

MISCONCEPTIONS REGARDING MAMMOGRAPHY BREAST CANCER SCREENING IN SAUDI ARABIA



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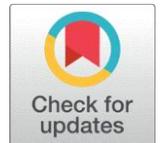
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ABSTRACT

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Background: Breast cancer is the most common cancer among women and a major cause of mortality. In Saudi Arabia, it accounts for 14.2% of female cancer cases, with an 8.4% mortality rate. Misconceptions about breast cancer and mammography screening contribute to delays in diagnosis and low screening participation.

Objective: To identify common misconceptions about breast cancer and mammography in Saudi Arabia.

Methods: A cross-sectional study was conducted among 930 women living in Saudi Arabia and aged 18 and above. Participants completed an Arabic online questionnaire to evaluate their knowledge and beliefs.

Results: The study revealed significant misconceptions about mammography among Saudi women, including perceived pain (32.5%), embarrassment (41.1%), and privacy concerns. Nearly half (50.4%) were unaware of mammography, and overall breast cancer screening awareness was low (67.8% poor awareness). Higher education, employment, and social connections to individuals diagnosed with breast cancer were significantly linked with better awareness and screening practices.

Conclusion: Significant misconceptions and low awareness regarding mammography persist among Saudi women, hindering early breast cancer detection. Targeted educational campaigns addressing myths and ensuring culturally sensitive screening environments are urgently needed.

Categories: Family Medicine, Internal Medicine

الخلفية:

يُعد سرطان الثدي أكثر أنواع السرطان شيوعًا بين النساء وأحد الأسباب الرئيسية للوفيات. في المملكة العربية السعودية، يُشكل 14.2% من حالات السرطان بين الإناث، مع معدل وفيات يبلغ 8.4%. تسهم المفاهيم الخاطئة حول سرطان الثدي وفحص الماموغرام في تأخر التشخيص وانخفاض معدلات المشاركة في الفحص.

الهدف:

تحديد المفاهيم الخاطئة الشائعة حول سرطان الثدي وفحص الماموغرام لدى النساء في المملكة العربية السعودية.

المنهجية:

أُجريت دراسة مقطعية شملت 930 امرأة تعيش في السعودية وتبلغ أعمارهن 18 سنة فأكثر. قامت المشاركات بتعبئة استبيان إلكتروني باللغة العربية لقياس مستوى المعرفة والمعتقدات.

النتائج:

أظهرت الدراسة وجود مفاهيم خاطئة ملحوظة حول فحص الماموغرام بين النساء السعوديات، شملت الشعور بالألم (32.5%)، والإحراج (41.1%)، والمخاوف المتعلقة بالخصوصية. كما أن نحو نصف المشاركات (50.4%) لم يكن لديهن معرفة بفحص الماموغرام، في حين كان الوعي العام بسرطان الثدي وفحوصاته منخفضًا (67.8% وعي ضعيف). وُجد أن الوعي والممارسات المتعلقة بالفحص كانت أفضل بشكل ملحوظ لدى النساء الحاصلات على تعليم أعلى، والموظفات، وأولئك اللواتي لديهن صلة اجتماعية بشخص مصاب بسرطان الثدي.

الاستنتاج:

تستمر المفاهيم الخاطئة وضعف الوعي بشأن فحص الماموغرام بين النساء في السعودية، مما يعيق الكشف المبكر عن سرطان الثدي. هناك حاجة ملحة لحملة توعوية موجهة تُعالج هذه المعتقدات المغلوطة وتوفر بيئة فحص تراعي الخصوصية والثقافة المحلية

Keywords: Misconceptions, Myths, Breast Cancer, Screening, Cancer

1. INTRODUCTION

The most prevalent type of cancer is breast cancer and globally it is the leading cause of cancer-related deaths for women. In 2020 The International Agency for

Research on Cancer revealed, that around 2.26 million new cases of breast cancer were reported, which accounted for 24.5% of all cases of cancer in women, and around 684 thousand breast cancer deaths, which accounted for 15.5% of all deaths related to female cancer [1]. In 2020 reports stated, that breast cancer is the most common type of cancer among adult females in Saudi Arabia, with an incidence rate of 14.2% and a mortality rate of 8.4%. Several factors can contribute to the cause of breast cancer [2]. In low and middle-income countries (LMICs) the load of breast cancer is higher, and as the course of risk factors and lifestyle changes is inclined, it results in increased incidence of the disease.

The factors comprise physical inactivity, smoking, elevated body mass index, and altered reproductive patterns (e.g., older age at first childbirth, fewer childbirths). Furthermore, the mortality rate in LMIC is higher. It can be due to the difficulties in reaching healthcare services, which may cause delays in diagnosing breast cancer [3,4]. Primary prevention is the key to reducing the load of breast cancer [5]. Cancer outcomes can be remarkably improved by raising awareness as research reported [6]. Health beliefs play a major role in health behaviors [7]. Preventive health practices can be impacted by accurate knowledge which is decisive [8].

