

# Awareness, attitude, and practices of adult females in Aseer Region, Saudi Arabia, about early detection of breast cancer

Abdulmohsen M.S. Alqahtani<sup>1</sup>; Faisal Abdullah I. Alshyer<sup>1</sup>;  
 Mohammed Abdullah S. Alrabie<sup>1</sup>; Abdulrahman Mohammed A Alshehri<sup>1</sup>;  
 Abdulkarim Abdurahman M. Alshehri<sup>1</sup>; Fowziah Mastour A. Al-Jouid<sup>2</sup>;  
 Ali A. Al-Mousa AlQahtani<sup>3</sup>

1. Medical Students, King Khalid College of Medicine, Abha, Saudi Arabia

2. Nursing Specialist, King Faisal Medical Complex, Taif, Saudi Arabia

3. Family Medicine Consultant, General Directorate of Health, Aseer Region, Saudi Arabia

## Corresponding Author

Abdulmohsen Mousa S. Almousa

Email: bshre0@gmail.com

Received: November 2023. Accepted: November 2023; Published: December 1, 2023.

Citation: Abdulmohsen Mousa S. Almousa et al. Awareness, attitude, and practices of adult females in Aseer Region, Saudi Arabia, about early detection of breast cancer. World Family Medicine. December 2023; 21(11): 96-108

DOI: 10.5742/MEWFM.2023.95256236

## Abstract

**Aim of Study:** To assess the awareness level of women about breast cancer as a major threat to women's health and the importance of its early detection.

**Methods:** This study followed a cross-sectional research design, which included 400 adult Saudi women, without breast cancer, who live in Aseer Region, Saudi Arabia. An online study questionnaire was developed in a simple Arabic language. It comprised participants' personal characteristics; their awareness about breast cancer; assessment of risk factors for breast cancer; and their attitude and screening practices for breast cancer.

**Results:** Only 59.4% of the participants were aware that breast cancer could be inherited in some families. The majority of the participants (78%) were aware that breastfeeding could protect against breast cancer. Early menarche and late menopause were recognized as risk factors for breast cancer by only 13.5% and 21.3% of the respondents respectively. Similarly, only 24.3% of the respondents answered correctly that the late age of first full-term pregnancy is a risk factor for breast cancer. More than half of the respondents (54.5%) were aware that hormonal replacement therapy is a risk factor for breast cancer. Women who had higher levels of education showed significantly more sufficient knowledge regarding breast cancer risk factors compared to those who were illiterate (48.2% versus 16.4%,  $P < 0.001$ ). The majority of women, 91.5%, who have heard of BSE, recognized that it should be

done to search for tumours, while only 37.8%, 18.5%, and 27.4% recognized that the objective of BSE is to look for nipple discharge, nipple changes, and changes in the skin of the breast, respectively. Most of the participants in the 18-30 years age group (76.0%) have heard of BSE as compared to only 13.5% of those aged over 50. This association between women's ages and hearing of BSE was statistically significant ( $P < 0.001$ ). The majority of non-married women have heard of BSE (82.9%) as opposed to 53.1% of married women ( $P < 0.001$ ). More employed women have heard of BSE than non-employed women (81.0% vs. 54.0%,  $p < 0.001$ ). More women with a university education have heard of BSE than those who are illiterate and those who have a school education (79.8% vs. 18.2% and 62.5% respectively,  $P < 0.001$ ).

**Conclusions:** Knowledge levels of adult Saudi women in Aseer Region about breast cancer risk factors and screening methods are suboptimal. The awareness and practice of BSE among them is generally poor. Primary healthcare professionals have a limited role in educating women regarding breast cancer issues.

**Key Words:** Awareness, attitude, practice, Women, Early detection of breast cancer, Saudi Arabia.

## Introduction

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020, with breast cancer being the most common (2.26 million new cases and 685,000 deaths) (1). Generally, the breast cancer rate is higher in developed than in developing countries. This difference may be due to relatively low awareness, screening practices, and diagnoses in developing countries. Nevertheless, the rates are increasing rapidly in many developing countries (2).

Breast cancer remains the leading cause of death among Saudi women (3). It has a significant impact on the health of women worldwide, and Saudi Arabia is no exception (4). In Saudi Arabia, breast cancer was ranked first among females in 2014. It accounted for 15.9% of all cancers reported among Saudi nationals and for 28.7% of all cancers reported among females of all ages. The age-standardized rate was 22.7/100,000 for the female population while, at diagnosis, the median age was 50 years (3).

Balekouzou et al. (5) noted that early detection of breast cancer could decrease the risks, be more likely to have a better prognosis, and better outcomes/more successful treatments. On the other hand, a delayed diagnosis of breast cancer, and consequently worse prognosis, have been attributed to a lack of awareness of breast cancer risks or the presence of barriers limiting women to utilize healthcare services. Therefore, early detection of breast cancer could occur through increasing the awareness of women toward breast self-examination (BSE), clinical breast examination, and mammography screening utilization (6).

In Saudi Arabia, most women present at advanced stages of breast cancer, especially among young pre-menopause women (7). The prevalence of breast cancer reached more than 25% of all diagnosed cancers among women in the Kingdom(8).

Lack of knowledge of breast cancer risks and low utilization of mammograms are reported among women in Saudi Arabia (9).

Education for breast cancer prevention could decrease the burden of breast cancer risks (10), which might be achieved through the implementation of strategies for primary prevention. These strategies included increasing the awareness of women about breast cancer risk factors, adherence to healthy lifestyle habits, lowering their weight, breastfeeding, being physically active, and preventing alcohol consumption which is considered the major cause of breast cancer among women (11-15).

In Saudi Arabia, breast cancer is the leading cause of death among women (3). Its incidence is increasing rapidly in many developing countries (2). Its early detection is associated with decreased risks, better prognosis, and more successful treatments (5). This can be achieved by increasing the awareness of women toward BSE, clinical breast examination, and mammography screening utilization (6).

This study aimed to assess the awareness level of women about breast cancer as a major threat to women's health and the importance of its early detection.

## Subjects and Methods

Following a cross-sectional research design, the present study included adult Saudi women (aged >18 years), without breast cancer, who live in Aseer Region, Saudi Arabia. Non-Saudi women, who live outside Aseer Region, and those with a confirmed diagnosis of breast cancer were excluded.

A convenience sampling was followed. The sample size was determined according to Dahiru et al. (16), as follows:  $n = (Z\alpha^2 \times P \times Q) / D^2$

where:

- n: Calculated sample size
- $Z\alpha$ : The z-value for the selected level of confidence ( $1-\alpha$ ) = 1.96.
- P: Estimated prevalence of women's awareness in the study population (assumed to be 50%, i.e., 0.5).
- Q:  $(1 - P) = 0.5$
- D: The maximum acceptable error = 0.05.

