Original Article

Mammography uptake among the female staff of King Saud University

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Abstract

Background: Breast cancer is having a major impact on women's health worldwide. Early detection is the best defense against the associated morbidity and mortality of the disease. **Objectives:** To assess the level of mammography uptake among working Saudi women and identify the obstacles and barriers that negatively affect it. In addition, to identify the most effective sources of breast-cancer-related information and early detection screening. **Method:** We conducted a cross-sectional study of women employees of King Saud University aged 40 years and above on March–May 2015 using a self-report questionnaire. **Results:** A total of 229 participants were recruited from the female staff of King Saud University. Of the participants, 34% were aged 41 years or above, approximately 66% were married, 53.3% had a bachelor's degree, and 61.1% worked as administrators; further, 64.6% had a history of breastfeeding. The rate of mammography uptake was 51.5%. Univariate logistic regression indicated that age, education, and being single predict the rate of mammography uptake. However, multivariate logistic regression indicated that earlier age significantly predicts a higher risk of a low rate of mammography uptake. The main obstacle negatively affecting mammography uptake was ineligible criteria (21.8%). The main sources of information regarding breast cancer were awareness campaigns and television and radio (45.4% and 43.7%, respectively). **Conclusion:** The participants' rate of mammography uptake, awareness of mammograms, the risk factors, and signs of breast cancer were low. To improve breast-cancer mortality rates in Saudi Arabia, earlier detection of breast cancer through increasing awareness of mammograms is of paramount importance.

Keywords: Female University Staff, mammography, Saudi Arabia

Introduction

Breast cancer is the most prevalent cancer among women in both developed and developing countries.[1,2] Further, in US, breast cancer is the second leading cause of death, following lung cancer.[1] As a result of increases in life expectancy, urbanization, and inappropriate lifestyles, developing countries are reporting higher rates of increase in the incidence of breast cancer.[3] According to the World Cancer Research Fund International, there were approximately 14.1 million cancer cases worldwide in 2012, and this number is expected to increase to 24 million by 2035.[4] Over two million cases of breast cancer are diagnosed annually worldwide,[5] and the number of diagnosed cases among Arab women (including Saudi women) has been rising in recent years.[6] In comparison to western countries, the diagnosis of breast cancer in most Arab women is at more advanced stages and earlier ages. However, in spite this increase in the incidence of breast cancer among Arab women, although Saudi Arabia provides free health services, participation rates in screening activities in Saudi Arabia remain low.[7,8]

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Investigating levels of breast cancer screening uptake in four Gulf Cooperation Council States, Kuwait, Oman, Saudi Arabia, and United Arab Emirates (UAE) reviled low uptake. The percentages of women aged 40–75 years who had a mammogram were 4.9% in Saudi Arabia, 8.9% in Oman, 13.9% in the UAE, and 14.6% in Kuwait. Marital status, wealth, education, nationality, and place of residence are associated with screening uptake, with the lower educated, poor, and unmarried having the lowest percentages of uptake.[9]

Breast cancer is the most common cancer among females in Saudi Arabia.[10] Further, in 2010, breast cancer was the ninth-most common cause of death among Saudi women,[11] and the median age at diagnosis was 50 years.[12]

Through conducting a comparison between women from the eastern region of Saudi Arabia and their American peers, Rudat found that the diagnosis of breast cancer among Saudi women was at a younger age <50 years for most women, in comparison to just 12.5% of the American females and at later stages.[13] In addition, a 2015 report revealed a high rate of noncompliance with breast-cancer screening measures (89%) in Saudi Arabia.[8] The available Saudi cancer statistics, along with the projected population growth and aging lead to the belief that the incidence rate of breast cancer in Saudi Arabia is expected to increase in the coming years.[14]

Increasing women's awareness of breast cancer is a crucial means of early prevention and treatment. Improving women's ability to distinguish between normal and abnormal breasts, their ability to recognize symptoms, and their knowledge of the appropriate periods in their life to undergo mammogram screening may contribute to increased early detection of breast cancer. Early diagnosis of breast cancer using screening methods is the best defense against the morbidity and mortality of the disease[15,16]; previous studies have shown that mammographic screening can reduce morbidity and mortality by 23%.[7] Thus, higher awareness can lead to more effective treatment, higher survival rates,[17] and lower rates of late-stage breast cancer.[18] Comparisons between mammography and other breast-cancer-detection methods have shown mammography to undoubtedly be the most effective technique in this regard.[19] However, women who receive frequent mammographies in proper time have a decreased risk of mortality when compared to women who forgo mammography.[20]

