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Knowledge, Attitude and Practice about Breast Cancer among Saudi Women: A Cross-sectional Study in Riyadh

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ABSTRACT

Background: *Worldwide, breast cancer is the most common cancer in women. Breast cancer screening has been found effective in early diagnosis and decreasing mortality rates.* ***Aim of the study:*** *To assess Saudi Women's knowledge, attitudes and practices towards breast cancer screening in Riyadh, Saudi Arabia, and investigate factors that influence these practices.* ***Methods:*** *This is a cross-sectional community-based survey; a self-administered questionnaire was used to collect data from a convenience sample of females with a wide spectrum of socio-demographic profiles. A scoring scheme was used to score women's responses. Logistic regression analyses were conducted to identify factors associated with screening practices viz. breast self-examination (BSE), mammography and attitudes.* ***Results:*** *The study included 407 females, mean (± S.D) age of 28 years (± 8.5); 45% were married and 40.2% had a university degree. Only 30% of females practiced BSE and 25% had ever performed mammography. Stepwise logistic regression analysis revealed that inappropriate attitude is independently predictable by inadequate knowledge ($p<0.0001$). Factors independently associated with BSE practice in the stepwise logistic regression analysis were being married ($p<0.05$), appropriate attitude ($p<0.05$), adequate knowledge ($p<0.05$) and performing a mammography test ($p<0.0001$). Factors independently associated with performing mammography were age greater than 40 years ($p<0.05$), higher knowledge score ($p<0.0001$) and practicing BSE ($p<0.0001$).* ***Conclusion:*** *These study findings indicate significant inadequate knowledge, inappropriate attitude towards breast cancer as well as suboptimal screening practices among Saudi women. Therefore, preventive educational campaigns employing innovative strategies to increase population awareness, particularly targeting future generations through schools and university curricula, should be urgently implemented to reverse the course of the upward growing incidence of breast cancer disease in the Kingdom of Saudi Arabia.*

Keywords: Knowledge, Attitude and practice, Breast cancer awareness, Saudi women

Abbreviations: KAP: Knowledge, Attitude, and Practice; BSE: Breast Self-Examination; ACS: American Cancer Society; SPSS: The Statistical Package for Social Sciences

INTRODUCTION

Breast cancer is by far the most frequent cancer among women in Saudi Arabia. Worldwide, breast cancer is the most frequent cancer among women with an estimated 1.67 million new cancer cases diagnosed in 2012 constituting 25% of all cancers and is the second most common cancer in the world [1,2]. Also, it is the most common cancer in the

Kingdom of Saudi Arabia, as reported by King Faisal specialist hospital and research center from 1975 to 2012 with a proportion of 11.8% [3].

Knowledge regarding breast cancer begins with the awareness and importance of early detection of the disease. Early detection through screening offers an opportunity for doctors to provide better diagnosis and treatment [4]. Doctors have a role to provide knowledge about the disease and to help patients to overcome it. In addition, doctors create awareness regarding the importance of frequent screening and various strategies that women can use to prevent cancer [5]. Other roles extend to providing information regarding self-examination, information about the risk factors, essential screening modalities, and the healthcare centers providing primary healthcare services [6]. It is important to note that physicians play an important role in creating awareness and by guiding women through screening, early detection, and diagnosis [7]. The active role that health practitioners play in educating women determines the manner in which female patients deal with psychological challenges after they are diagnosed with breast cancer. A proper understanding of the level of Knowledge, attitude, and practices (KAP) would provide an opportunity to develop efficient diagnostic prevention, detection, and prognosis tool for breast cancer. As a prevention tool, KAP helps because when more women learn about the risks and challenges that breast cancer patients go through, more women will want to undergo screening for the disease [8]. Ultimately, a KAP survey is an effective intervention given that there is a strong indication that it will help in creating more consciousness regarding the prevention and management of breast cancer.

In order to understand the knowledge, attitude, and practices of women in Riyadh regarding breast cancer, it was important to conduct a study on a local Saudi women population. This is a comprehensive study investigating the KAP regarding breast cancer which may act as an informative tool to determine the level of awareness among the population and to acquire a better understanding of the knowledge of the Saudi female population in Riyadh.