The minimum sample size was calculated to be 384 participants. However, the sample size was increased to 400 participants to compensate for missing data.

A study questionnaire was developed in a simple Arabic language. It was adapted from those used by similar studies (17-20). The study questionnaire comprised the following parts:

- 1- Personal characteristics (8 questions): Age, having regular menses, marital status, absolute breastfeeding practices, educational status, employment status, average monthly family income, and residence.
- 2- Awareness about breast cancer (6 questions): Having heard about breast cancer, sources of information about breast cancer, knowing a woman who has been diagnosed with breast cancer, screening methods, risk factors, and symptoms of breast cancer.
- 3- Assessment of risk factors for breast cancer (14 questions): Age at menarche, age at marriage, age at first pregnancy, number of pregnancies and abortions, number of children, use of hormonal contraceptives, family history of cancer of the breast, practice of physical activity, and smoking status.
- 4- Attitude and screening practices for breast cancer (12 questions): Age at start of BSE, being vulnerable to breast cancer, benefits of early diagnosis of breast cancer, advising others to perform BSE, what has been done for early diagnosis of breast cancer, intention to perform BSE in the future, sources of advice to perform BSE, frequency of performing BSE, how to perform BSE, and reasons for not performing BSE.

An electronic copy of the study questionnaire was designed using the Google Forms. Participants were invited through their social media groups and their WhatsApp

accounts. The study obtained the official approval from the Aseer Institutional Review Board (IRB), (#H-06-B-091) on March 4th, 2023.

All participants were informed about the study objectives and were asked to provide their consent to participate on the first page of the online questionnaire, and then to answer the questions. All respondents received a brief description of the study and its objectives. Collected data were secured by restricting unauthorized access.

### Statistical Analysis

Collected data were statistically analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 28). Descriptive statistics (i.e., frequency and percentage for categorical data; and mean and standard deviation for quantitative data) were calculated. Testing significance of differences was applied using the chi-square ( $\chi^2$ ) test. P-values  $<0.05$  were considered as statistically significant.

## Results

Participants' socio-demographic characteristics are presented in Table (1). Almost two-thirds of the respondents (60.4%) were in the age group 18-30 years and only 9.3% of them were over 50 years. Two hundred and seven (51.8%) were married. Exactly half of them (50%) were employed. Approximately two-thirds (64.2%) had a university education and 55 (13.8%) had no formal education.

Table (2) shows the participants' knowledge of risk factors for breast cancer. In response to the question on the inheritability of breast cancer, only 238 (59.4%) were aware that breast cancer could be inherited in some families. The majority of the respondents (78%) were aware that breastfeeding could protect against breast cancer. Early menarche and late menopause were recognized as risk factors for breast cancer by only 13.5% and 21.3% of the respondents respectively. Similarly, only 24.3% of the respondents answered correctly that the late age of first full-term pregnancy is a risk factor for breast cancer. More than half of the respondents (54.5%) were aware that hormonal replacement therapy is a risk factor for breast cancer. High-fat diet and lack of physical exercise were recognized as risk factors for breast cancer by 29.5% and 37% of the respondents respectively.

Figure (1) displays that 35 women (8.8%) did not answer any question correctly while 102 women (25.5%) answered more than five questions correctly.

Socio-demographic determinants of breast cancer risk factors knowledge are presented in Table (3). Sufficient knowledge was reported by 44.4% of respondents in the age group between 41 and 50 years compared to only 29.7% of those aged over 50 years. However, this difference was not statistically significant. Women who had higher levels of education showed more sufficient knowledge regarding breast cancer risk factors compared to those who were illiterate (48.2% versus 16.4%). This

difference was statistically significant ( $P<0.001$ ). There was no significant association between the level of knowledge of breast cancer risk factors and both marital status and work status.

### Breast self-examination knowledge and practice

Figure (2) shows that about two-thirds of the participants have heard of BSE (67.5%). Figure (3) shows that about one-third of the participants had practiced BSE (37.8%). Figure (4) displays the reasons for non-practicing of BSE among those who claimed that they did not practice BSE. In more than half of them (51.3%), the reason was the carelessness of the participants. The reason for non-practicing BSE was fear/anxiety and ignorance of the proper technique among 26.9% and 21.8% of the participants respectively. Figure (5) shows that 25.2% and 23% of those who have heard of BSE claimed that their sources of information regarding BSE were their study curriculum and TV/press media respectively. Only 13.3% and 15.2% of them claimed that their sources of information were physicians and the Internet respectively.

Table (4) illustrates the knowledge of BSE among those who have heard of it ( $n=270$ ). Most of them answered correctly the question about the optimal BSE frequency (72.2%). The majority of women, 91.5%, who have heard of BSE, recognized that it should be done to explore for tumors, while only 37.8%, 18.5%, and 27.4% recognized that the objective of BSE is to look for nipple discharge, nipple changes, and changes in the skin of the breast, respectively. More than half of women with BSE familiarity (54.8%), answered correctly that they should not wear gloves during BSE. Most of them (80.4%) recognized that they should stand in front of a mirror while practicing BSE.

Table (5) presents the association between socio-demographic characteristics of the participants and their familiarity with BSE. Most of the women in the 18-30 years age group (76.0%) have heard of BSE as compared to only 13.5% of those aged over 50 years. This association between women's ages and hearing of BSE was statistically significant ( $P<0.001$ ). The majority of non-married women have heard of BSE (82.9%) as opposed to 53.1% of married women. This difference was statistically significant ( $P<0.001$ ). More employed women have heard of BSE than non-employed women (81.0% versus 54.0%). This difference was statistically significant ( $P<0.001$ ). Educational level was significantly associated with BSE familiarity. More women with a university education have heard of BSE than those who are illiterate and those who have a school education (79.8% versus 18.2% and 62.5% respectively), ( $P<0.001$ ).

Table (6) illustrates the association between the socio-demographic characteristics of the participants and their history of practicing BSE. Slightly less than half of the women in the age group 18-30 years (47.1%) have practiced BSE as compared to only 13.5% of those aged over 50 years. This association between women's ages and practicing BSE was statistically significant

( $P < 0.001$ ). Regarding marital status, non-married women have practiced BSE more than married women (52.3% versus 24.2%). This difference was statistically significant ( $P < 0.001$ ). Working women practiced BSE more than non-working women (52.5% versus 23.0%). This difference was statistically significant ( $P < 0.001$ ). The educational level was significantly associated with BSE practice among participants. Women who had a university education practiced BSE more than those who were illiterate and those who had a school education (50.6% versus 0.0% and 23.9% respectively) ( $P < 0.001$ ).