Regarding the causes of cancer, especially breast cancer, there are global misconceptions. These include things like stress, food additives, microwave ovens, physical trauma, and electromagnetic frequency exposure. If efforts are redirected towards lowering risk from bogus mythological cancer causes, the risk-reducing actions for evidence-based breast cancer causes are unlikely to be adopted by individuals [9-11].

So, this study will evaluate myths and misconceptions about breast cancer in Saudi Arabia, mammogram myths and reasons for avoiding screening, and common myths and misconceptions about breast cancer causation.

2. METHODS

2.1 Study design

This cross-sectional study in Saudi Arabia explored myths and misconceptions about breast cancer screening among 930 participants. A self-administered questionnaire gathered data on demographics, awareness, and screening barriers. Convenience sampling was used.

2.1.1 Participant recruitment

Participants were conveniently included from the general adult population of Saudi Arabia. Inclusion criteria included female adults living in Saudi Arabia, aged 18 to 65, who were able to provide informed consent. Exclusion criteria included males, not living in Saudi Arabia, under 18 or above 65, and individuals who declined participation. The survey link was distributed to eligible participants via email, WhatsApp, and other social media platforms.

2.2 Data collection

Data was collected through an online questionnaire administered in Arabic. The questionnaire used for this study was adapted from Kwok et al. [12].

2.2.1 Sample size calculation

The sample size was calculated using the Raosoft sample size calculator, which applies a standard formula for estimating sample size, based on data from the 2022 Saudi census. A sample size of 385 participants was determined to achieve a 95% confidence level and a 5% margin of error. Although the determined sample size was 385 participants, the final number of participants was 930 to ensure greater accuracy and reliable interpretation and results.

2.3 The questionnaire validity

Regarding the questionnaire, it was originally developed by Kwok et al. and was adapted to the Saudi context by translating it into Arabic and conducting a forward–backward translation process to ensure linguistic accuracy. Content validity was reviewed by three public health experts familiar with breast cancer screening in Saudi Arabia. A pilot test was then conducted among 30 Saudi women to assess clarity, cultural relevance, and comprehension. Minor modifications were made

based on participant feedback before final administration. These details have now been added to the Methods section for clarity.

2.4 Data analysis

The data analysis for this study was conducted using SPSS version 27 (IBM Corp., 2020). Descriptive statistics were used to present the bio-demographic characteristics of the study participants, using frequencies and percentages for categorical variables. To assess overall awareness levels regarding breast cancer, health check-ups, and breast examination practices, a scoring system was developed. The best answers were assigned higher scores, and a cutoff of 60% of the total score was used to categorize participants into "poor" and "good" awareness groups. Participants scoring below 60% were classified as having poor awareness while 60% or above was considered for good awareness. To examine the associations between bio-demographic factors and awareness levels, breast self-examination (BSE) practices, and mammography uptake, Pearson's chi-square (χ^2) tests were performed. In cases where cell counts were low, exact probability tests were used. The p-value was set at 0.05 to determine statistical significance.

2.5 Ethical Approval

The IMSIU Institutional Review Board (IRB) Committee approved the study (project number 788/2025; approval date, March 12, 2025). All writing was collected in accordance with the ethical principles of the Declaration of Helsinki. The survey link included a brief study description and a more detailed explanation on the front page.

3. RESULTS

A total of 930 individuals participated in this study conducted in Saudi Arabia. The majority of participants resided in the Central region (44%), followed by the Western region (29.5%). Most participants (69.5%) were aged between 18 and 25 years. Regarding educational attainment, the most common qualification was a Bachelor's degree, reported by 59.4% of the participants. The majority were single (71.3%), and students constituted the largest employment category (65.5%). Concerning breast cancer history, only 1.3% of participants reported a personal

history of breast cancer, while 12.9% reported a family history of the disease. Additionally, 16.1% of participants indicated that a friend had a history of breast cancer.

Table 1: Knowledge and Perceptions of Breast Cancer, Health Check-ups, and Breast Examination Practices among Study Participants (N=930)

Domain	Items	Main Finding
Breast Cancer	“Even if breast cancer is detected early, there is little a woman can do to reduce the chances of dying from it.”	83% disagreed (rejecting the misconception).
	“Breast cancer cannot be cured; you can only prolong the suffering.”	82% disagreed (rejecting the misconception).
Health Check-ups	“If I feel well, it is not necessary to have a health check-up.”	62% disagreed (acknowledging preventive care).
	“I only see a doctor when I have a health problem.”	44% agreed (indicating limited preventive health behavior).
Breast Examination	Heard about clinical breast examination.	61% Yes.
	Know how to perform breast self-examination.	43% Yes.
Mammography	Heard about mammography.	50% Yes / 50% No.