MATERIALS AND METHODS

Study Design

This is a cross-sectional study which is aimed to measure knowledge, attitudes, and breast cancer-screening practices amongst Saudi women in Riyadh. The study was designed as a descriptive cross-sectional survey. A self-administered questionnaire was used for data collection. The questions included in this survey were formatted to assess knowledge about preventive measures and risk factors for breast cancer, and investigate women's attitude and practices towards early detection of breast cancer.

Study Setting and Population

The studied sample consisted of Saudi females living in Riyadh, Saudi Arabia. The study was based on convenience sampling of Saudi women visiting one of three pre-determined public locations. These locations were the women's department of the Ministerial Agency of Civil Affairs, Al Jenadriah social festival, and the Princess Norah University in Riyadh City. It was envisioned that these 3 locations would likely represent the wider spectrum of Saudi women population of Riyadh. The first location is a governmental office that provides a wide range of civil affairs services to women, such as the issuance of the civil affairs ID card, national ID card, family register, birth and death certificates, Hajj permits and national number. The second is an annual popular festival that attracts a large and diversified range of Saudi citizens. The third location is the largest female university in the kingdom. As such, this sample included Saudi women with different socio-demographic backgrounds.

The study recruited 407 women in Riyadh City between January 2015 and May 2015. OpenEpi was used to determine the sample size with a 95% confidence level and 5% margin of error. Assuming that about 50% of women lacked knowledge about breast cancer risk factors and screening methods with the absolute precision of 5%, the required sample size was estimated to be 385 women (considering the confidence limits to be 95%). After adding 10% for non-response, the sample was calculated to be 424. However, eventually data were collected from 407 women; a 95% response rate. The overall reference population (Saudi females living in Riyadh City), at the time of the study, was estimated at 1,489,556.

The questionnaire included questions related to socio-demographic data and questions pertaining to participants' knowledge, attitude towards breast cancer and practices of early detection and screening procedures. Knowledge about breast cancer was assessed by 12 questions pertaining to painless mass, bloody discharge, getting older in age,

late age at first pregnancy, positive family history, and breastfeeding, early onset of menstruation and late onset of menopause, smoking, nulliparity, use of oral contraceptive pills, and 2 questions regarding breast self-examination timing. A correct answer in the knowledge section was assigned one point, whereas a negative answer was allocated zero. The total score ranged from 0 to 12. The median value was used to classify the participants into the 2 knowledge strata "high and low". The attitudes and cultural barriers were measured by 3 questions. A positive attitude was allocated a scored value of two, fair attitude one and negative attitude zero. The median value was used to classify the participants into the 2 attitude strata "high and low". The practice was assessed through questions regarding breast self-examination practice and timing and the frequency for mammography screening.

Statistical Analysis

The Statistical Package for Social Sciences (IBM SPSS version 21, N.Y, USA) was used for data processing and analysis. Simple descriptive statistics were performed using mean (± standard deviation (S.D)), or median (interquartile range (IQR)) for quantitative variables, and frequency (%) for categorical variables, as appropriate. The Shapiro-Wilks test was used to test for the normality of the continuous variables included in the analysis.

Backward stepwise binary logistic regression analyses were performed to identify factors associated with dependent binary variables. The choice of this modeling process was based on the observation that many variables of interest where binary variables or needed to be categorized as binary variables due to their non-normal distribution (A Shapiro-Wilks test $p<0.05$). These dependent variables included knowledge and attitude scores. The median (i.e. 50^{th} percentile) was used as a cut-off for variable transformation. As such, respondents with a score of $\geq 50^{th}$ percentile were modeled as a comparison group.

Explanatory (i.e. independent) variables entered in these models included age (<40 or ≥ 40 years), marital status (married vs unmarried) and level of education (university level and above vs lower than university level). Analysis conducted included identification of factors associated with inappropriate attitude score; factors associated with BSE; and performing a mammography test. The latter two analyses also included inappropriate attitude (an attitude score less than the median) and inadequate knowledge (a knowledge score less than the median) as explanatory variables. All variables were initially included in the model and a backward iterative selection process was performed (with a probability of 0.05 to enter and 0.10 to leave the model). All tests performed were two-sided with a p-value of <0.05 were considered as significant.