In a similar vein, a study conducted in Jeddah, Saudi Arabia, reported that the level of breast-cancer awareness differs with age, level of education, and marital status.[21] Further, a study conducted in the United Arab Emirates showed that females younger than 49 years have better awareness scores than do females older than 49 years and that a higher level of education is positively associated with a higher level of awareness.[22]

There have been few Saudi-Arabia-based studies regarding breast-cancer-related attitudes, knowledge, and practices; consequently, in this study, we aim to assess the level of Saudi Arabian women's mammography uptake and to identify the obstacles and barriers that negatively affect their intention to undergo such examination. Further, we also seek to identify the most effective sources of information regarding breast cancer and early detection screening.

Method

To perform our examination, we chose to conduct a cross-sectional study, using women aged 40 years and above as our participants on March–May 2015. All of these women were sourced from employees of King Saud University, and the inclusion criteria were never having undergone mastectomy, not being pregnant or lactating, and not having had a mammogram in the previous year. We determined the ideal sample size using the Raosoft electronic sample-size calculator,[23] in which we applied a confidence level of 95% and a margin of error of 5%, estimated that the number of female staff in the university as 4,000, and set the response distribution at 30%. This returned a recommended sample size of 299.

For this study, a self-report questionnaire was created in the Arabic language, and a mobile mammography unit was stationed in a convenient place at the primary care clinic on the campus, offering a free service to participants who accepted an offer to undergo a mammogram. The questionnaire obtained socio-demographic data regarding age, education level, occupation, and marital status; inquired into the media through which participants obtained information regarding breast-cancer disease and early detection screening; determined the participants' parity, previous breastfeeding practices, and family history of breast cancer; recorded whether the participants accepted the mammography appointment; and ascertained factors affecting participants' decisions to undergo mammography. Questions were primarily closed-ended with multiple responses; however, there were some open-ended questions that allowed comments.

Before commencing the survey, five experts (a family physician, an epidemiologist, an oncologist, a surgeon, and a radiologist) reviewed the questionnaire, validating it and analyzing whether it could be further improved.

Trained medical students approached on a face-to-face basis in their offices randomly selected potential participants from a database of university employees and asked them to complete the questionnaire. Three hundred and thirty women were approached. For those who agreed, before beginning the questionnaire, informed consent was obtained. The medical students then offered the participants the choice of making an appointment for a mammogram with the mobile mammography unit.

Data collection

A pilot study was conducted on 30 participants to test the clarity and feasibility of the developed tool, obtain logistics, and gather information before the main study; this information was used

to improve the quality and efficiency of the main survey. The participants who were included in the pilot study were excluded from the main study. The Cronbach's alpha of the questionnaire was 0.71, indicating good reliability.

Data analysis

Data were analyzed using the Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Categorical variables were expressed as percentages and were analyzed using a Chi-square test. Univariate and multivariate logistic regression analyses were used to assess the relationship between participants' characteristics and the low rate of mammography uptake. *P* values of < 0.05 were considered to indicate statistical significance.

Ethical considerations

Ethical codes of conduct were strictly adhered to at all stages of the project, and all information sourced from participants in the study remained strictly anonymous and confidential. This project was approved by the Institutional Review Board of the College of Medicine, King Saud University (Research project No. E141311) on 03 Nov 2014.

Table 1: Participants' attitudes towards mammograms versus their actual uptake of mammograms

Attitude	N[%] 229 [100%]	Underwent mammogram		*P*
		Yes 43 (18.8)	No 186 (81.2)	
Positive	118[51.5]	42 (35.6)	76 (64.4)	0.0001
Negative	111[48.5]	1 (0.9)	110 (99.1)	

Results

A total of 229 female staff from King Saud University agreed to participate in the study. Among these participants, 51.5% reported intending to undergo mammography; however, only 18.8% actually received a mammogram [Table 1].

Table 2 summarizes the characteristics of the study population and indicates for each characteristic the numbers who intended to and who actually underwent mammography. Overall, 34% of the participants were aged 41 years or above; the age groups of 46–50 and 41–45 years showed the highest intention to undergo mammography (74.5% and 72.7%, respectively). Approximately, 65% of the respondents were married, and the majority were Saudi and living in Riyadh. Over half of the participants had a bachelor's degree (53.3%), and approximately, 20% were employed as administrators. Higher age was associated with a higher likelihood of accepting an appointment for and undergoing mammography ($P < 0.001$). Compared to the other groups, less-educated participants were more likely to accept and keep their appointments ($P < 0.01$). Administrators were the least likely to undergo mammograms ($P < 0.04$). In addition, regarding marital status, single women were the least likely to undergo a mammogram ($P < 0.007$).