Table (7) shows that the highest knowledge score regarding BSE was reported among women in the 41-50 age group (61.5%) who had sufficient BSE knowledge compared to none of those aged over 50 and 26.6% of those in the 18-30 age group. These differences were statistically significant ( $P < 0.001$ ). Women who had their information from physicians had the highest BSE knowledge score as 72.2% of them had sufficient knowledge compared to 19.4% and 22% of those who depended on TV and the internet as a source of BSE information, respectively. The association between the source of information and BSE knowledge level was statistically significant ( $P < 0.001$ ). Educational level, work status, and marital status were not statistically significantly associated with the level of BSE knowledge.

Table 1: Socio-demographic characteristics of the study participants

Variables	Categories	No. (%)
Age (in years)	18-30	242 (60.4)
	31-40	76 (19.0)
	41-50	45 (11.3)
	>50	37 (9.3)
Marital status	Married	207 (51.8)
	Non-married	193 (48.2)
Employment status	Employed	200 (50.0)
	Unemployed	200 (50.0)
Educational level	Illiterate	55 (13.8)
	School †	88 (22.0)
	University	257 (64.2)

† Primary, intermediate, or secondary schools

Table 2: Participants' knowledge of risk factors for breast cancer

Risk factors	Correct answer No. (%)	Incorrect answer No. (%)	Don't know No. (%)
Early menarche	54 (13.5)	178 (44.5)	168 (42.0)
Late menopause	85 (21.3)	131 (32.7)	184 (46.0)
Late age of first full-term pregnancy (>30 years)	97 (24.3)	135 (33.7)	168 (42.0)
Never breastfed a child	312 (78.0)	39 (9.8)	49 (12.2)
Family history of breast cancer	238 (59.4)	93 (23.3)	69 (17.3)
Hormonal-replacement therapy	218 (54.5)	48 (12.0)	134 (33.5)
Taking oral contraceptives for a long period	203 (50.7)	56 (14.0)	141 (35.3)
High-fat diet	118 (29.5)	114 (28.5)	168 (42.0)
Lack of physical exercise	148 (37.0)	105 (26.3)	147 (36.7)
Diabetes mellitus	75 (18.8)	139 (34.8)	186 (46.5)

**Figure 1: Distribution of the participants according to the number of correctly answered questions regarding breast cancer risk factors**

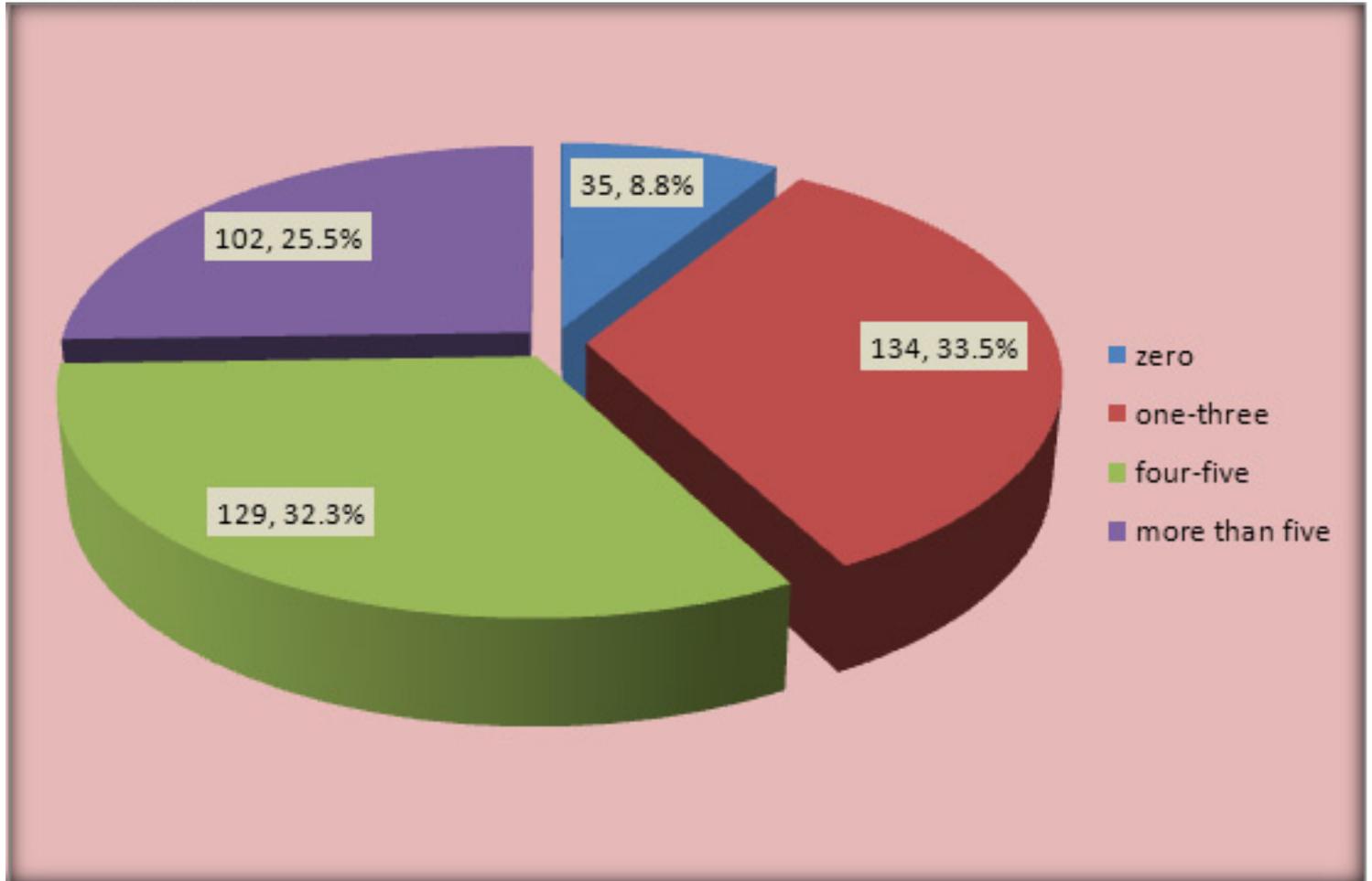


Table 3: Association between knowledge of breast cancer risk factors and relevant variables