RESULTS

General Characteristics of Study Population

Table 1 represents the general characteristics of the study population. The respondents were relatively young with a mean (± S.D) age of 28.6 (± 8.5) years. Nearly half (49.6%) of the participants were single, 184 (45.2%) were married and 21 (5.1%) were divorced/widowed. Most of them had university degrees (40.2%).

Table 1 General characteristics of the study population

Characteristic	n (%)
Age (Years)	
Mean ± S.D	28.6 ± 8.5
Range	18-55
Education:	
Primary	35 (8.5%)
Secondary	156 (38.3%)
Tertiary	44 (10.8%)
University	159 (40.2%)
Higher education	13 (3.2%)
Marital status:	
Single	202 (49.6%)
Married	184 (45.2%)
Divorced/Widower	21 (5.1%)

Knowledge about Breast Cancer

Table 2 demonstrates knowledge of participants about the risk and preventive factors for breast cancer. The median (interquartile range) of the knowledge score was calculated to be 6 [4-7]. Knowledge of participants of individual symptoms and risk factors showed that 252 (61.9%) women believed that painless breast mass was a presenting sign of breast cancer and 206 (50.6%) recognized bloody nipple discharge as a breast cancer symptom. Only about half 210 (51%) of the participants were aware of increasing age as a risk factor. Over half 233 (57.2%) recognized positive family history as a risk factor while 104 (25%) mentioned that they did not know about the effect of positive family history on breast cancer. Only 113 (27.7%) believed that early menarche or late menopause were risk factors while 203 (49.8%) declared that they did not know about their effect. Only 107 (26.2%) recognized nulliparity as a risk factor and 264 (64.8%) showed an absence of awareness regarding that factor. Giving birth after the age of 30 years was mentioned as a risk factor for breast cancer by only 98 (24%), while 282 (69.2%) women were not aware of that factor.

Table 2 Knowledge about risk and protective factors for breast cancer

Risk/Preventive Factors for breast cancer	Right Answer	Wrong or Don't Know	Missed Answer
	N (%)	N (%)	N (%)
Increase in age	210 (51%)	183 (44.9 %)	14(4%)
First relative positive family history	233 (57.2%)	152 (37.3%%)	22(5.4%)
Early menarche or late menopause	113 (27.7%)	265 (65.1%)	29 (7.1%)
Nulliparity	107 (26.2%)	264 (64.8%)	36 (8.8%)
Having first child after 30 years old	98 (24%)	282 (69.2%)	27(6%)
Long lactating period	236 (57.9%)	147 (36.1%)	24(5.8%)
Oral contraceptive pills	167 (41%)	226 (55.5%)	14 (3.4%)
Smoking	256 (62.8%)	138 (33.9%)	13 (3.1%)
BSE performed usually one week after menstrual period beginning	227 (55.8%)	145 (35.6%)	35 (8.5%)
BSE for menopausal women performed on the same day each month	140 (34.4%)	243 (59.7%)	24 (5.8%)
Breast Cancer Signs and Symptoms			
Painless breast mass	252 (61.9%)	141 (34.6%)	14 (3.4%)
Bloody nipple discharge	206 (50.6%)	188 (46.19%)	13 (3.19%)

Total 236 (57.9%) participants recognized the role of breastfeeding as a protective factor, while 147 (36.1%) did not know about it. The use of Oral Contraceptive Pills (OCP) was mentioned as a risk factor for breast cancer by 167 (41%) women, but 67 (16.4%) believed that use of OCP was protective. Knowing someone with breast cancer was mentioned to be a risk factor by only 39 (9.6%) and was believed to be a preventive factor by 90 women (22.1%). The median was used to classify the participants into two categories; High knowledge (higher than or equal to the median score of 6) and low knowledge (lower than the median score of 6). Table 3 represents a number of females classified as high knowledge group were 210 (51.6%) and those with low knowledge group were 197 (48.4%).