Table 1 presents the participants' knowledge and perceptions of breast cancer, general health check-ups, and breast examination practices. As for breast Cancer, it explores beliefs about the disease. Regarding the statement "Even if breast cancer is detected early, there is very little a woman can do to reduce the chances of dying from it," 474 participants (51.0%) strongly disagreed, while 298 (32.0%) disagreed. For the statement "Breast cancer cannot be cured; you can only prolong the suffering," 426 participants (45.8%) strongly disagreed, and 338 (36.3%) disagreed. The second domain, "Health Check-ups", regarding the statement "If I feel well, it is not necessary to have a health check-up," 401 participants (43.1%) disagreed, and 176 (18.9%) strongly disagreed. Similarly, for the statement "If I follow a healthy lifestyle such as a balanced diet and regular exercise, I don't feel it is necessary to have a regular health check-up," 435 participants (46.8%) disagreed, and 170 (18.3%) strongly disagreed. For "I see a doctor or have a health check-up only when I have a health problem," 294 participants (31.6%) disagreed, and 120 (12.9%) strongly disagreed. Lastly, for "If I feel healthy, I do not need to see the doctor," 326 (35.1%) disagreed and 122 (13.1%) strongly disagreed. The third part,

"Breast Examination", 569 participants (61.2%) had heard about clinical breast examination, while 361 (38.8%) had not. Regarding breast self-examination, 735 participants (79.0%) had heard about it, and 396 (42.6%) knew how to perform it. However, 246 (26.5%) did not know how. The final section, "Mammography," examines awareness of mammography. 461 participants (49.6%) had heard about mammography, while 469 (50.4%) had not.

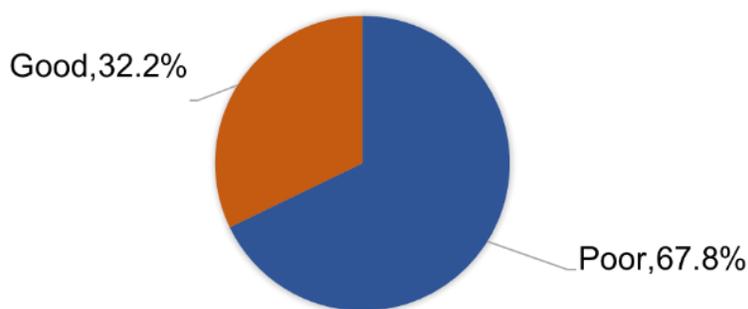


Figure 1: The Overall Knowledge and Perceptions of Breast Cancer, Health Check-ups, and Breast Examination Practices among Study Participants (N=930)

Figure 1 presents the overall awareness level of breast cancer, health check-ups, and breast examination practices among the 930 study participants. Exact of 631 participants (67.8%) had poor overall awareness but 299 participants (32.2%) had good overall awareness.

Table 2: Breast Cancer Examination and Screening Practices among Study Participants (N=930)

items	No	%
When was your last clinical breast examination?		
I have never done it	751	80.8%
Within a year or less	80	8.6%
Two years ago	27	2.9%
Three years ago	24	2.6%
More than 3 years	48	5.2%
Why did you go for the last clinical breast examination?		
As part of a health check-up	80	44.7%
Because of a breast problem	69	38.5%

My doctor advised it	30	16.8%
How often do you perform breast self-examination?		
Never	466	50.1%
Rarely	225	24.2%
At least once every six months	117	12.6%
At least once a month	104	11.2%
At least once a week	18	1.9%
How often do you have a mammogram?		
Never	813	87.4%
Once every three years or more	44	4.7%
Once every two years	17	1.8%
Once a year	56	6.0%
How many mammograms have you had in the last 5 years?		
Never	825	88.7%
1 time	58	6.2%
2 times	20	2.2%
3 times	8	.9%
4 times / more	19	2.0%
Why did you go for the last mammogram?		
My doctor advised it	25	23.8%
Because of a breast problem	33	31.4%
I wanted a mammogram done because its free of charge	15	14.3%
Because I believe that early detection could save lives	13	12.4%
As part of a health check-up	44	41.9%
Have any of your friends ever had a mammogram?		
Yes	131	14.1%
No	366	39.4%
I don't know	433	46.6%
Would you prefer the mammographic technician to be male or female?		
Female	841	90.4%

Male	9	1.0%
No preference	80	8.6%

Table 2 provides a detailed overview of breast cancer examination and screening practices among the 930 study participants. A significant proportion of the participants reported a lack of engagement in recommended screening practices. Specifically, 751 participants (80.8%) had never undergone a clinical breast examination. Among those who had received a clinical breast examination, the most common reasons were as part of a general health check-up, reported by 80 participants (44.7%), and due to a breast problem, reported by 69 participants (38.5%). As for breast self-examination, 466 participants (50.1%) reported never performing this practice, with a further 225 participants (24.2%) performing it rarely. Mammography screening rates were also low, with 813 participants (87.4%) reporting never having had a mammogram. In the past 5 years, 825 participants (88.7%) had not received a mammogram. The primary reasons for those who had undergone mammography were doctor's advice, reported by 25 participants (23.8%), breast problems, reported by 33 participants (31.4%), free availability, reported by 15 participants (14.3%), belief in early detection, reported by 13 participants (12.4%), and as part of a health check-up, reported by 44 participants (41.9%). A total of 433 participants (46.6%) were unaware of whether their friends had undergone mammography. A strong preference for female mammographic technicians was reported by 841 participants (90.4%).