Variables	Knowledge		$\chi^2$ (P-value)
	Sufficient No. (%)	Insufficient No. (%)	
<b>Age in years</b>			
• 18-30 (n=242)	101 (41.7)	141 (58.3)	2.21 (0.529)
• 31-40 (n=76)	31 (40.8)	45 (59.2)	
• 41-50 (n=45)	20 (44.4)	25 (55.6)	
• >50 (n=37)	11 (29.7)	26 (70.3)	
<b>Marital status</b>			
• Married (n=207)	82 (39.6)	125 (60.4)	0.23 (0.684)
• Not married (n=193)	81 (42.0)	112 (58.0)	
<b>Employment status</b>			
• Employed (n=200)	88 (44.0)	112 (56.0)	1.75 (0.222)
• Unemployed (n=200)	75 (37.5)	125 (62.5)	
<b>Educational level</b>			
• Illiterate (n=55)	9 (16.4)	46 (83.6)	21.15 (<0.001)
• School (n=88)	30 (34.1)	58 (65.9)	
• University (n=257)	124 (48.2)	133 (51.8)	

Figure 2: Distribution of the participants according to their awareness of BSE

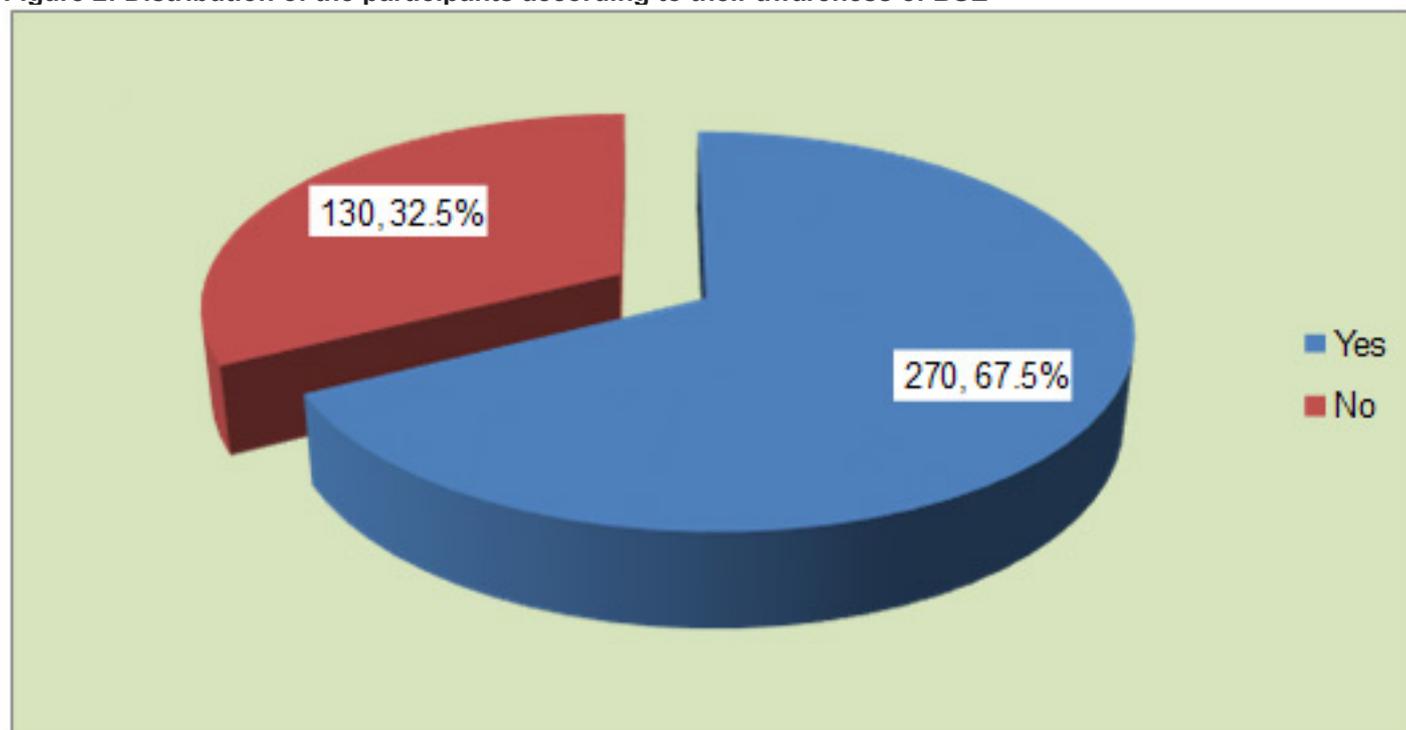


Figure 3: Distribution of the participants according to their BSE practice

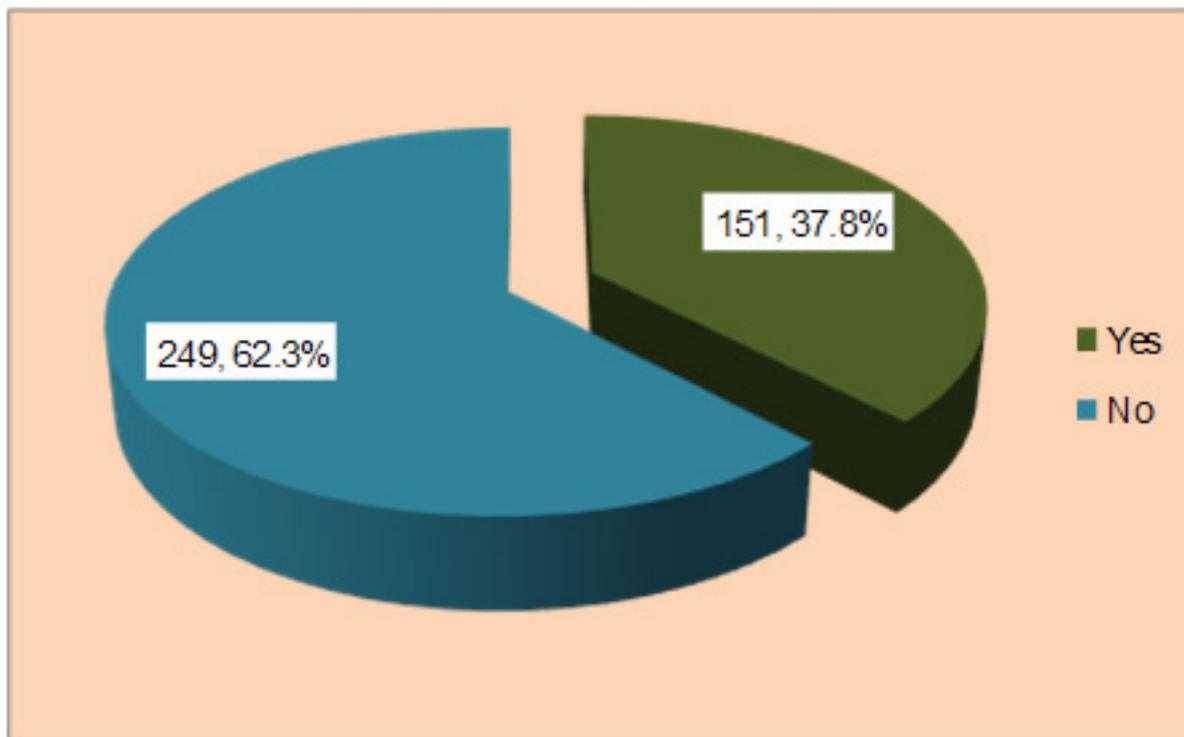


Figure 4: Reasons for non-practicing BSE among participants (n=249)