Table 3 Distribution of knowledge score strata by the median (6) among the participants

Knowledge Strata	n (%)
High knowledge	210 (51.6%)
Low knowledge	197 (48.4%)

Attitude towards Breast Cancer

Table 4 shows participants responses to the attitude questions towards breast cancer. Over 3 quarters 321 (79%) had a positive attitude towards the benefits of treatment of breast cancer, and 225 (55.3%) showed a positive attitude towards the concern of breast cancer. About 107 women (26.2%) reported feeling inhibition by their relatives or husbands to perform screening for breast cancer and 76 (18.6%) had neither inhibition nor encouragement to perform the tests.

Table 4 Participants Attitude toward breast cancer

Question	Negative Attitude	Fair Attitude	Positive Attitude
Feeling that treatment of breast cancer is beneficiary?	38 (9.0%)	18 (4.0%)	321 (79.0%)
Feeling that the problem of breast cancer does not concern you. Ex. (I'm not ill so it's not necessary)	116 (28.5%)	49 (12.0%)	225 (55.3%)
Discouraged by husband or others?	107 (26.2%)	76 (18.6%)	188 (46.0%)

The overall median (interquartile range) of the attitude score was 4 (3-5) out of 6. Accordingly, participants were categorized of low attitude if they scored less than the median or high attitude if they scored a value equal to or greater than the median. As such, the low attitude score group included 133 (32.6%) participants and the high attitude score group 274 (67.3%) participants.

The distribution of these 2 groups across the different recorded socio-demographic characteristics and breast cancer screening practices is shown in Table 5. The table shows no statistically significant differences in age, level of education, marital status or mammography screening. The only statistically significant difference between the 2 groups was observed in knowledge score, with a higher proportion of participants with a higher knowledge score among those with a higher attitude score Tables 6 and 7.

Table 5 Attitude score status by participant characteristics

Characteristic	Low Attitude Score (<4)	High Attitude Score (≥ 4)	p-value
	n (%)	n (%)	
Age (Years)			
<40	114 (85.7%)	234 (85.4%)	0.9330
≥ 40	19 (14.3%)	40 (14.6%)	
Education			
University and above	57 (42.9%)	115 (42.0%)	0.8650
High school and below	76 (57.1%)	159 (58.0%)	
Marital Status			
Married	64 (48.1%)	120 (43.8%)	0.4410
Unmarried	69 (51.9%)	154 (56.2%)	
Knowledge Score			
Low	81 (60.9%)	116 (42.3%)	<0.0001
High	52 (39.1%)	158 (57.7%)	

Table 6 Full logistic regression model for factors associated with low attitude score

Factor	B	S.E.	Wald	p-value	OR	OR 95%CI	
						Lower	Upper
Knowledge score							
High score	0.77	0.03	12.500	<0.0001	2.17	1.410	3.33
Low score							
Age							
≥ 40	0.01	0.33	0.007	0.9340	1.03	0.540	1.96
<40							
Education							
University and above	0.02	0.22	0.011	0.9150	1.02	0.662	1.58
High school and below							
Marital status							
Unmarried	0.25	0.23	1.170	0.2780	1.28	0.819	2.00
Married							

Table 7 Stepwise logistic regression for factors associated with low attitude score

Factor	B	S.E.	Wald	p-value	OR	OR 95%CI	
						Lower	Upper
Knowledge score							
High score	0.75	0.22	12.16	<0.0001	2.11	1.39	3.34
Low score							
OR: Odds ratio. P-value: Wald test. S.E: standard error							

Breast Self-Examination

Total 122 (30.3%) women reported that they practice BSE. Among these, 76 (19.6%) women performed the test every month. Only 59 (15.5%) women performed mammography screening every year and 41 (10.8%) every 2 years. To identify factors associated with BSE practice, a comparison across various sociodemographic characteristics among participants who indicated whether they ever practiced BSE and those who did not. The results are described in Table 8.