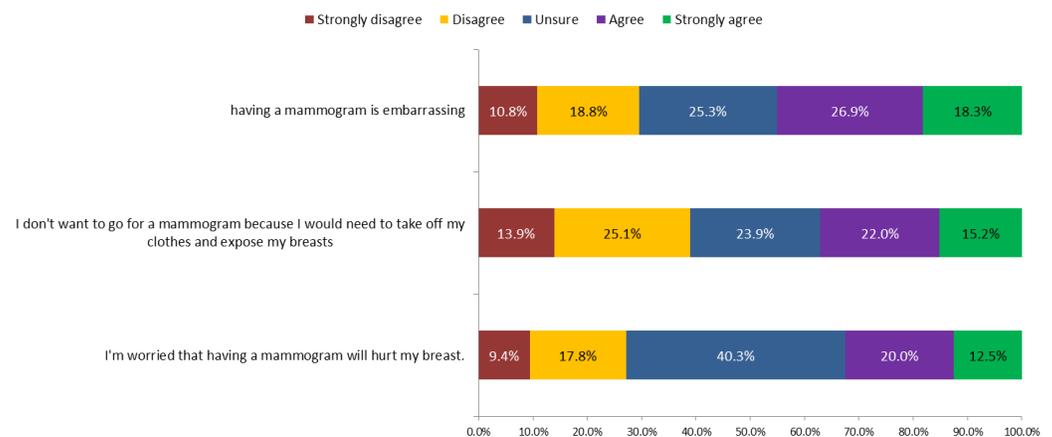


Figure 2. Attitudes towards mammography among the 930 study participants.

Figure 2 shows the attitudes towards mammography among the 930 study participants. Regarding the concern that "having a mammogram will hurt my breast," 186 participants (20.0%) agreed, and 116 participants (12.5%) strongly agreed. Concerning the attitude that "I don't want to go for a mammogram because I would need to take off my clothes and expose my breasts," 205 participants (22.0%) agreed, and 141 participants (15.2%) strongly agreed. Finally, regarding the perception that "having a mammogram is embarrassing," 250 participants (26.9%) agreed, and 170 participants (18.3%) strongly agreed.

Table 3. Factors associated with participants' overall knowledge about breast cancer and screening

Factors	Overall awareness level				p-value
	Poor		Good		
	No	%	No	%	
Region					
Central region	268	65.5%	141	34.5%	.416
Eastern region	69	65.1%	37	34.9%	
Northern region	46	74.2%	16	25.8%	
Southern region	58	73.4%	21	26.6%	
Western region	190	69.3%	84	30.7%	
Age in years					
18-25 years	444	68.7%	202	31.3%	.217
26-35 years	38	57.6%	28	42.4%	
36-45 years	46	62.2%	28	37.8%	
46-60 years	85	72.6%	32	27.4%	
> 60 years	18	66.7%	9	33.3%	
Education					
Basic education	11	73.3%	4	26.7%	.001*^
Tertiary education	12	37.5%	20	62.5%	
High school Diploma	212	74.6%	72	25.4%	
Bachelor Degree	360	65.2%	192	34.8%	
College Diploma	36	76.6%	11	23.4%	
Marital status					
Single	453	68.3%	210	31.7%	.887
Married	158	66.7%	79	33.3%	
Divorced/ widow	20	66.7%	10	33.3%	
Employment					
Not working	121	71.6%	48	28.4%	.049*
Student	412	67.7%	197	32.3%	
Employee	57	58.2%	41	41.8%	
Retired	41	75.9%	13	24.1%	
Do you have history of breast cancer?					
Yes	8	66.7%	4	33.3%	.930^
No	623	67.9%	295	32.1%	
Has anyone in your immediate					
					.319

family (mother, sisters, daughter, grandmother) had breast cancer?					
Yes	80	66.7%	40	33.3%	
No	500	67.3%	243	32.7%	
I don't know	51	76.1%	16	23.9%	
Have any of your friends had breast cancer?					
Yes	86	57.3%	64	42.7%	.002*
No	482	68.9%	218	31.1%	
I don't know	63	78.8%	17	21.3%	

P: Pearson X^2 test

\wedge : Exact probability test

* $P < 0.05$ (significant)

Table 3 assesses the factors associated with participants' overall knowledge about breast cancer and screening. Participants with tertiary education had higher levels of good awareness (62.5%) compared to those with basic education (26.7%), high school diplomas (25.4%), bachelor's degrees (34.8%), or college diplomas (23.4%) ($P=0.001$). Furthermore, participants who reported having friends with breast cancer showed a significantly higher proportion of good awareness (42.7%) compared to those who reported their friends did not have breast cancer (31.1%) ($P=0.002$). Employment status also showed a significant association ($p = 0.049$). Employees showed the highest percentage of good awareness (41.8%), while retired individuals showed the lowest (24.1%). Other factors, such as region, age, marital status, personal history of breast cancer, and family history of breast cancer, did not show statistically significant associations with overall awareness levels ($p > 0.05$).