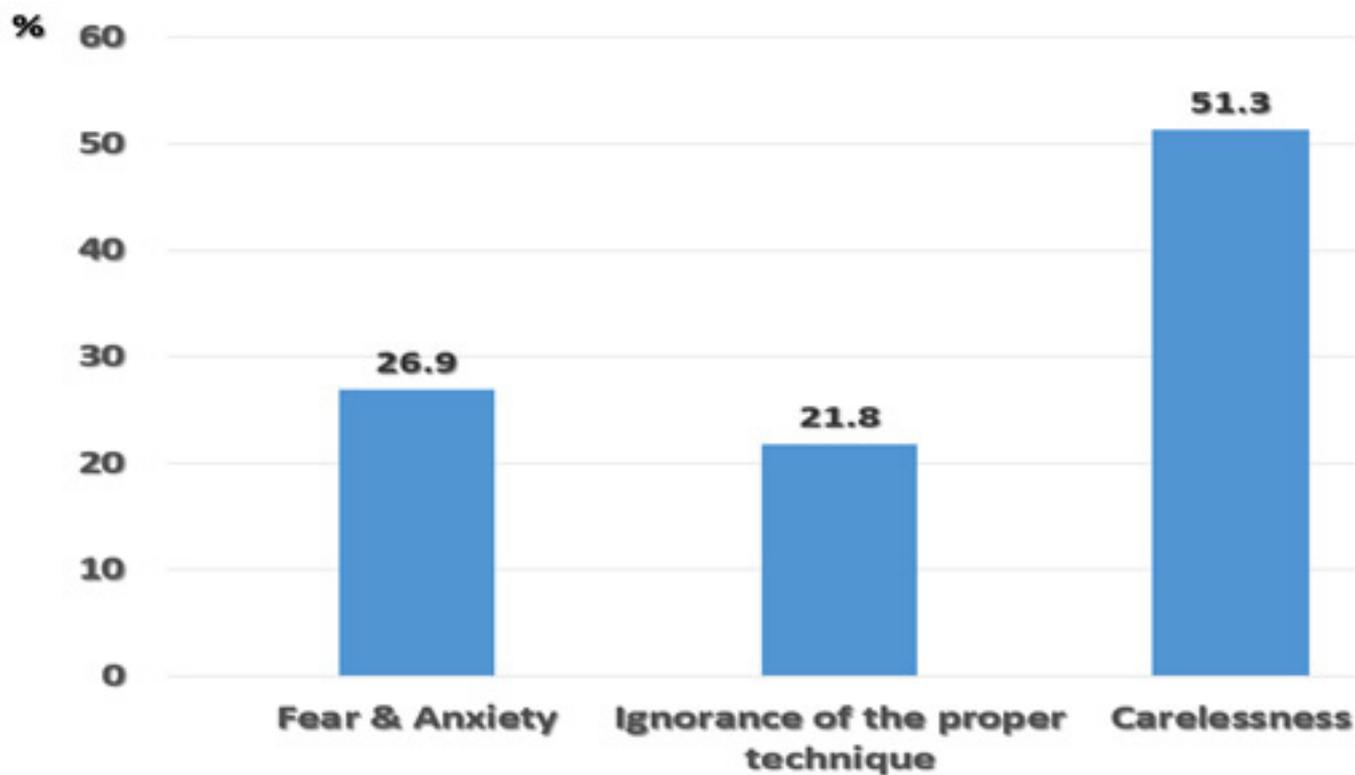


Figure 5: Source of information regarding BSE (n=270)

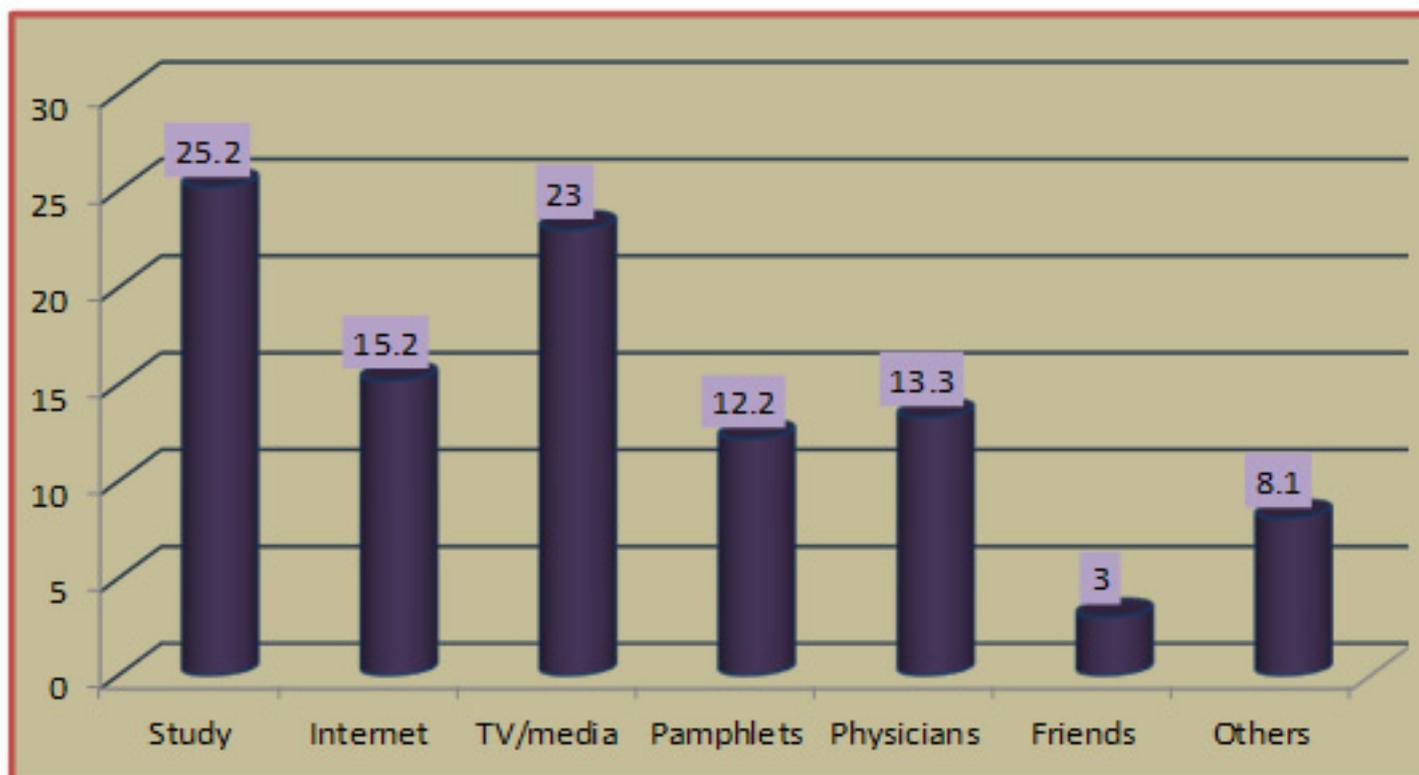


Table 4: Knowledge of BSE among participants (n=270)