Table 8 Breast self-examination by patient characteristics

Characteristic	Practices breast cancer self-examination		p-value
	Yes (n=122)	No (n=265)	
	N (%)	N (%)	
Age (Years)			
<40	98 (80.3%)	250 (87.7%)	0.0520
≥ 40	24 (19.7%)	35 (12.3%)	
Education			
University and above	50 (41%)	122 (42.8%)	0.7330
High school and below	72 (59%)	163 (57.2%)	
Marital status			
Married	67 (54.9%)	117 (41.1%)	0.0100
Unmarried	55 (45.1%)	168 (58.9%)	
Mammography screening			
Yes	75 (61.5%)	102 (35.8%)	<0.0001
No	47 (38.5%)	183 (64.2%)	
Attitude score			
High(score ≥ 4)	94 (77%)	180 (63.2%)	0.0060
Low(score <4)	28 (23%)	105 (36.8%)	
Knowledge score			
High (score ≥ 6)	81 (66.4%)	129 (45.3%)	<0.0001
Low(score <6)	41 (33.6%)	156 (54.7%)	

The table shows significant differences in regard to marital status (p=0.010), mammography screening (p<0.0001), attitude and knowledge scores (p<0.0001). Those who performed BSE had higher proportions of those who are married (54.9% vs 41.1%), performed mammography screening (61.5% vs 35.8%), had higher attitude score (77% vs 63.2%) and knowledge score (66.4% vs 45.3%) compared with those who did not perform BSE. Further logistic regression models were fitted to ascertain factors associated with practicing BSE. These are described in Tables 9 and 10. In the above stepwise logistic regression model, the variables independently associated with performing BSE were being married (OR=1.69, 95% CI 1.05-2.72, p=0.03), performing a mammography test (OR=2.48, 95% CI 1.56-3.92, p<0.0001). In addition, those with lower knowledge score (OR=0.59, 95%CI 0.37-0.95, p=0.03) and lower attitude score (OR=0.55, 95% CI 0.33-0.92, p=0.02) were less likely to practice BSE.

Table 9 Univariate logistic regression analysis for factors associated with practicing of breast self-examination

Factor	B	S.E.	Wald	p-value	OR	OR 95%CI	
						Lower	Upper
Knowledge score							
High score	-0.53	0.24	4.68	0.03	0.6	0.37	0.95
Low score							

Age							
≥ 40	-0.1	0.33	0.09	0.77	0.91	0.47	1.74
< 40							
Education							
University and above	-0.08	0.24	0.11	0.74	0.92	0.58	1.47
High school and below							
Marital status							
Unmarried	0.53	0.24	4.7	0.03	1.69	1.05	2.72
Married							
Mammography screening							
Yes	0.90	0.24	14.31	<0.0001	2.456	1.54	3.91
No							
Attitude score							
High score	-0.60	0.26	5.29	0.02	0.55	0.33	0.92
Low score							

Table 10 Stepwise logistic regression for factors associated with practicing breast self-examination

Factor	B	S.E.	Wald	p-value	OR	OR 95%CI	
						Lower	Upper
Knowledge score							
High score	-0.53	0.24	4.7	0.03	0.59	0.37	0.95
Low score							
Marital status							
Unmarried	0.53	0.24	4.7	0.03	1.69	1.05	2.72
Married							
Mammography screening							
Yes	0.91	0.24	14.85	<0.0001	2.48	1.56	3.92
No							
Attitude score							
High score	-0.60	0.26	5.26	0.02	0.55	0.33	0.92
Low score							

Mammography Test

A further analysis was conducted to fully characterized the use of mammography test amongst study participants. Those who ever performed a mammography test were compared with those who did not across the various recorded socio-demographic characteristics. This descriptive analysis is shown in Table 11 which shows that these 2 groups differed significantly with respect to age (p=0.001), BSE practicing (p<0.0001) and knowledge score (p<0.0001). Participants performed this test were significantly older (20.9% vs 9.6%), had higher knowledge score (66.7% vs 40%) and perform BSE (42.4% vs 20.4%) test more frequently relative to those who did not perform mammography testing.

