ORIGINAL RESEARCH

Perceived Barriers and Facilitators to Breast Cancer Screening Among Women in Saudi Arabia

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Background: According to the World Health Organization, by the end of 2020, an estimated 7.8 million people was living with breast cancer diagnosed between 2015 and 2020; in Saudi Arabia, more than fifty percent of cancer cases are detected in late stages, which results in increased mortality rates and reduces the chances of remission. Breast cancer screening using mammography in women fifty years and older worldwide and in women forty years and older in Saudi Arabia shows a significant decrease in morbidity and mortality. However, screening rates are not satisfactory and require further investigation.

Methods: This cross-sectional study included women aged 40 years and older. Data was collected through an online survey distributed via social media platforms to all regions of Saudi Arabia. Chi-square and Fisher's exact tests were used to examine the difference in the distribution of study variables among women who had received breast screening and those who had not. A logistic regression model was used to estimate the risk of not having breast cancer screening.

Results: A total of 973 participants completed the survey. Among respondents, 476 (48.9%) had been screened at least once in their lifetime. The main motivators for screening were: receiving an advice from a physician (41.8%), interest in early detection (39.8%), and receiving free mammography (29.7%). On the other hand, the main barriers to receiving breast cancer screening were: finding screening unnecessary (24.2%), believing screening to be painful (22.1%), and fearing abnormal results (18.6%).

Conclusion: We found that nearly half of the targeted screening group had never received mammography screening. These results warrant urgent attention, as early detection is key to better outcomes. Our study's results aid in better understanding the public's points of view and inform interventions to improve breast cancer.

Keywords: breast cancer, barriers, mammography screening, facilitators

Background

According to the World Health Organization, by the end of 2020, an estimated 7.8 million people were living with breast cancer diagnosed between 2015 and 2020. Globally, the confirmed death toll was 685,000 people in 2020.[1] In Saudi Arabia, breast cancer cases documented in 2020 accounted for 14.2% of all cancer cases and 29% of all cases in women. Breast cancer consistently ranks as the most common type of cancer in Saudi women, with 3954 patients in 2020 alone. Of those patients, 1095 died, making breast cancer the second most common cause of cancer-related death in Saudi Arabia that year.[2]

Worldwide, breast-cancer screening guidelines differ, as the United Kingdom National Screening Committee (UK NSC) and the United States Preventative Services Task Force (USPSTF) recommend starting screening at fifty years old, using mammography imaging.[3,4] Whereas, in Saudi Arabia, the recommended starting age is 40 years old, as breast cancer is a leading cause of female mortalities and is the most common cancer among Saudi women, accounting for 31.8% of all registered cancers in women in Saudi Arabia.[5,6]

A leading measure taken by the Ministry of Health in Saudi Arabia to reduce the prevalence of advanced disease is providing free breast cancer screening for all women aged 40 years old and above.[5] Screening and early detection reduce

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morbidity and mortality rates among breast cancer patients.[7] Even with such measures, screening rates were still on the lower side, as shown by a study conducted by El Bcheraoui that found that 92% of women had never had mammography screening, and 89% had not had a clinical breast exam in the previous year.[8] A 2020 study by S.A. Alsareii showed poor knowledge regarding breast cancer warning signs, especially among women with risk factors.[9]

Some studies in Saudi Arabia show that many abstain from routine mammography screening, even with the above-mentioned measures.[8,10,11] These numbers and results need to be examined further to understand the underlying issues behind this abstention and to determine factors that might aid in increasing the number of screened individuals.

This study aims to understand the barriers and motivators to breast cancer screening as perceived by women in Saudi Arabia. Understanding the population's perceived barriers and motivators may aid in providing a better clinical approach to women over 40, targeting those barriers in health promotion campaigns, and soliciting the motivators to increase the number of screened individuals.

Methods

This study was undertaken after receiving ethical approval from the Imam Abdulrahman bin Faisal University Institutional Review Board (IRB), Dammam, Saudi Arabia (approval number IRB-2021-01-180). This study complies with the Declaration of Helsinki, and the participants' written consents were obtained after they were provided with information regarding the study's objective and assured that their information would be kept anonymous and secure. Participants were not forced to participate; they were not approached individually or offered anything in exchange for participation.

This study was an online survey-based study conducted in Saudi Arabia, Eastern Province. Data collection was done between August 2021 and January 2022. Our study included women aged 40 years and older who were residents of Saudi Arabia, had access to the Internet, and were willing to participate in the study. We excluded responses from women aged 39 and under and women living outside Saudi Arabia.

