini women between 2009 and 2018.[3]

It is widely agreed that screening mammography is an effective means for detecting early stages of breast cancer in women and has decreased breast cancer mortality.[4-5] An USA study identified that eighty-four women between 40 and 84 years needed to be screened annually to save one life from breast cancer.[6] A study conducted in Bahrain showed that 12.7% of breast cancer cases were detected through breast screening.[7]

The American College of Radiology's (ACR) Breast Imaging-Reporting and Data System (BI-RADS) classifies mammographic density into four categories: BI-RADS A for almost entirely fatty breasts found in 10% of women, BI-RADS B for breasts with scattered areas of fibro-glandular density found in 40% of women, BI-RADS C for heterogeneously dense breasts found in 40% of women, and BI-RADS D for extremely dense breasts found in 10% of women.[8] Increased breast density is associated with a greater risk for breast cancer and reduces the sensitivity of mammography to determine changes associated with breast cancer.[9] However, evidence indicates that ultrasound for those with dense breasts detects additional cancers but is accompanied by the possibility of false-positive studies and the need for biopsy.[10]

BI-RADS categories 1, 2, 3, 4, 5, and 6 are used in assessments in final mammography reports and are linked to management recommendations based on evaluating the mammographic features of concern.[8]

Recall rate is defined as the percentage of screening studies for which further workup is recommended by the radiologist.[11] In a study done in Manchester, the recall rate of digital mammography was 4.69%.[12] Another study on Asian women attending screening mammography for the first time identified a recall rate of 7.6%, and breast cancer was detected in 0.5% of cases.[13]

In the Kingdom of Bahrain, no baseline data is available on mammographic screening outcomes, and its cancer detection rate is unknown. Therefore, improvements in the current breast cancer screening program must be based on a thorough understanding of the current outcome, which is the motive behind the undertaking of this study.

Materials and method

Study design

Cross-sectional study.

Setting

In August 2005, Bahrain Cancer Society, in collaboration with Ministry of Health launched National Campaign for Early Detection of Breast Disease in which eligible women were invited to screening mammography. Since 2012, the Ministry of Health has been responsible for the screening.

Mammographic screening at primary healthcare centers targets Bahraini women and wives of Bahrainis aged 40 years and above and it is done biennially. The screening was opportunistic offered to women who attended primary healthcare centers.

Mammograms were performed at Naim and Hamad Kanoo Health Centers by experienced technicians.

The captured images were then electronically sent to Salmaniya Medical Complex (SMC), where specialized radiologists interpreted the films.

The mammography reporting method was based on the morphological features used in BI-RADS classification. Patients with normal results were advised to continue routine screenings. At the same time, those who required additional workup were recalled to SMC for further radiological assessment. They were usually required to undergo additional mammographic imaging and/or an ultrasound evaluation of their breasts. Moreover, women with probably benign findings were advised to further screening within three to six months. Patients with suspicious findings did not have the classic appearance of malignancy but were sufficiently suspicious to justify a recommendation for biopsy.[8] Such cases are referred to the breast clinic in SMC, which is run by a team of specialized doctors, for further assessment and appropriate management.

Sample selection

Breast mammogram reports of women 40 years and older who underwent screening at all primary healthcare centers in Bahrain in 2018 were targeted.

Exclusion criteria

The following reports were excluded: women with breast lumps mentioned in clinical summaries, breast mammograms requested by SMC doctors, women with a history of breast cancer, and images with missing reports.

Sample size

The sample size of this study is 2438 women (after excluding those as per the criteria mentioned above) who underwent screening mammograms between January to December 2018 at Primary Healthcare in the Kingdom of Bahrain. 2018 was selected to ensure that all women with abnormal results were given adequate time for follow-ups and diagnosis. Additionally, electronic medical records needed to be more adequately documented before 2018.

Data collection

Reports of each patient's screening mammogram, acquired from electronic medical records, were compiled into a spreadsheet. It included data such as age, mammogram results, breast density levels, reasons for the recall, type of additional imaging or procedures recommended by a radiologist, outcomes of the recommended imaging and procedure performed, and final diagnoses.