Table 11 Use of mammography by patient's characteristics

Characteristic	Performed mammography test?		p-value
	Yes (n=177)	No(n=230)	
	n(%)	n(%)	
Age			
<40	140 (79.1%)	208 (90.4%)	0.001
≥ 40	37 (20.9%)	22 (9.6%)	
Education			
University and above	71 (40.1%)	101 (43.9%)	0.442
High school and below	106 (59.9%)	129 (56.1%)	

Marital status			
Married	84 (47.5%)	100 (43.5%)	0.424
Unmarried	93 (52.5%)	130 (56.5%)	
Practicing BSE			
Yes	75 (42.4%)	47 (20.4%)	<0.0001
No	102 (57.6%)	183 (79.6%)	
Attitude score			
High(score ≥ 4)	123 (69.5%)	151 (65.7%)	0.413
Low(score <4)	54 (30.5%)	79 (34.3%)	
Knowledge score			
High (score ≥ 6)	118 (66.7%)	92 (40%)	<0.0001
Low(score <6)	59 (33.3%)	138 (60%)	

Table 12 represents the full regression model for factors associated with mammography testing; low knowledge score, young age, and BSE practice were the only significant variables in the model. Stepwise regression is summarized in Table 13 which shows that participants with inadequate knowledge score (OR=0.39, 95% CI 0.26-0.59, p<0.0001) age <40 years (OR=0.47, 95%CI 0.26-0.86, p=0.01), were less inclined to perform a mammography test. However, those who performed BSE practices were more likely to perform mammography testing (OR=2.37, 95% CI 1.51-3.74, p<0.0001) compared with those who do not practice BSE.

To further explore the association between age and mammography testing, a more refined analysis was done. The objective of this analysis was to determine whether mammography testing amongst the participants of this study was age-specific.

Table 12 Univariate logistic regression analysis for factors associated with the use of mammography

Factor	B	S.E.	Wald	p-value	OR	OR 95%CI	
						Lower	Upper
Knowledge Score							
High score	-0.10	0.22	19.60	<0.0001	0.38	0.24	0.58
Low score							
Age							
≥ 40	-0.09	0.33	6.82	0.009	0.42	0.22	0.81
< 40							
Education							
University and above	-0.05	0.22	0.05	0.83	0.95	0.62	1.47
High school and below							
Marital status							
Unmarried	-0.22	0.23	0.93	0.34	0.80	0.51	1.26
Married							
Practicing BSE							
Yes	0.90	0.24	14.66	<0.0001	2.47	1.56	3.92
No							
Attitude score							
High score	0.13	0.23	0.32	0.57	1.14	0.72	1.80
Low score							

Table 13 Stepwise logistic regression for factors associated with the use of mammography

Factor	B	S.E.	Wald	p-value	OR	OR 95% CI	
						Lower	Upper
Knowledge score							
High score	-0.94	0.22	19.12	<0.0001	0.39	0.26	0.59
Low score							
Age							
≥ 40	-0.75	0.3	6.04	0.0100	0.47	0.26	0.86
< 40							

Practicing BSE							
Yes	0.87	0.23	13.86	<0.0001	2.37	1.51	3.74
No							

In Table 14, age was further categorized into 6 age groups between age 18-55 years with a 10 years class interval, and mammography testing into 4 groups (every year, every two years, other frequency or never) as shown below. This analysis further confirms that the performance of mammography testing was age-specific (Chi-square p-value<0.0001).

Table 14 Age-specific distribution of mammography practice

Age-categories (Years)	Mammography Practice n (%)				Total
	Every-year	2-years	Never	Others	
18-28	26 (10.6%)	19 (7.7%)	143 (58.1%)	58 (23.6%)	246 (100.0%)
29-39	9 (10.8%)	15 (18.0%)	46 (55.4%)	13 (15.6%)	83 (100.0%)
40-49	19 (46.3%)	7 (17.0%)	12 (29.2%)	3 (7.3%)	41 (100.0%)
50-55	5 (45.4%)	0 (0.0%)	3 (27.2%)	3 (27.2%)	11 (100.0%)
Total	59 (15.5%)	41 (10.8%)	204 (53.5%)	77 (20.2%)	381 (100.0%)

DISCUSSION

Breast cancer is the most common of all female cancers in the Kingdom of Saudi Arabia [9,10]. This study provides valuable insights into the knowledge, attitude, and practices of Saudi females towards breast cancer. Study findings indicate significantly inadequate knowledge, inappropriate attitude towards breast cancer as well as inappropriate screening practices among Saudi women. The median of knowledge and attitude scores were used to classify the participants into higher and knowledge strata as well as higher and lower attitude strata. Those classified as high knowledge group comprised slightly over half of the study participants 210 (51.6%) and those with low knowledge were 197 (48.4%).