Table 4. Factors associated with participants' BSE practice in Saudi Arabia

Factors	Undergo BSE				p-value
	Frequently		Never / rarely		
	No	%	No	%	
Region					
Central region	112	27.4%	297	72.6%	.500
Eastern region	24	22.6%	82	77.4%	
Northern region	18	29.0%	44	71.0%	
Southern region	15	19.0%	64	81.0%	
Western region	70	25.5%	204	74.5%	
Age in years					
18-25 years	146	22.6%	500	77.4%	.023*
26-35 years	21	31.8%	45	68.2%	

36-45 years	26	35.1%	48	64.9%	
46-60 years	36	30.8%	81	69.2%	
> 60 years	10	37.0%	17	63.0%	
Education					
Basic education	2	13.3%	13	86.7%	
Tertiary education	11	34.4%	21	65.6%	.001*
High school Diploma	49	17.3%	235	82.7%	
Bachelor Degree	163	29.5%	389	70.5%	
College Diploma	14	29.8%	33	70.2%	
Marital status					
Single	151	22.8%	512	77.2%	.003*
Married	81	34.2%	156	65.8%	
Divorced/ widow	7	23.3%	23	76.7%	
Employment					
Not working	48	28.4%	121	71.6%	.003*
Student	136	22.3%	473	77.7%	
Employee	38	38.8%	60	61.2%	
Retired	17	31.5%	37	68.5%	
Do you have a history of breast cancer?					
Yes	6	50.0%	6	50.0%	.048*^
No	233	25.4%	685	74.6%	
Has anyone in your immediate family (mother, sisters, daughter, grandmother) had breast cancer?					
Yes	48	40.0%	72	60.0%	.001*^
No	187	25.2%	556	74.8%	
I don't know	4	6.0%	63	94.0%	
Have any of your friends had breast cancer?					
Yes	51	34.0%	99	66.0%	.014*
No	174	24.9%	526	75.1%	
I don't know	14	17.5%	66	82.5%	
Overall awareness level					
Poor	106	16.8%	525	83.2%	.001*
Good	133	44.5%	166	55.5%	

Table 4 examines the factors associated with breast self-examination (BSE)

practices among Saudi Arabian participants. Age was significantly associated with BSE practice ($p = 0.023$), with older participants showing a higher percentage of frequent BSE, specifically 37.0% of those over 60 years compared to 22.6% of those aged 18-25 years. Education level also significantly influenced BSE practice ($p = 0.001$), with participants had a Bachelor's Degree showed a higher percentage of frequent BSE (29.5%) compared to those with a High School Diploma (17.3%) or Basic Education (13.3%). Marital status showed a significant association ($p = 0.003$), with married participants more likely to perform frequent BSE (34.2%) compared to single participants (22.8%). Employment status also significantly impacted BSE frequency ($p = 0.003$), with employees showing a higher percentage of frequent BSE (38.8%) compared to students (22.3%). A personal history of breast cancer was significantly associated with BSE practice ($p = 0.048$), with 50.0% of participants with a history of breast cancer reporting frequent BSE, compared to 25.4% of those without a history. A family history of breast cancer also showed a significant association ($p = 0.001$), with 40.0% of participants with a family history performing frequent BSE, compared to 25.2% of those without. Having friends with breast cancer significantly influenced BSE practice ($p = 0.014$), with 34.0% of participants with friends who had breast cancer reporting frequent BSE, compared to 24.9% of those whose friends did not have breast cancer. Overall awareness level was also significantly associated with BSE practice ($p = 0.001$), with 44.5% of participants with good awareness performing frequent BSE, compared to 16.8% of those with poor awareness. Region did not show a significant association with BSE practice ($p = 0.500$).