The bespoke questionnaire we used was in Arabic and distributed online using the QuestionPro platform and was distributed via social media platforms, including Twitter, WhatsApp, and Telegram.

The questionnaire contained 42 questions divided into seven parts. The first part covered pregnancy history (marital status, number of children, age at pregnancy, breastfeeding). The second part aimed to gain information about participants' menstrual cycle details (use of contraceptives, type of contraceptives used, age of menarche, still menstruating?). The third part asked about participants' past medical history, surgical history, family history, and prescription medications used regularly. The fourth part was about mammogram screening (previous mammograms, timing of previous mammograms, reasons for obtaining screening, whether fine needle aspiration was done, number of past mammograms, history of radiation therapy, history of chemotherapy). The fifth part aimed to gain details about family history (breast cancer in the family, which generation, maternal or paternal side, colon cancer history in the family, pancreatic cancer history in the family, ovarian cancer history in the family, other types of cancer, having any new complaints, family history of positive BRACA 1 and BRACA 2 genes). The sixth part aimed to understand the barriers to receiving a mammogram screening test (smoking, weight, height, barriers, and motivators). The last part covered participants' demographics (nationality, place of residency, age, job description, and level of education).

Data were analyzed using IBM SPSS Statistics for Windows, Version 23.0.0.0 (released 2015; IBM Corp., Armonk, New York, United States). Chi-square and Fisher's exact tests were used to examine the difference in the distribution of study variables among women who had received breast screening and women who had not. A logistic regression model was used to estimate the risk of not having breast cancer screening. Adjustment of the logistic models involved variables that showed significant statistical results in the univariate analysis. A P-value of less than 0.05 was considered significant during the analysis.

Results

The total number of included participants was 973. The majority of our participants were in their 40s (n=586, 60.2%), unemployed (n=559, 57.5%), having a bachelor's degree (n=570, 58.6%), married (n=781, 85.1%), and Saudis (n=835, 85.8%) (see Table 1).

Table 1 The Distribution of Participants Individual Characteristics in Relation to Their Breast Screening Status

Variables	Received Screening		Did Not Receive Screening		Total		X^2	df	p-value
	N=476	%	N=497	%	N=973	%			
Age									
40–45	108	22.7	255	51.3	363	37.3%	98.85	5	<0.001
46–50	116	24.4	107	21.5	223	22.9			
51–55	128	26.9	67	13.5	195	20.0			
56–60	89	18.7	39	7.8	128	13.2			
61–65	27	5.7	21	4.2	48	4.9			
>65	8	1.7	8	1.6	16	1.6			
Occupation									
Employed	191	40.1	223	44.9	414	42.5	2.24	1	0.135
Unemployed	285	59.9	274	55.1	559	57.5			
Degree									
Diploma or below	193	40.5	210	42.3	403	41.4	0.29	1	0.589
Bachelor or above	283	59.5	287	57.7	570	58.6			
Marital status									
Married	414	87.0	414	87.0	828	85.1	2.59	1	0.108
Non-married	62	13.0	83	16.7	145	14.9			
Region									
Central	152	31.9	143	28.8	295	30.3	48.19	4	<0.001
Western	28	5.9	44	8.9	72	7.4			
Eastern	275	57.8	224	45.1	499	51.3			
Northern	9	1.9	33	6.6	42	4.3			
Southern	12	2.5	53	10.7	65	6.7			
Nationality									
Saudi	413	86.8	422	84.9	835	85.8	0.69	1	0.407
Non-Saudi	63	13.2	75	15.1	138	14.2			
BMI									
=< 18.5	2	0.4	2	0.4	4	0.4			0.21*5
18.6–24.9	84	17.6	103	20.7	178	19.2			
25.0–29.9	224	47.1	201	40.4	425	43.7			
≥ 30.0	166	34.9	191	38.4	357	36.7			

(*Continued*)

Table 1 (Continued).