Table 3 shows the rate of intention to undergo and the actual undergoing of mammography among the participants in terms of parity, breastfeeding history, and family history of breast cancer. This table shows that higher parity and more recent breastfeeding are associated with higher rates of intention to undergo and actual undergoing of mammography ($P < 0.001$). However, family history of breast cancer did not show a statistically significant difference

Table 2: Demographic characteristics versus attitudes towards and actual practice regarding the mammograms

Characteristics	*n* [%] 229 [100]	Intended to undergo a mammogram *n* (%) 118 (51.5)*	Actually underwent a mammogram *n* (%) 43 (18.8)**	*P*
Age in years				
<35	109[47.6]	35 (32.1)	1 (0.9)	*0.001
36-40	40[17.5]	24 (60.0)	12 (30.0)	**0.001
41-45	33[14.4]	24 (72.7)	10 (30.3)	
46 +	47[20.5]	35 (74.5)	20 (42.6)	
Educational level				*0.004
Below secondary level	25[10.9]	21 (84.0)	10 (40.0)	**0.01
Secondary school	48[21.0]	26 (54.2)	8 (16.7)	
Bachelor's degree	122[53.3]	57 (46.7)	17 (13.9)	
Master's & PhD	34[14.8]	14 (41.2)	8 (23.5)	
Occupation				*0.2
Faculty	29[12.7]	12 (41.4)	8 (27.6)	**0.04
Medical professional	15[6.6]	10 (66.7)	4 (26.7)	
Administrator	139[60.7]	68 (48.9)	18 (12.9)	
Other	46[20.1]	28 (60.9)	13 (28.3)	
Marital status				*0.4
Single	52[22.7]	19 (36.5)	2 (3.8)	**0.007
Married	149[65.1]	84 (56.4)	34 (22.8)	
Divorced/widowed	28[12.2]	15 (53.6)	7 (25.0)	
Nationality				
Saudi	210[92.1]	110 (52.4)	39 (18.6)	*0.34
Non-Saudi	18[7.9]	8 (44.4)	4 (22.2)	**0.45

Table 3: Parity, breast feeding history, and family history of breast cancer versus attitudes toward mammograms

Variables	*n* [%] 229 [100]	Intended to undergo a mammogram *n* (%) 118 (51.5)*	Actually performed a mammogram *n* (%) 43 (18.8)**	*P*
Parity				
0	68[29.7]	26 (38.2)	3 (4.4)	*0.0001
1	33[14.4]	14 (42.4)	6 (18.2)	**0.0001
2-3	43[18.8]	20 (46.5)	8 (18.6)	
4-5	50[21.8]	29 (58.0)	11 (22.0)	
>5	35[15.3]	29 (82.9)	15 (42.9)	
Breastfeeding history				
Nil	81[35.4]	30 (37.0)	4 (4.9)	*0.002
<6 months	81[35.4]	42 (51.9)	16 (19.8)	**0.001
6 months-1 year	42[18.3]	29 (69.0)	15 (35.7)	
>1 year	25[10.9]	17 (68.0)	8 (32.0)	
Family history of breast cancer				
Nil	172[75.1]	83 (48.3)	33 (19.2)	*0.13
First degree	34[14.8]	19 (55.9)	5 (14.7)	**0.7
Others	23[10.0]	16 (69.6)	5 (21.7)	

Table 4: Attitudes towards and actual uptake of mammogram versus sources of information regarding breast cancer

Source	Frequency (n%)	Intended to undergo a mammogram	Actually underwent a mammogram	*P*
World Health Organization	8 (3.5)	4	2	
Ministry of Health's website	23 (10.0)	13	3	
Television and radio	100 (43.7)	54	21	
Newspaper	68 (29.7)	42	13	
Awareness campaigns	104 (45.4)	57	24	
Physician	18 (7.9)	10	7	0.02
Friends and colleagues	48 (21.0)	27	9	
Twitter	25 (10.9)	11	4	
Facebook	3 (1.3)	2	1	
WhatsApp	22 (9.6)	12	5	

Table 5: Obstacles and barriers negatively affecting mammography uptake

Obstacles and barriers	Number	%
Too busy to undergo screening	7	3.1
Psychologically unprepared	13	5.7
Non-applicability of criteria	50	21.8
Fear of embarrassment during screening	1	0.4
Fear that x-rays have an effect on the breast and body	2	0.9
Feeling that the examination takes a long time	1	0.4
Fear that disease will be detected	3	1.3
No confidence in the breast-cancer examination	1	0.4
Other	13	5.7

in this regard. Among the participants, the breastfeeding rate was 64.6% and the percentage of those with a family history of breast cancer among first-degree relatives was 14.8%.