Items	No. (%)
<b>1. Optimal frequency for practicing BSE</b>	
• Correct answer	195 (72.2)
• Incorrect answer	75 (27.8)
<b>2. Objectives of BSE</b>	
- Searching for tumors	
• Correct answer	247 (91.5)
• Incorrect answer	23 (8.5)
- Looking for nipple discharge	
• Correct answer	102 (37.8)
• Incorrect answer	168 (62.2)
- Looking for nipple change	
• Correct answer	50 (18.5)
• Incorrect answer	220 (81.5)
- Looking for a change in the skin of the breast	
• Correct answer	74 (27.4)
• Incorrect answer	196 (72.6)
- Wearing gloves during BSE	
• Correct answer	148 (54.8)
• Incorrect answer	81 (30.0)
• Do not know	41 (15.2)
- Standing in front of a mirror during BSE	
• Correct answer	217 (80.4)
• Incorrect answer	15 (5.6)
• Do not know	38 (14.1)

Table 5: Association between hearing about BSE and relevant variables

Variables	Practice BSE		$\chi^2$ (P-value)
	Yes No. (%)	No No. (%)	
<b>Age in years</b>			
• 18-30 (n=242)	114 (47.1)	128 (52.9)	25.39 (<0.001)
• 31-40 (n=76)	22 (28.9)	54 (71.1)	
• 41-50 (n=45)	10 (22.2)	35 (77.8)	
• >50 (n=37)	5 (13.5)	32 (86.5)	
<b>Marital status</b>			
• Married (n=207)	50 (24.2)	157 (75.8)	33.74 (<0.001)
• Not-married (n=193)	101 (52.3)	92 (47.7)	
<b>Employment status</b>	105 (52.5)	95 (47.5)	37.03 (<0.001)
• Employed (n=200)	46 (23.0)	154 (77.0)	
• Unemployed (n=200)	0 (0.0)	55 (100.0)	58.59 (<0.001)
<b>Educational level</b>	21 (23.9)	67 (76.1)	
• Illiterate (n=55)	130 (50.6)	127 (49.4)	
• School (n=88)			
• University (n=257)			

Table 6: Association between practicing breast self-examination and relevant variables

Variables	Practice BSE		$\chi^2$ (P-value)
	Yes No. (%)	No No. (%)	
<b>Age in years</b>			
• 18-30 (n=242)	114 (47.1)	128 (52.9)	25.39 (<0.001)
• 31-40 (n=76)	22 (28.9)	54 (71.1)	
• 41-50 (n=45)	10 (22.2)	35 (77.8)	
• >50 (n=37)	5 (13.5)	32 (86.5)	
<b>Marital status</b>			
• Married (n=207)	50 (24.2)	157 (75.8)	33.74 (<0.001)
• Not-married (n=193)	101 (52.3)	92 (47.7)	
<b>Employment status</b>	105 (52.5)	95 (47.5)	37.03 (<0.001)
• Employed (n=200)	46 (23.0)	154 (77.0)	
• Unemployed (n=200)	0 (0.0)	55 (100.0)	58.59 (<0.001)
<b>Educational level</b>	21 (23.9)	67 (76.1)	
• Illiterate (n=55)	130 (50.6)	127 (49.4)	
• School (n=88)			
• University (n=257)			

Table 7: Association between BSE knowledge and relevant variables (n=270)

Variables	BSE knowledge		$\chi^2$ (P-value)
	Sufficient No. (%)	Insufficient No. (%)	
<b>Age in years</b>			
18-30 (n=184)	49 (26.6)	135 (73.4)	15.74 (0.001)
31-40 (n=55)	15 (27.3)	40 (72.7)	
41-50 (n=26)	16 (61.5)	10 (38.5)	
>50 (n=5)	0 (0.0)	5 (100.0)	
<b>Marital status</b>			
Married (n=110)	37 (33.6)	73 (66.4)	1.43 (0.145)
Not-married (n=160)	43 (26.9)	117 (73.1)	
<b>Employment status</b>			
Employed (n=162)	49 (30.2)	113 (69.8)	0.01 (0.914)
Unemployed (n=108)	32 (29.6)	76 (70.4)	
<b>Educational level</b>			
Illiterate (n=10)	2 (20.0)	8 (80.0)	2.70 (0.259)
School (n=55)	21 (38.2)	34 (61.8)	
University (n=205)	157 (27.8)	148 (72.2)	
<b>Source of information</b>			
Study (n=68)	14 (20.6)	54 (79.4)	47.02 (<0.001)
Internet (n=41)	9 (22.0)	32 (78.0)	
TV/press media (n=62)	12 (19.4)	50 (80.6)	
Pamphlets (n=33)	15 (45.5)	18 (54.5)	
Physicians (n=36)	26 (72.2)	10 (27.8)	
Friends/relatives (n=8)	0 (0.0)	8 (100.0)	
Others* (n=22)	4 (18.2)	18 (81.8)	

\*Books, conferences, and general knowledge

## Discussion

In Saudi Arabia, breast cancer is the most common cancer, ranked first among females and accounting for 20.6% of all newly diagnosed female cancers. It usually presents at advanced stages and more frequently in young women in comparison to Western countries (21). In the present study, the knowledge of risk factors for breast cancer was unsatisfactory as only one-quarter of participants were able to answer five or more (out of 10) questions correctly.

Study findings confirmed the unsatisfactory knowledge regarding risk factors. The level of women's knowledge about breast cancer risk factors and screening methods previously reported among Saudi women (22). In a study done in the Qassim region, 76% of the participants were able to answer correctly 3 out of 7 questions (20).