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS 22). In addition, a descriptive analysis was carried out. The responses are displayed in frequencies and percentages with 95% CI.

Results

Our study population's ages ranged between 41 to 90 years, with a mode and median ages of 43 and 53 years, respectively. Bahraini women accounted for 98.7 % of the sample (2406).

Table 1 shows the various types of breast density levels that were analyzed, with scattered fibro-glandular being the most prevalent, accounting for 55.3% (95% CI = 53.4 to 57.3%). In addition to that, heterogeneous density was found in 26.4% (95% CI = 24.7 to 28.2%), fatty breasts were found in 13% (95% CI =11.7 to 14.3%), and lastly, extremely dense breasts in 5.3%, (95% CI= 4.4 to 6.21%).

Table 1: Categories of breast density levels (values are number (%), n=2,438).

Type of Breast Density	Number (%)	95% CI
Fatty Breast	317 (13.0)	11.7 to 14.3
Scattered Fibroglandular Density	1,349 (55.3)	53.4 to 57.3
Heterogeneously Dense	644 (26.4)	24.7 to 28.2
Extremely Dense	128 (5.3)	4.4 to 6.21
Total	2,438 (100)	

Of the 2,438 women screened, 68.3% (1664) of the reports showed normal results, and 31.7% (774) of the cases needed further follow-up. The most common reasons for recalls were: nodules/lumps accounting for 34.2% (95% CI = 30.8% to 37.5%), followed by calcifications in 15.5% (95% CI = 13 to 18%), and dense breast tissue and distorted

parenchymal changes in 13.8% (95% CI= 11.4 to 16.3%) and 9.7% (95% CI= 7.71 to 12.0%), respectively (Table 2).

Table 2: Reasons for recall (values are number (%), n=774)

Reasons for Recall	Number (%)	95% CI
Technically Inadequate	17(2.2)	1.29 to 3.5
Dense Breast Tissue	107(13.8)	11.4 to 16.3
Nodule/Lump	264(34.2)	30.8 to 37.5
Calcification	120(15.5)	13.0 to 18.1
Distorted Parenchymal Change	75(9.7)	7.71 to 12.0
Axillary Lymph Node	12(1.6)	0.8 to 2.69
Others	179(23.0)	20.1 to 26.0

Table 3 shows the types of additional imaging requested for recalled cases. A combination of breast mammographic views and ultrasounds were requested for 43.9% (95% CI = 40.4 to 47.4%), while ultrasound only was ordered for 39.8% (95% CI = 36.3 to 43.2%). Furthermore, additional mammographic views were requested for 16.3% (95% CI= 13.7 to 18.9%) of the recalled cases. All in all, out of the 774 requests, only 69.4% (n=537) (CI 66.1-72.6) of further radiological studies were done.

Table 3: Types of additional imaging requests (values are number (%), n=774).

Types of additional imaging	Number (%)	95% CI
Additional Mammographic View	126(16.3)	13.7 to 8.9
Ultrasound	308(39.8)	36.3 to 43.2
Ultrasound and Mammography	340(43.9)	40.4 to 47.4

Table 4 shows the results of the additional imaging: 51.6%, (95% CI= 47.4 to 55.8%) were normal, 29.4% (95% CI = 25.6 to 33.3%) were probably benign and needed follow-up, whereas 8.6% (95% CI = 6.34 to 11.3%) showed indeterminate results and 10.4 % (56) were suspicious cases and needed a biopsy.

Table 4 : Results of additional imaging (values are number (%), n=537).

Results of additional images	Number (%)	95% CI
Normal	277(51.6)	47.4 to 55.8
Probably benign/ Follow up	158(29.4)	25.6 to 33.3
Indeterminate	46(8.6)	6.3 to 11.3
Suspicious/for biopsy	56(10.4)	7.8 to 13.1

Biopsies were performed for only 38 out of the 56 suspicious cases requiring a biopsy. Out of these, 12 (31.6%) (95% CI=17.5 to 47.7%) were histologically confirmed malignancies, as shown in Table 5. This accounted for only 0.5% of the total women in the study.