Variables	Received Screening		Did Not Receive Screening		Total		X^2	df	p-value
	N=476	%	N=497	%	N=973	%			
Smoking									
Currently Smoker	40	8.4	32	6.4	72	7.4	2.67	2	0.264
Never smoked	426	89.5	459	92.4	885	91.0			
Ex-smoker	10	2.1	6	1.2	16	1.6			
Age of menarche									
< 11 years	68	14.3	66	13.3	134	13.8	0.50	2	0.78
12–13 years	274	57.6	297	59.8	571	58.7			
>13 years	134	28.2	134	27.0	268	27.5			
Age of first child									
< 20 years	117	25.8	96	22.0	213	24.0	5.77	3	0.12
20,24 Years	181	40.0	172	39.4	353	39.7			
25,30 years	98	21.6	122	28.0	220	24.7			
>30 years	57	12.6	46	10.6	103	11.6			
Menopause	235	49.4	122	24.5	357	36.7	64.49	1	<0.001
History of chronic diseases	172	36.1	236	47.5	408	41.9	12.86	1	<0.001
Family history of Breast cancer	123	25.8	67	13.5	190	19.5	23.64	1	<0.001
Family history of Breast Pancreatic cancer	20	2.4	17	3.4	37	3.8	0.41	1	0.524
Family history of Ovarian cancer	20	4.2	10	2.0	30	3.1	3.90	1	0.48
History of gene mutation (BRCA1, BRCA2) in the family	7	1.5	2	0.4	9	0.9			0.22*
Medications use	231	48.5	170	34.2	401	41.2	20.59	1	<0.001
History of breast plastic surgery	33	6.9	9	1.8	42	4.3	15.44	1	<0.001
History of breast feeding	328	72.4	296	67.9	624	70.2	2.26	2	0.32
History of hormonal contraceptive	297	62.4	241	48.5	538	55.3	19.72	2	<0.001

Note: *pvalue came from Fisher exact test.
Abbreviations: X^2, chi-square test; df, degree of freedom; BMI, Body mass index.

Concerning health-related risk factors, most of our participants were overweight or obese (n=782, 80.4%) and had never smoked (n=885, 91%). Moreover, 41.9% suffered from chronic diseases, including diabetes mellitus (n=140, 14.3%), hypertension (n=153, 15.7%), polycystic ovarian syndrome (n=87, 8.9%), peripheral vascular disease (n=13, 1.3%), anemia (n=127, 13.1%), and prolactinoma (n=34, 3.5%) (see Table 1).

Regarding screening, 476 (48.9%) participants had received a screening at least once in their lifetime. The most recent screening was: within the previous year (n=236, 49.6%), from one to two years earlier (n=78, 16.4%), and more than two years earlier (n=162, 34.0%). The main reason for being screened was age (n=289, 60.7%), presence of

a complaint (n=106, 22.2%), and having a family history of cancer (n=67, 14.7%). In addition, the majority of screened participants were in their early 50s (n=244, 51.3%, $x^2(5)$=98.85, p<0.001), married (n=396, 87.6%, $x^2(1)$=4.50, p=0.03), or from the Eastern Province (n=275, 57.8%, $x^2(4)$=48.19, p<0.001, Table 1). Furthermore, as seen in Table 1, when comparing the distribution of the screened to the unscreened participants, the screened participants had a higher rate of chronic diseases (n=172, 36.1%, $x^2(1)$=12.86, p<0.000), and a higher rate of family history of breast cancer (n=123, 25.8%, $x^2(1)$=23.64, p<0.001). In addition, (n=45, 4.6%) participants had a history of breast cancer, (n=28, 62.2%) participants had received chemotherapy, and (n=27, 60%) participants had received radiotherapy. Furthermore, participants' most common breast complaint was breast pain (n=148, 15.2%), followed by breast lump (n=48, 4.9%). However, not all patients presented with breast changes went under screening, as seen in Figure 1.

The screening was most common among participants who had received cancer chemotherapy (n=28,87.5%), had a breast lump (n=38, 79.2%), or showed skin changes (n=24, 70.6%). At the same time, it was least common among participants who complained of nipple discharge (n=10, 55.6%) (see Figure 1). The most commonly believed barrier regarding screening was that participants believed it was unnecessary (n=235, 24.2%), followed by the belief that screening would be painful (n=215, 22.1%) (see Table 2). The prevalence of breast screening was less among participants who believed that screening was embarrassing (n=60, 61.86%, $x^2(1)$=5.01, p=0.025), feared the results (n=108, 59.7%, $x^2(1)$=6.57, p=0.01), thought it was unnecessary (n=185, 78.7%, $x^2(1)$=94.75, p<0.001), was not interested in early detection (n=22, 81, $x^2(1)$=10.27, p<0.001), did not know where to obtain a screening (n=73, 82.9%, $x^2(1)$=39.34, p<0.001), or had an unsupportive family (n=9, 81.8%, $x^2(1)$=4.21, p=0.04) (see Table 2).