Table 4 displays participants' sources of information regarding breast cancer, with awareness campaigns, television and radio, and newspapers representing the most common sources of information (45.4%, 43.7%, and 29.7%, respectively). Only 7.9% attributed their knowledge to doctors; interestingly, these participants were more likely to keep their appointments and undergo mammography than were the other groups ($P < 0.02$).

Table 5 shows the obstacles and barriers that negatively affect mammography uptake, with ineligible criteria representing the highest obstacle (21.8%).

The results of the univariate and multivariate logistic regression analyses of the participants' characteristics and causes of a low rate of mammography uptake are shown in Table 6. The univariate logistic regression indicated that earlier age, university education or above, and single marital status predict a significantly higher risk of a low rate of mammography uptake. However, after multivariate logistic regression, only earlier age continued to indicate a significantly higher risk of a low rate of mammography uptake.

Discussion

Mammographic screening is an essential component of the early diagnosis of breast cancer. However, several studies have reported that although mammography is provided free of charge in many countries, women tend to forgo mammogram screening.[8,24-26] In this study, we found that 51.5% of the female staff of King Saud University was willing to accept a mammography appointment, but that the actual mammography uptake was just 18.8%. This low uptake was below our expectation, but similar to that found in a previous study of the general population of women in

Table 6: Results of the univariate and multivariate logistic regression analyses of the participants' characteristics and causes of a low rate of mammography uptake

	Univariate logistic regression			Multivariate logistic regression		
	OR	**95% CI**	***P***	**OR**	**95% CI**	***P***
Age						
Age ≤35 y	4.75	2.72-8.29	< 0.001*	4.39	2.26-8.50	<0.001*
Age >35#	1			1		
Educational level						
University or above	2.09	1.18-3.71	0.012*	1.85	0.94-3.64	0.076
Secondary or less#	1			1		
Marital status						
Single	2.21	1.15-4.23	0.017*	1.04	0.49-2.20	0.913
Married#	1			1		
Nationality						
Saudi	0.65	0.24-1.78	0.401			
Non-Saudi#	1					
Family history of breast cancer						
Yes	0.59	0.32-1.08	0.087			
No#	1					

*Significant *P* (*P*<0.05), #Used as a reference

Saudi Arabia 17.9%.[27] It is also similar to the findings from other countries where the female university staff mammography uptake were (23%).[28]

Our analysis found that higher age was associated with a higher acceptance of mammography appointments ($P < 0.001$). Further, women with lower levels of education were more likely to keep their appointments and undergo screening ($P < 0.01$); in contrast, women who held an administrative position were the least likely to keep their appointments and undergo mammograms ($P < 0.04$). Regarding marital status, single women were least likely to undergo a mammogram ($P < 0.007$). These findings are comparable to several previous studies. For instance, a study conducted in Spain similarly reported a higher tendency to undergo mammography among participants who were married and a lower commitment to appointments among the youngest age group studied (40–49 years); however, in contrast to our findings, this study also reported a higher mammography tendency among participants with higher education and income levels.[29] In addition, contrasting with our findings, a Taiwan-based study reported that women with lower socioeconomic status were least likely to undergo cancer screening, which is surprising considering that cancer-screening services are provided free of charge in that country.[30] A cross-sectional study conducted in Riyadh (similar to the present study) showed a statistically significant association between marital status, level of education, family history of breast cancer, and mammography, which partly accords with our findings; this study also reported that the married females examined had better knowledge regarding mammography than did the single females.[31] A study conducted in Italy showed a positive association between higher levels of education and mammogram uptake, which again contrasts with our findings.[25] Further, in this Italy-based study, after comparing the occupational levels of women and their acceptance of mammograms, women with intermediate and high occupational levels were found to be more likely to undergo breast-cancer screening, with women in the highest occupational levels is most likely to undergo cervical cancer screening; this again contrasts with our findings. In addition, compared to more advantaged women, women with lower levels of education and occupation were more likely to attend organized screening programs than to receive screening under their initiative.[25]