Regarding attitude, the median (interquartile range) for attitude score was 4 (3-5) out of 6. Women with higher attitude comprised 274 (67.3%) and those with lower attitude were 133 (32.6%). The analysis of the knowledge of individual risk factors reveals that 57.2% of the respondents in this study recognized family history as a risk factor of breast cancer. This proportion is higher compared with estimates reported in KAP studies carried out in AL-Qassim (42%), AL-Hasaa (33.1%) [10], Buridah survey among teachers (22.1) but lower than those reported in studies carried out in Iran (74.6%) and Singapore (78.7%) [11].

In this study, the recognition of oral contraceptives as a risk factor for breast CA was 41%. The proportion of 42% was reported in a KAP study conducted in AL-Madinah [12]. This is in contrast to estimates of other reports; 48.3% in Abha, 56% in AL-Qassim, and higher than reported by more westernized country of UK with a proportion of 35% [13], and Eastern study with a proportion of 21.6% in Singapore [11]. Similarly, knowledge regarding smoking as a risk factor was correct in 62.8% of the respondents. This is relatively lower than the proportion reported in AL-Qassim study (73%) and is much higher than the proportion calculated in the Singaporean study (24.6%) [11].

This study shows that giving birth after the age of 30 years was found as a risk factor by only less than a quarter 98 (24%) of the participants. In a similar study conducted in Abha city, giving birth before the age of 40 years was recognized by 40.8% of the participants as a protective factor against breast cancer [14]. This finding might be explained by the perception that the acquisition of more information regarding cancer will be more enhanced when interacting with some breast cancer patient.

Regarding screening practices in this study, 122 (30.3%) women reported that they practiced breast self-examination and 15.5% of women performed radiological screening every year. This study further indicates that married women are performing the BSE test more frequently than unmarried women, and those who do mammography testing have an increased likelihood of also doing the test as opposed to those who do not. The association between age and mammography testing was highly significant when the age of participants was further categorized into 6 age groups between age 18-55 years with a 10 years class interval, and mammography testing into 4 groups (every year, every 2 years, other frequency or never). In 2004, a similar study was carried out in Riyadh [15], which reported a relatively

higher proportion of BSE (41.2%) and (18.2%) had undergone mammography without specification mentioned regarding the frequency of BSE practicing.

Knowledge seems to have a decisive factor in the adoption of proper attitudes towards the recommended examination and in turn proper practices. Therefore, we anticipate that having proper knowledge about breast cancer risk and preventive factors is essential features to bring about positive behavioral changes, although we recognize that this is not the only determinant factor of health practices.

CONCLUSION

Saudi Arabia is characterized by having breast cancer as the first cause of death among women, and by earlier ages at time of diagnosis of the disease. Despite that, Saudi women still have low knowledge and attitude toward breast cancer risk factors and low early detection and screening practices. This study demonstrates low knowledge but the relatively higher attitude of the Saudi women participants. There is well-known interaction between knowledge, attitude, and practices toward breast cancer. Keeping and enhancing awareness toward breast cancer play a critical rule to lessen the impact of breast cancer, therefore lessen the psychological and economic stressors on the population as a whole.

DECLARATIONS

Acknowledgment

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Availability of Data and Materials

All the datasets analyzed or generated during the present study are not publicly available due to ethical considerations.

Authors' Contributions

MAD designed the study, collected the data and wrote the first draft of the manuscript, MA contributed to the data analysis for this study, RN supervised this study and edited the manuscript, FA contributed in the data collection of this study, MF contributed in editing and writing the final draft of the manuscript.

Ethics Approval and Consent to Participate

All the necessary approvals for carrying out the research were obtained. The study was approved by the institutional review board at King Khalid University Hospital, Riyadh, prior to its initiation. A written consent explaining the purpose of the research was prepared to be signed by the participants. In order to maintain confidentiality, questionnaires were made anonymous.

Conflict of Interests

The authors declare that they have no competing interests.

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