On the other hand, the most common motivator for screening was receiving a physician's advice to do so (n=407, 41.8%). However, among screened participants, the most common motivator was the interest in early detection (n=250, 52.5%). More than half (n=43, 68.3%, $x^2(1)$=7.95, p=0.005) of participants with a relative/friend who had received mammography screening had not themselves received screenings while having a personal experience of mammography screening aligned with a higher rate of screening (n=49, 87.5%, $x^2(1)$=35.39, p<0.001). In addition, interest in the early detection of cancer influenced the rate of screening among participants (n=250, 64.6%, $x^2(1)$=63.21, p<0.001) (see Table 3).
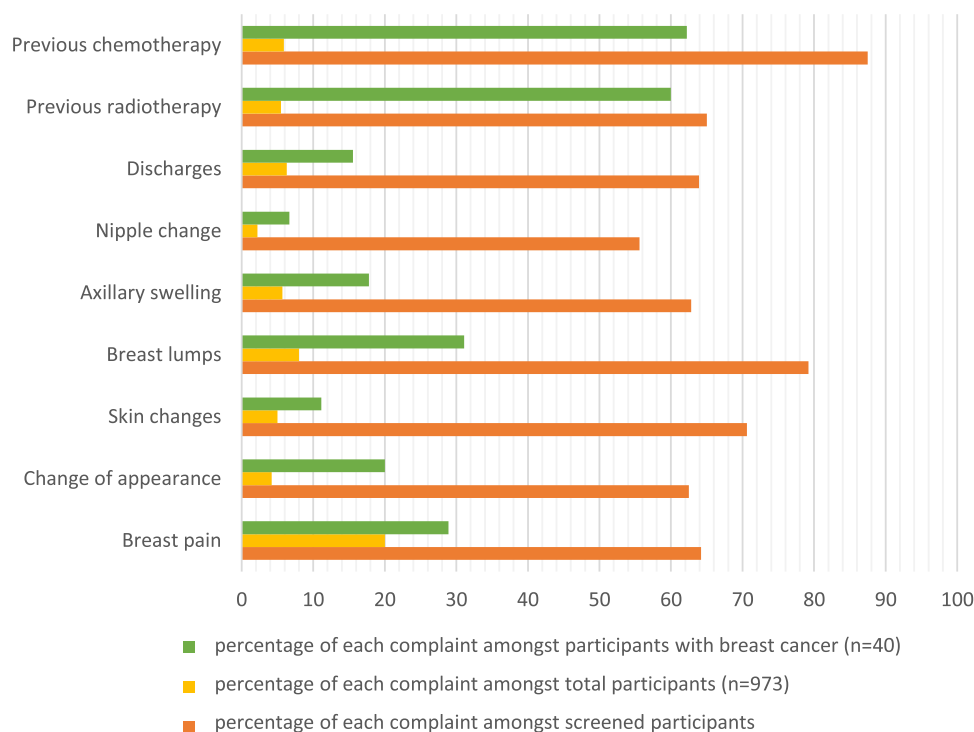

Figure 1 Bar graph showing the distribution of different breast complaints amongst the total participants of the study, participants with breast cancer, and screened participants.

Table 2 The Frequency and Percentages of the Distribution of Suggested Barriers of Breast Cancer Screening in Relation to the Participants Screening Status

	Received Screening		Did Not Receive Screening		Total		X^2	df	p-value
	N=476	%	N=497	%	N=973	%			
Mammography is Painful	98	20.6	117	23.5	215	22.1	1.23	1	0.267
Mammography Screening is Embarrassing	37	7.8	60	12.1	97	10.0	5.01	1	0.025
Fear of Abnormal Results	73	15.3	108	21.7	181	18.6	6.57	1	0.010
Fear of Radiation	62	13.0	74	14.9	136	14.0	0.70	1	0.402
Screening is Unnecessary	50	10.5	185	37.2	235	24.2	94.75	1	<0.001
Knowing a relative/friend diagnosed with cancer	7	1.5	8	1.6	15	1.5	0.03	1	0.860
Screening causes cancer	18	3.8	16	3.2	34	3.5	0.23	1	0.633
Having an Unsupportive family	2	0.4	9	1.8	11	1.1			0.040*
Do not know where to receive screening	15	3.2	73	14.7	88	9.0	39.34	1	<0.001
Not interested in early detection	5	1.1	22	4.4	27	2.8	10.27	1	<0.001

Note: *p value came from Fisher exact test.
Abbreviations: X^2, chi-square test; df, degree of freedom.