Our results showed that higher parity and breastfeeding history were associated with a higher intention to undergo, and actual uptake of, mammography among our participants ($P < 0.001$). Overall, 64.6% of the participants had performed breastfeeding at some point in the past. In the Gulf Cooperation Council Countries, the exclusive breastfeeding rates were suboptimal in spite the implementation of a "baby-friendly" hospital initiative.[32]

In our study, 14.8% of the women had a family history of breast cancer among first-degree relatives. However, a family history of breast cancer did not show a statistically significant difference in this regard. In contrast to the previous study that a woman's risk of developing breast cancer nearly doubles if she has a first-degree relative diagnosed with breast cancer.[33]

Knowledge and awareness regarding breast cancer and its associated risk factors are worryingly low in Saudi Arabia. Two previous studies conducted in Tabuk and Taif, respectively, concluded that women have inadequate knowledge and awareness.[34,35] Among our participants, awareness campaigns, television and radio, and newspapers represented the highest sources of information (45.4%, 43.7%, and 29.7%, respectively). Only 7.9% of our participants attributed their knowledge of mammograms to doctors, and these participants were more likely to keep their appointments and undergo mammograms when compared to the other groups ($P < 0.02$). This finding

strongly indicates that doctors and their teams should continue to advise eligible women to undergo mammographies. Medical records, particularly electronic ones, can notify doctors of overdue preventive procedures, including mammographies. Our findings in this regard conform with those of a previous study, which reported that doctors and the media influence, the awareness and information regarding breast-cancer screening for most women.[36]

Primary care is the optimal setting for health promotion and disease prevention. The primary care team lead by a family physician and supported by health decision-makers should not miss the opportunity to check the women's mammographic records and emphasize the importance of such a procedure for women attending their clinics for whatsoever reasons. Furthermore, the primary care center can send a reminder to eligible women and follow-up defaulters. Fully integrated health education campaigns and awareness programs into the health system can ensure women use services that are available to prevent breast cancers.[37,38] A previous study showed that high levels of Primary Care Physician interaction result in improvements in longitudinal screening mammography adherence.[39] Other studies highlighted barriers such as organizational (e.g. screening hours coinciding with work hours, screening facilities located far away)[40] and lack of perceived need and cost[41] that may limit participation. One of the vital principles of primary care is to ensure equity and reduce disparity in health services coverage, including preventive measures such as mammography.[42]

We identified several obstacles and barriers that negatively affect mammography uptake; these included embarrassment, low confidence in radiologists, a lack of coping skills regarding results, and a fear of pain during the process. However, the most prominent barrier was the non-applicability of criteria (21.8%). A study conducted in Jordan highlighted similar barriers but also identified a lack of support from others and religious reasons.[43] Religiously-tailored messages provide an opportunity for addressing barriers to preventive health in a theologically consonant way.[44] Ameta-analysis of breast-cancer-screening indicates that several of the barriers we identified are cross-cultural.[45]

Low knowledge regarding cancer and early detection methods negatively impact women's participation in cancer screening.[46] Moreover, health beliefs strongly affect compliance with breast-cancer-screening measures.[47,48] Furthermore, female healthcare workers who understand the benefits of mammography and those who believe they are susceptible to breast cancer are most likely to undergo breast screening.[49]

Health belief model studies can help understand related health behaviors[50] and obtain an in-depth understanding of Saudi women's delay regarding help-seeking leading to late diagnosis and poor survival.[51] With the expected increase in the incidence of breast cancer in Saudi Arabia in the coming decades, early diagnosis is critical and can play a significant role in cancer control.[17,52]

Emphasizing on previous researchers' recommendation, future research should highlight help-seeking behavior enhancement in Saudi communities[53]; how to improve early detection for life-threatening cancers?[54]

Conclusion

In conclusion, the present study found that the study participants' awareness of mammograms, risk factors, and signs of breast cancer, and breast-cancer prevention measures were low. Earlier detection of breast cancer through increasing awareness of breast cancer on an institutional, societal, and governmental level is of paramount importance for achieving early detection and an overall better breast-cancer mortality rate in Saudi Arabia and worldwide.

Limitations of the study

There is some limitation to our study, as with any other study. The findings of this study cannot be generalized, as all of the participants were from a single university. Hence, it is advisable to recruit more universities and from all regions of Saudi Arabia. In spite these limitations, we believe that this study can improve knowledge, attitude, and practice toward breast cancer screening among working women.

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Conflicts of interest

There are no conflicts of interest.

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