The analysis of the knowledge of individual risk factors revealed that among the most identified risk factors were non-breastfeeding and hormonal treatment, which might reflect the religious culture that encourages, breastfeeding and natural methods of birth control. Almost 59.4% of respondents in the current survey recognized that family history was a risk factor for breast cancer compared to only 42% in a study done in the Qassim region (20). However, this proportion is low when compared with the studies carried out in the United Kingdom (UK) (90%), (23). Among studies in Tehran (63%)(24) and Singapore (78.3%), (25) participants were aware of the fact that a positive family history is a risk factor for breast cancer. In the present study, the knowledge of oral contraceptives as a risk factor was 50.6% as compared to 56% in the Qassim study, (20) 35% in the UK study (23) and 21.6% in the Singapore study (25). It is argued that ignorance regarding the risk of breast cancer makes it unlikely that at-risk females could currently make informed decisions on a range of breast issues (26).

Despite inconclusive evidence, it is thought that BSE makes women more “breast aware”, which in turn may lead to earlier diagnosis of breast cancer. Two-thirds of respondents (67.5%) in the current study had heard about BSE. This rate is higher when compared with similar studies carried out in Jeddah, (8) Qassim, (20) Riyadh (27), and Alexandria, (28) where 39.6%, 30%, 12%, and 10.4% of the participants reported being aware of BSE respectively. However, it is low in comparison to similar studies in KSA, (29) Europe (30-31) and Nigeria (32).

In the current study, 37.8% of the participants claimed that they practiced BSE. This figure is lower than the rate of BSE practice of 44% and 52% reported in studies done in Europe and Hong Kong (33-34).

A higher rate of BSE practice was also reported in KSA in which 66% of the nursing students reported to perform BSE (12). However, the nursing students, being related to the medical profession, may have a higher level of awareness and are different from the current participants. The proportion of BSE performance in our study is greater when compared to similar studies carried out in Egypt (2.65%), (28) Iran (6%) (24), and Qassim (19%) (20).

The reasons for non-practicing of BSE in the current study were carelessness in 59.7% and ignorance of the proper technique of BSE in 21.8%. This finding claims the importance of a proper health education program for BSE. To confirm the role of proper BSE health education, a randomized clinical trial of nurse-provided, community-based teaching of BSE in Shanghai, was conducted. Women showed that at baseline, 9% of the intervention and 6% of the control groups did BSE at least every other month. After 12 months, 34% of the intervention, but only 11% of the control group did BSE that often ( $P < 0.001$ ) (35).

Some factors were significantly responsible for a better knowledge level regarding BSE practice among participants. Statistical analysis indicated that performing BSE was significantly related to age, marital status, education, and working status. Those aged between 40 and 50 years showed the best level of knowledge. However, many studies pointed to the negative association of knowledge scores with age (36). The age of participants in this study was considered fairly young (60.4% were under 30 years) which coincides with the literature. In this study, an association was observed between the level of respondents' education and their awareness of BSE; those who had a university education were more knowledgeable and practiced BSE more. This finding is consistent with other studies conducted among nursing students in KSA (12) and healthcare workers in Iran (24).

It has been shown that women with less formal education were more likely to have inadequate knowledge about breast cancer which inversely influenced their breast cancer screening behaviors (37). The same finding has been mentioned by Montazeri et al. in Iran (38).

The source of information regarding BSE in the current study was physicians in 13.3% and pamphlets/brochures in 12.2%. This finding reflected a lack of active participation of healthcare workers in the health education of patients despite their great role in education as the best level of knowledge was reported among women who received information from physicians. The same has been reported in Qassim, KSA (20), and Nigeria (32) where mass media was the main source of information about breast cancer.

All participants in the current survey had positive attitudes towards breast cancer screening. This finding is in comparison with the study carried out in Jeddah, (8) where 82.4% had a positive attitude towards practicing and teaching BSE. This could be attributed to the fact that almost two-thirds of respondents in the current study had a university education.

In conclusion, our study findings confirm the suboptimal knowledge level of women about breast cancer risk factors and screening methods. The awareness and practice of BSE is generally unacceptable. Primary healthcare professionals have a limited role in educating women regarding breast cancer issues. The results of the present survey provide valuable clues and perspectives toward the formulation of relevant breast cancer prevention strategies in Abha City, Saudi Arabia.

Therefore, this study recommends a focused breast cancer education program to improve the knowledge about breast cancer and change misconceptions about risk factors. Primary health care professionals should play an important role in conveying correct information regarding breast cancer during regular physician office visits for other health issues. Educational programs could be designed to meet the women's needs in their workplace environment. The group approach would foster the regular practice of BSE as some women could be trained to act as peer educators for others, and encourage the production of electronic and print media that would provide access to comprehensive information on breast cancer risk factors as well as on BSE for these women. Health education programs should be targeted to women through various media including leaflets, television, and radio. Health education should be channeled through women-friendly agencies/ organizations such as hospital antenatal and postnatal clinics, religious organizations, and women's organizations. Non-governmental and other charitable organizations can also make significant contributions to “breast awareness” by sponsoring health talks, symposia, and workshops targeted at relevant segments of the population.