Table 5. Factors associated with participants' doing mammography in Saudi Arabia

Factors	Undergone mammography				p-value
	Yes		No		
	No	%	No	%	
Region					
Central region	88	21.5%	321	78.5%	.001*
Eastern region	8	7.5%	98	92.5%	
Northern region	6	9.7%	56	90.3%	
Southern region	2	2.5%	77	97.5%	
Western region	13	4.7%	261	95.3%	

Age in years					
18-25 years	17	2.6%	629	97.4%	
26-35 years	4	6.1%	62	93.9%	.001*
36-45 years	22	29.7%	52	70.3%	
46-60 years	58	49.6%	59	50.4%	
> 60 years	16	59.3%	11	40.7%	
Education					
Basic education	4	26.7%	11	73.3%	.001*^
Tertiary education	15	46.9%	17	53.1%	
High school Diploma	24	8.5%	260	91.5%	
Bachelor Degree	62	11.2%	490	88.8%	
College Diploma	12	25.5%	35	74.5%	
Marital status					
Single	18	2.7%	645	97.3%	.001*
Married	86	36.3%	151	63.7%	
Divorced/ widow	13	43.3%	17	56.7%	
Employment					
Not working	44	26.0%	125	74.0%	.001*
Student	17	2.8%	592	97.2%	
Employee	30	30.6%	68	69.4%	
Retired	26	48.1%	28	51.9%	
Do you have a history of breast cancer?					
Yes	10	83.3%	2	16.7%	.001*^
No	107	11.7%	811	88.3%	
Has anyone in your immediate family (mother, sisters, daughter, grandmother) had breast cancer?					
Yes	29	24.2%	91	75.8%	.001*
No	84	11.3%	659	88.7%	
I don't know	4	6.0%	63	94.0%	
Have any of your friends had breast cancer?					
Yes	59	39.3%	91	60.7%	.001*
No	49	7.0%	651	93.0%	
I don't know	9	11.3%	71	88.8%	
Overall awareness level					.016*

Poor	68	10.8%	563	89.2%
Good	49	16.4%	250	83.6%

Table 5 documents the factors associated with participants undergoing mammography in Saudi Arabia. Region significantly influenced mammography practice ($p = 0.001$), with the Central region showing the highest percentage of participants having undergone mammography (21.5%), while the Southern region had the lowest (2.5%). Age was also significantly associated with mammography uptake ($p = 0.001$), with older participants showing a higher percentage of mammography use. Specifically, 59.3% of those over 60 years had undergone mammography, compared to only 2.6% of those aged 18-25 years. Education level significantly impacted mammography practice ($p = 0.001$), with participants holding a Tertiary education showing the highest percentage of mammography uptake (46.9%) compared to those with a High School Diploma (8.5%) or a Bachelor's Degree (11.2%). Marital status showed a significant association ($p = 0.001$), with married participants more likely to have undergone mammography (36.3%) compared to single participants (2.7%). Employment status also significantly influenced mammography uptake ($p = 0.001$), with retired participants showing the highest percentage of mammography use (48.1%), compared to students (2.8%). A personal history of breast cancer was significantly associated with mammography practice ($p = 0.001$), with 83.3% of participants with a history of breast cancer having undergone mammography, compared to 11.7% of those without a history. A family history of breast cancer also showed a significant association ($p = 0.001$), with 24.2% of participants with a family history having undergone mammography, compared to 11.3% of those without. Having friends with breast cancer significantly influenced mammography practice ($p = 0.001$), with 39.3% of participants with friends who had breast cancer having undergone mammography, compared to 7.0% of those whose friends did not have breast cancer. Overall awareness level was also significantly associated with mammography practice ($p = 0.016$), with 16.4% of participants with good awareness having undergone mammography, compared to 10.8% of those with poor awareness.

4. DISCUSSION

This study assessed awareness, beliefs, and practices regarding breast cancer and its screening among women in Saudi Arabia. The findings revealed suboptimal awareness (67.8% poor awareness), limited knowledge of mammography (49.6% unaware), and common misconceptions—such as perceived pain (32.5%), embarrassment (41.1%), and concerns about privacy—that significantly hinder screening uptake. Additionally, actual practice of screening methods was low, with 87.4% never undergoing a mammogram and 50.1% performing breast self-examination (BSE). Despite these gaps, most participants correctly believed that breast cancer is treatable if detected early. This aligns with global public health strategies that emphasize early diagnosis and screening as key to improving survival [13,14]. However, the persistence of myths among a significant portion of the population highlights the need for targeted education.

The study participants demonstrated some understanding of the importance of preventive healthcare: many rejected the notion that being asymptomatic eliminates the need for health check-ups. These results correspond with findings from studies emphasizing the value of preventive behaviors in reducing cancer burden [15–17]. Yet, a considerable proportion still associated health checks with symptom onset—an issue well-documented in low- and middle-income countries (LMICs), where delayed health-seeking behavior is common [18].

Awareness of BSE was relatively high (79%), but only 42.6% reported knowing how to perform it, reflecting a significant gap between awareness and practice. This discrepancy mirrors evidence from Nigeria, where limited education and sociocultural barriers impede regular BSE [19]. Globally, similar trends are seen in LMICs, where structural and cultural barriers restrict access to breast cancer screening. For example, studies from Nigeria and India have shown low rates of BSE and mammography due to factors like cost, lack of knowledge, and healthcare inaccessibility [33,34]. In contrast, high-income countries such as the United States and parts of Europe benefit from organized screening programs and broad public education. Still, disparities persist in underserved populations, even in resource-rich settings [20–23]. Similarly, mammography knowledge was poor, a finding

consistent with multiple studies in Saudi Arabia that report inadequate awareness and low participation in screening programs [24–27].