Table 3 The Frequency and Percentages of the Distribution of Suggested Breast Cancer Screening Motivators in Relation to Our Participants Screening Status

	Received Screening		Did Not Receive Screening		Total		X^2	df	p-value
	N=476	%	N=497	%	N=973	%			
Physician's Advice	201	42.2	206	41.4	407	41.8	0.06	1	0.806
Interest in Early Detection	250	52.5	137	27.6	387	39.8	63.21	1	<0.001
Previous experience with mammography	49	10.3	7	1.4	56	5.8	35.39	1	<0.001
Having a Relative/Friend receive Mammography	20	4.2	43	8.7	63	6.5	7.95	1	0.005
Having a Family Member diagnosed with Cancer	47	9.9	31	6.2	78	8.0	4.36	1	0.037
Receiving screening free of charge	136	28.6	153	30.8	289	29.7	0.57	1	0.450
Easy accessibility to screening	124	26.1	151	30.4	275	28.3	2.25	1	0.134

Abbreviations: X^2, chi-square test; df, degree of freedom.

As seen in Table 4, the odds of not receiving screening increased in women who did not know where to receive screening (adjusted OR=5.34, 95% CI = 2.93, 9.72), women who were not interested in early detection (adjusted OR=4.77, 95% CI=1.71, 13.26), in women who believed screening was unnecessary (adjusted OR=5.52, 95% CI=3.81, 7.99), and women who feared having an abnormal result (adjusted OR=1.62, 95% CI=1.14, 2.30).

Discussion

This study aimed to understand the motivators and barriers perceived by women regarding breast cancer screening and the factors associated with abstaining from routine screening, as well as to explore factors associated with receiving mammography screening. We hope to provide insight into the concepts physicians and stakeholders should focus on in future patient encounters and health promotion campaigns to increase the willingness to undergo routine mammography screening.

Table 4 Odd Ratios of Unadjusted and Adjusted Logistic Regression Models That Measures the Association Between Breast Cancer Screening Barriers and Not Receiving Screening

Variables	Unadjusted		Adjusted*	
	OR	95% CI	OR	95% CI
Mammography is Painful	1.19	0.88, 1.61	1.17	0.85, 1.60
Mammography Screening is Embarrassing	1.63	1.06, 2.51	1.41	0.90, 2.22
Fear of Abnormal Results	1.53	1.10, 2.13	1.62	1.14, 2.30
Fear of Radiation	1.17	0.81, 1.68	1.22	0.83, 1.79
Screening is Unnecessary	5.05	3.58, 7.13	5.52	3.81, 7.99
Knowing a relative/friend diagnosed with cancer	1.10	0.39, 3.05	1.04	0.35, 3.04
Screening causes cancer	0.85	0.43, 1.68	0.79	0.38, 1.63
Having an Unsupportive family	4.37	0.94, 20.34	5.08	0.47, 0.82
Do not know where to receive screening	5.29	2.99, 9.37	5.34	2.93, 9.72
Not interested in early detection	4.36	1.64, 11.62	4.77	1.71, 13.26

Note: *Adjusted for age, previous cancer, chronic illnesses, family history of cancer.
Abbreviations: CI, Confidence Interval; OR, Odds ratio.

Breast cancer screening with mammography is one of the essential components of preventive care, as it has been proven to decrease breast cancer mortality across a broad age group of 39 to 70 years old.[7,12,13] In this study, approximately half of the participants had received breast cancer screening at least once in their life. On the other hand, in the United States of America (USA), the Department of Health and Human Services reports that more than three-quarters of women within the screening window had received mammography screening in 2019.[14] However, a local study done in 2014 showed that 92% of women within the screening population did not receive mammography.[8] Moreover, a recent local study done in 2018 showed a slight increase, as 12.4% of the participants had received mammography screening.[10] The increase since then in the local percentage noted in this study may indicate a gradual and promising increase in the public's awareness, as the Saudi MOH has only started its yearly breast cancer awareness campaigns in 2006. The studies mentioned above were only done six and 12 years after the campaign's start.