Table 5. Biopsy results (values are numbers (%). n=38)

Results of biopsy	Number (%)	95% CI
Benign	26(68.4)	51.3 to 82.5
Malignant	12(31.6)	17.5 to 47.7

Discussion

This study showed that 55.3% of women had scattered fibroglandular breast density corresponding to BI-RADS B, and 26.4% had heterogeneously dense breasts, which corresponds to BI-RADS C, according to the American College of Radiology's Breast Imaging-Reporting and Data System (ACR BI-RADS) for the classification of mammographic breast density. Similarly, a study done in the UAE revealed that 43.4% and 21.5% fell under categories BIRADS B and C, respectively.[14] In contrast, another study conducted in the United States showed that their sample population of women aged 40 to 74 years had higher breast density levels than our study population, where 43% were classified under BIRADS C.[15]

Moreover, this study's recall rate of about 32% is much higher than in other studies, where it ranged between 9% to 23%.[16-17] A regional study in the UAE showed that the recall rate for additional

imaging was only 4.9%.[14] The most common reason for recall in our study was the discovery of nodules/lumps in 34.2% of cases, whereas dense breast tissue accounted for only 13.8%. In a Dutch study where the recall rate was at only 3%, the most common reasons for recalls were the detection of masses at 55.7%, calcifications at 24.7%, asymmetry at 7.4%, architectural distortion at 6.6% and masses with calcifications in 2%.[18]

A recent Cochrane review could not detect controlled studies on supplemental ultrasound screening in women with dense breasts at average risk of breast cancer.[19] The US Preventive Service Task Force highlights insufficient evidence to recommend any adjunctive screening solely on breast density.[20] On the other hand, many studies have shown that adding breast ultrasound results in identifying mammographically occult breast cancers.[10] A systematic review concluded that the addition of breast ultrasound in the case of dense breast tissue increases screen detection rates by an average of 40% compared to the detection rate from mammography screening.[21] The total number of breast cancer cases in this study (12) is too small to correlate with the type of breast density in the screened women.

This study showed that 51.6% of the cases, which underwent additional imaging, were normal, and the remaining 48.4% needed further follow-ups. The regional research done in the UAE showed that only 0.3% of the additional imaging results were abnormal and fell under BIRADS 4 and 5, while the remaining cases showed benign changes that warrant routine screening.[14]

In this study, only 69.4% of women underwent the recommended additional images, much lower than reports by the Ministry of Health in Taiwan, in which 92.3% of cases with positive initial breast screening conducted follow-up examinations.[22] Thus, the reasons for the high rate of women in this study (30.6%) who did not undergo the recommended additional imaging need to be explored.

Breast cancer is detected in 0.5% of all screened women in this study, which aligns with the results of a study targeting the Asian population of women attending screening mammography for the first time.[13] The cancer detection rate in this study might have been affected by the many women who failed to undergo the recommended additional imaging and/or biopsy.

Limitations

The limitations of this study were that some demographic data risk factors of breast cancer were not readily available on the electronic records. Moreover, no information was available on women who might have followed up for additional imaging at other healthcare facilities.

Conclusion and Recommendations

This study has shown that the most common breast density level found with screening mammography is scattered fibroglandular breast density, which corresponds with BI-RADS B, and the breast cancer detection rate in the screened women was found to be at 0.5%. Additionally, the recall rate was higher than in other studies at 31.7%. While the high rate of 30.6% of women, who did not undergo the additional requested imaging, necessitates further studies to explore the underlying reasons.

Women's education on the importance of compliance with the additionally requested workups is essential for the early detection and management of breast cancer. In addition, a comprehensive follow-up system by health facilities to ensure that all screened women are adequately managed is crucial for the success of the screening program.

Further research is needed to estimate the number of breast cancer cases that developed in the sample population (cancer interval) after this study period. Also, the role of additional imaging in the detection of breast cancer is yet to be investigated further.

Conflict of Interest

The authors of this study have no conflict of interest to declare.

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