Several sociodemographic factors were significantly associated with better awareness and screening practices. Higher educational attainment, employment, and having friends or family members affected by breast cancer were all linked to improved awareness and behaviors. These associations are well-supported in the literature, which underscores the role of social exposure and educational background in shaping health beliefs and behaviors [6–8,28–30]. The low uptake of breast screening practices—particularly BSE, clinical breast examination (CBE), and mammography—closely mirrors previous findings in the Kingdom. For instance, Alshehri et al. reported that only 31.5% of Saudi women practiced regular BSE, and 78% had never undergone a mammogram [31]. Likewise, Almutairi et al. identified significant knowledge deficits and cultural barriers to screening participation in Jeddah [32].

A major barrier identified in this study was discomfort with the mammography process. Concerns about pain, embarrassment, and exposure were widely reported. These findings are consistent with other studies in conservative societies, including Saudi Arabia, where modesty norms and privacy fears inhibit screening attendance [31,15].

5. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, awareness of the importance of early breast cancer detection among Saudi Arabian participants was unsatisfactory. Overall awareness was low, with poor understanding of mammography and breast self-examination, and underutilization of screening practices such as clinical breast examinations and mammography. These match with national and global patterns, particularly in low- and middle-income settings. Negative attitudes, including concerns about pain, embarrassment, and privacy, further hinder screening uptake. Healthcare providers must actively promote screening, and efforts should ensure the availability of female technicians and comfortable screening environments. Future research should focus on identifying barriers and evaluating the effectiveness of

interventions to improve screening rates. The findings assessed the urgent need for culturally sensitive educational campaigns and system-level interventions, including accessible screening services with female staff, to address barriers specific to the Saudi population. These suggestions highlight the study's relevance for policymakers and healthcare providers aiming to improve breast cancer screening uptake.

6. CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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8. REFERENCES

- [1] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin.* 2021;71(3):209–49.
- [2] WHO, International Agency for Research in Cancer (IARC) Saudi Arabia. Source: Globocan 2018. Available from: <https://gco.iarc.fr/today/data/factsheets/populations/682-saudi-arabia-factsheets.pdf>.
- [3] Torre LA, Islami F, Siegel RL, Ward EM, Jemal A. Global Cancer in Women: Burden and Trends. *Cancer Epidemiol Biomarkers Prev.* 2017;26(4):444–57.
- [4] Medical Aid for Palestinians (MAP). Breast Cancer in Occupied Palestine. <https://www.map.org.uk/downloads/map-breast-cancer-factsheet.pdf>. Accessed 23 Oct 2023.
- [5] Danaei G, Vander Hoorn S, Lopez AD, Murray CJ, Ezzati M. Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. *Lancet.* 2005;366(9499):1784–93.
- [6] Niksic M, Rachet B, Duffy SW, Quaresma M, Moller H, Forbes LJ. Is

cancer survival associated with cancer symptom awareness and barriers to seeking medical help in England? An ecological study. *Br J Cancer*. 2016;115(7):876–86.

[7] Ryan AM, Cushen S, Schellekens H, Bhuachalla EN, Burns L, Kenny U, Power DG. Poor awareness of risk factors for cancer in Irish adults: results of a large survey and review of the literature. *Oncologist*. 2015;20(4):372–8.

[8] Wilkinson AV, Vasudevan V, Honn SE, Spitz MR, Chamberlain RM. Sociodemographic characteristics, health beliefs, and the accuracy of cancer knowledge. *J Cancer Educ*. 2009;24(1):58–64.

[9] Daher M. Cultural beliefs and values in cancer patients. *Ann Oncol*. 2012;23(Suppl 3):66–9.

[10] Gansler T, Henley SJ, Stein K, Nehl EJ, Smigal C, Slaughter E. Sociodemographic determinants of cancer treatment health literacy. *Cancer*. 2005;104(3):653–60.

[11] Shahab L, McGowan JA, Waller J, Smith SG. Prevalence of beliefs about actual and mythical causes of cancer and their association with socio-demographic and health-related characteristics: Findings from a cross-sectional survey in England. *Eur J Cancer*. 2018;103:308–16.

[12] Kwok C, Endrawes G, Lee CF. Cultural Beliefs and Attitudes About Breast Cancer and Screening Practices Among Arabic Women in Australia. *Cancer Nurs*. 2016;39(5):367–374. doi:10.1097/NCC.0000000000000325.

[13] World Health Organization. Breast cancer: early diagnosis and screening. Available from: <https://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/> [Accessed 10 October 2023].

[14] Smith RA, Caleffi M, Albert US, Chen TH, Duffy SW, Franceschi D, Nyström L, Global Summit Early Detection and Access to Care Panel. Breast cancer in limited-resource countries: early detection and access to care. *The Breast Journal*. 2006 Jan;12:S16–26.