Most screened individuals were in their early 50s, which might be attributed to known other countries' guidelines recommending mammograms for all women aged 50 and above.[3,4] However, Saudi Arabia's Ministry of Health recommends starting regular screening at the age of 40, as the average age of diagnosis is 52 years old.[5] Moreover, screening was significantly higher in individuals living in Eastern Province. A possible explanation might be related to the Saudi Cancer Registry (SCR) published results, which showed that the Eastern Province has the highest age-standardized rate of breast cancer—37.1/100,000 in 2015 and 52.2/100,000 in 2017.[6]

This study found a significant association between having a family history of breast cancer and receiving mammography screening. This finding is in adherence with the results of Seiffert et al, who found that individuals with a family history of breast cancer had significantly more mammography screenings throughout their lives than those with no family history of breast cancer. Interestingly, the screening rate was not different whether the person was a first-degree or a second-degree family member.[13]

An expected finding was that having a chronic disease is associated with receiving mammography screening. This result might be explained by the fact that individuals with chronic diseases frequently encounter their physicians, who are likely to recommend undergoing routine screenings. This study showed that a physician's advice was the top factor in considering mammography screening. This theory was proven by a recent study done by Elewonibi and Nkwonta, who found that women with frequent primary care encounters were more likely to undergo routine screenings.[15]

As for the motivators encouraging women to undergo mammography screening, this study found that the most common influencer was "physician's advice", reported by nearly half of the participants. In an explicit acknowledgment

of the importance of this motivator, another study conducted by Jovicevic et al found that "physician advice" was the most influential factor that caused a significant increase in breast cancer screening rates.[16] This result emphasizes the importance of physicians advising patients to undergo routine screenings during every visit.

Moreover, interest in early detection was the second most common motivator among this study's participants, as it was reported by more than one-third of the participants. Furthermore, it is the leading motivator among participants who have received mammography screening. When coupled with timely treatment access, early detection will form a critical prerequisite, as the more clinical downstaging achieved, the lower the mortality rate will be.[7]

Our study showed that having a personal mammography experience influenced the screening rate, as most of our participants who had undergone mammography tended to continue to have screenings. On the other hand, most participants with a family experience of mammography had not had screenings. This comparison raised a statistically significant difference in the screening rate between these two groups.

It is puzzling that personal mammography experience positively impacts the screening rates while family experience does not. This observation signifies the importance of practical intervention to increase the community's awareness that family history is an important predisposing risk factor for breast cancer. A study in Serbia showed that the most common motivators among participants are gynecologist advice, health maintenance, and family history of cancer, respectively.[16] It is not surprising that most community motivators are consistent.

Regarding barriers that keep participants from obtaining screenings, our study revealed that the most common barrier to screening was the misconception that mammograms were unnecessary. A quarter of participants indicated they were not interested in undergoing mammograms. This seems consistent with another cross-sectional survey conducted in Saudi Arabia in 2017; the study raised the fact that one-third of participants believe that screening is unnecessary. Another 22% of participants believed that screening would be painful. When comparing this to a collateral study in Saudi Arabia, the second most common barrier was that women were worried about possible abnormal results.[17]

Our study determined that the third most common barrier that keeps people away from screening is the fear of abnormal results. Similarly, a group of Greek women described "Fear of pain, fear of a serious diagnosis, embarrassment, and stress while anticipating the results" as the main factors in avoiding mammograms in a study by Trigoni et al.[18]

Moving to a global point of view, a systematic review conducted in 2020 revealed that lack of awareness is one of the most prominent barriers worldwide.[19] Lack of awareness encompasses multiple aspects, such as the importance of screening, the benefits of early detection of breast cancer, the consequence of late diagnosis, the time of screening, and the accessibility of screening. Furthermore, fear is the most prominent psychological barrier considered in multiple studies.[20–22]

Conclusion

The findings of this study showed a marked increase in the rate of mammography screening in Saudi Arabia, reflecting the rising awareness of women in the area and showing that there is room for improvement as, despite the rise in numbers, the percentage is still not satisfactory.

A thorough understanding of the perceived barriers and motivators is warranted to encourage women to undergo routine screening. This study found that the primary motivators were physicians' advice and interest in early detection. These findings encourage physicians to discuss routine screenings and their benefits, as physician advice may increase the number of screened individuals.

This study found that the main barriers to screening are a person's belief that screening is unnecessary, lack of interest in early detection, fear of abnormal results, embarrassment, fear of pain, and not knowing where to receive screening. All of the mentioned barriers could be tackled by increasing public awareness and explaining the procedure thoroughly. Another critical barrier was the lack of family support. One way to overcome this is by raising awareness among the population in general, men and women, as breast cancer can affect both sexes and having educated families encourage their family members to undergo regular screening.

The standing strength of this study is that it provides a comprehensive understanding of the general public's insights and beliefs. As mentioned previously, this directs the attention of physicians and stakeholders toward tackling these specific fears and barriers to have a tangible outcome at the individual level in physician-patient encounters and the community level through health promotion campaigns.

Disclosure

The authors report no conflicts of interest in this work.

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