## References

- 1- WHO. World Health Organization, "Cancer," retrieved from <http://www.who.int/topics/cancer/en/> on September 10, 2021.
- 2- Rojas K, Stuckey A. Breast Cancer Epidemiology and Risk Factors. *Clin Obstet Gynecol.* 2016; 59 (4):651–672.
- 3- Asiri S, Asiri A, Ulahannan S, et al. Incidence Rates of Breast Cancer by Age and Tumor Characteristics Among Saudi Women: Recent Trends. *Cureus* 2020; 12(1): e6664. DOI 10.7759/cureus.6664.
- 4- Saggi S, Rehman H, Abbas ZK, Ansari AA: Recent incidence and descriptive epidemiological survey of breast cancer in Saudi Arabia. *Saudi Med J.* 2015, 36:1176-1180.
- 5- Balekouzou A, Yin P, Pamatika CM, Nambei SW, Djeintote M, Doromandji E, et al. Assessment of breast cancer knowledge among health workers in Bangui, Central African Republic: A cross-sectional study. *Asian Pac J Cancer Prev* 2016; 17:3769–76.
- 6- Baig MR, Subramaniam V, Chandrasegar AA, Khan TM. A population-based survey on knowledge and awareness of breast cancer in the suburban females of Sungai Petani, Kedah, Malaysia. *Int J Collab Res Inter Med Pub Health* 2011; 3:671–9.
- 7- Chiedozi LC, El-Hag IA, Kollur SM. Breast diseases in the Northern region of Saudi Arabia. *Saudi Med J.* 2003; 24:623–7.
- 8- Radi SM. Breast cancer awareness among Saudi females in Jeddah. *Asian Pac J Cancer Prev.* 2013; 14:4307–12.
- 9- Binhussien BF, Ghoraba M. Awareness of breast cancer screening and risk factors among Saudi females at family medicine department in security forces hospital, Riyadh. *J Family Med Prim Care.* 2018; 7(6):1283-1287.
- 10- Holman DM, Grossman M, Henley SJ, Peipins LA, Tison L, White MC. Opportunities for cancer prevention during midlife: Highlights from a meeting of experts. *American Journal of Preventive Medicine*, 2014; 46 (30 Suppl 1):S73– S80.
- 11- Thomson CA, McCullough M, Wertheim BC, et al. Nutrition and physical activity cancer prevention guidelines, cancer risk, and mortality in the women's health initiative. *Cancer Prevention Research*, 2014; 7(1): 42–53.
- 12- Kaplan CP, Haas JS, Pérez-Stable EJ, Gregorich SE, Somkin C, Des Jarlais G, Kerlikowske K. Breast cancer risk reduction options: awareness, discussion, and use among women from four ethnic groups. *Cancer Epidemiol Biomarkers Prev.* 2006 Jan;15(1):162-6. doi: 10.1158/1055-9965.EPI-04-0758.
- 13- Kratzke C, Amatya A, Vilchis H. Breast cancer prevention knowledge, beliefs, and information sources between non-Hispanic and Hispanic college women for risk reduction focus. *J Commun Health.* 2015:40124–30.
- 14- Colditz, G. A, Wollin, K. Y, & Gehlert, S. (2012). Applying what we know to accelerate cancer prevention. *Science Translational Medicine*, 4(127), rv4.
- 15- Dart, H, Wolin, K. Y, & Colditz, G. A. (2012). Commentary: Eight ways to prevent cancer: A framework for effective prevention messages for the public. *Cancer Causes and Control*, 23, 601–608.
- 16- Dahiru T, Aliyu A, Kene TS. Statistics in Medical Research: Misuse of Sampling and Sample Size Determination. *Annals of African Medicine* 2006; 5(3):158 –61.
- 17- Alwan NAS, Al-Attar WM, Eliessa RA, Madfaie ZA, Tawfeeq FN. Knowledge, attitude and practice regarding breast cancer and breast self-examination among a sample of the educated population in Iraq. *EMHJ* 2012; 18 (4):337-345.
- 18- Marzouni HZ, Lavasani Z, Shalilian M, Najibpour R, Fakhr MS, Nazarzadeh R, et al. Women's Awareness and Attitude Toward Breast Self-Examination in Dezful City, Iran, 2013. *Iran Red Crescent Med J* 2015; 17(11): e17829.
- 19- Osei-Afryie S, Addae AK, Oppong S, Amul H, Ampofo E, Osei E. Breast cancer awareness, risk factors and screening practices among future health professionals in Ghana: A cross-sectional study. *PLoS ONE* 2021; 16(6): e0253373. YAHIA
- 20- Jahan S, Al-Saigul AM, Abdelgadir MH. Breast cancer. Knowledge, attitudes and practices of breast self examination among women in Qassim region of Saudi Arabia. *Saudi Med J.* 2006; 27(11):1737-41.
- 21- Ministry of Health National Cancer Registry Cancer Incidence Report-Saudi Arabia-1999 – 2000. King Fahad National Library, 3840/22, date: 6/9/1422H, ISSN: 1658-0559, Riyadh May, 2004.
- 22- Dandash KF, Al-Mohaimed A. Knowledge, Attitudes, and Practices Surrounding Breast Cancer and Screening in Female Teachers of Buraidah, Saudi Arabia. *International Journal of Health Sciences* 1997; 1(1): 75-85.
- 23- Grunfeld EA, Ramirez AJ, Hunter MS, Richards MA. Women` knowledge and beliefs regarding breast cancer. *Br J Cancer* 2002; 86:1373-1387.
- 24- Haji-Mahmoodi M, Montazeri A, Jaryandi S, Ebrahimi M, Haghghat S, Harirchi I. Breast self-examination: knowledge, attitudes and practice among female health care workers in Tehran, Iran. *Breast Journal.* 2002; 8:222.
- 25- Singapore: Chang PN, Krishnan M, Swah TS. Knowledge and practice of breast cancer screening among public health nurses in Singapore. *Singapore Med J* 2002; 43:509-516.
- 26- McMenamin M, Barry H, Lennon AM, Purcell H, Baum M, Keegan D, McDermott E, O'Donoghue D, Daly L, Mulcahy H: A survey of breast cancer awareness and knowledge in a western population: lot of light but little illumination. *Eur J Cancer* 2005; 41:393-397.
- 27- Kashgari RH, Ibrahim AM. Breast cancer: attitude, knowledge and practice of breast self-examination of 157 Saudi women. *J Fam Comm Med* 1996; 3:10-13.
- 28- Abdel-Fattah M, Zaki A, Bassili A, El-Shazly M, Tognoni G. Breast self-examination practice and its impact on breast cancer diagnosis in Alexandria, Egypt. *East Mediterr Health J* 2000; 6: 34-40.
- 29- Alam AA. Knowledge of breast cancer and its risk and protective factors among women in Riyadh. *Ann Saudi Med* 2006; 26(4); 272-277.
- 30- Persson K, Johansson I, Ek A. Breast self-examination among Swedish women: a survey of frequency, knowledge

and attitude. *J Cancer Educ* 1995; 10:163-167.

31- Janda M, Obermair A, Haidinger G, Waldhoer T, Vutuc C. Austrian women` attitude towards and knowledge of breast self-examination. *J Cancer Educ* 2000; 15:91-94.

32- Salaudeen AG, Akande TM, Musa OI. Knowledge and attitudes to breast cancer and breast self examination among female undergraduates in a state in Nigeria *European Journal of Social Sciences* 2009; 7(3): 157-165.

33- Wardle J, Steptoe A, Smith H, Groll-Knappe E, Koller M, Smith D, et al. Breast self-examination: attitudes and practice among young women in Europe. *Eur J Cancer Prev* 1995; 4:61-68.

34- Ng KK, Fung SY, Chow LW. Practice of BSE among high risk Chinese women in Hong Kong. *Chin Med J.* 2000; 113:1100-1103.

35- Liu md CY, Xia HO, Isaman DM, Deng W, Oakley D., Nursing clinical trial of breast self-examination education in China. *International Nursing Review* 2010; 57(1):128-134.

36- Chamot E, Perneger TV. Men's and Women's Knowledge and perceptions of breast cancer and mammography screening. *Prev Med.* 2002; 34(3):380-5.

37- Webster P, Austoker J: Women's knowledge about breast cancer risk and their views of the purpose and implications of breast screening- a questionnaire survey. *J Public Health* 2006, 28:197-202.

38- Montazeri A, Vahdaninia M, Harirchi I, Harirchi AM, Akram Sajadian A, Khaleghi F, Ebrahimi M, et al. Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. *Asia Pacific Family Medicine* 2008; 7:6.