[15] Smith RA, Andrews KS, Brooks D, Fedewa SA, Manassaram-Baptiste D, Saslow D, Wender RC. Cancer screening in the United States, 2019: A review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin*. 2019 May;69(3):184–210.

- [16] Lane DS, Smith RA. Cancer screening: patient and population strategies. *Medical Clinics*. 2023 Nov 1;107(6):989–99.
- [17] Alexander K, Korc-Grodzicki B. Cancer Screening in the Older Adult. In: *Geriatric Medicine: A Person-Centered Evidence Based Approach*. 2024 Feb 20; pp. 801–825. Cham: Springer International Publishing.
- [18] Ginsburg O, Bray F, Coleman MP, Vanderpuye V, Eniu A, Kotha SR, Sarker M, Huong TT, Allemani C, Dvaladze A, Gralow J. The global burden of women’s cancers: a grand challenge in global health. *Lancet*. 2017 Feb 25;389(10071):847–60.
- [19] Taiwo O, Tunde O. Breast cancer awareness, attitude and screening practices in Nigeria: a systematic review. *Clinical Reviews and Opinions*. 2016 Jul 31;7(2):11–25.
- [20] Pace LE, Keating NL. A systematic assessment of benefits and risks to guide breast cancer screening decisions. *JAMA*. 2014 Apr 2;311(13):1327–35.
- [21] Rhodes DJ, Radecki Breitkopf C, Ziegenfuss JY, Jenkins SM, Vachon CM. Awareness of breast density and its impact on breast cancer detection and risk. *J Clin Oncol*. 2015 Apr 1;33(10):1143–50.
- [22] Edgar L, Glackin M, Hughes C, Ann Rogers KM. Factors influencing participation in breast cancer screening. *Br J Nurs*. 2013;22(17):1021–6.
- [23] Akram M, Iqbal M, Daniyal M, Khan AU. Awareness and current knowledge of breast cancer. *Biol Res*. 2017 Dec;50:1–23.
- [24] Al-Zalabani AH, Alharbi KD, Fallatah NI, Alqabshawi RI, Al-Zalabani AA, Alghamdi SM. Breast cancer knowledge and screening practice and barriers among women in Madinah, Saudi Arabia. *J Cancer Educ*. 2018 Feb;33:201–7.
- [25] Al-Khamis NK. Low awareness of breast cancer and considerable barriers to early presentation among Saudi women at a primary care setting. *J Cancer Educ*. 2018 Apr;33:391–7.
- [26] Alanazi WN, Mohamed GM, Alosaimi NS, Alosaimi LM. Breast cancer awareness, knowledge and self-screening intention among females in Northern Border of Saudi Arabia, Arar City. *BMC Public Health*. 2025 Mar 11;25(1):964.

- [27] Amin TT, Al Mulhim AR, Al Meqihwi A. Breast cancer knowledge, risk factors and screening among adult Saudi women in a primary health care setting. *Asian Pac J Cancer Prev.* 2009 Jan 1;10(1):133–8.
- [28] Islam MA, AlShayban DM, Nisa ZU, Al-Hawaj GA, Al-Eid GH, Alenazi AM, Malik Z, Maqsood MB, Ishaqui AA, Akbar Z, Iqbal MS. What is the current state of awareness, knowledge, and attitudes toward breast cancer? A cross-sectional survey among health and non-health college students. *Front Public Health.* 2022 May 6;10:838579.
- [29] Ashing-Giwa K. Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women Health.* 1999 May 12;28(4):53–71.
- [30] Ma GX, Gao W, Lee S, Wang M, Tan Y, Shive SE. Health seeking behavioral analysis associated with breast cancer screening among Asian American women. *Int J Womens Health.* 2012 May 25:235–43.
- [31] Alshehri AH, Alzahrani AA, Alsaadi MM, et al. Awareness of breast cancer among female students and faculty from health and non-health colleges in Saudi Arabia: a cross-sectional study. *J Cancer Educ.* 2022;37(2):456–463.
- [32] Almutairi KM, Ahmad M, Vinluan JM, et al. Breast cancer awareness among Saudi females in Jeddah. *Asian Pac J Cancer Prev.* 2016;17(4):1845–1851.
- [33] Akhigbe AO, Omuemu VO. Knowledge, attitudes and practice of breast cancer screening among female health workers in a Nigerian urban city. *BMC Cancer.* 2009 Dec;9:1–9.
- [34] Mitra I, Mishra GA, Singh S, Aranke S, Notani P, Badwe R, Miller AB, Daniel EE, Gupta S, Uplap P, Thakur MH. A cluster randomized, controlled trial of breast and cervix cancer screening in Mumbai, India: methodology and interim results after three rounds of screening. *Int J Cancer.* 2010 Feb 15;126(4):976–84.