Public Awareness of Breast Cancer Screening and Risk Factors among Women in Saudi Arabia

Anas Abdulqader Fathuldeen[1], Salha Saud Al-Motiri[2]*, Sara Hamad Almogren[3], Alaa Ahmed Al-Saegh[4]

[1] Assistant Professor of Plastic Surgery, Department of Plastic Surgery, College of Medicine, University of Hail, Kingdom of Saudi Arabia.

[2] Intern Doctor, College of Medicine, University of Hail, Kingdom of Saudi Arabia.

[3] Medical Student, College of Medicine, Imam Mohammed Ibn Saud Islamic University, Kingdom of Saudi Arabia.

[4] Intern Doctor, College of Medicine, Alfaisal University, Kingdom of Saudi Arabia.

ABSTRACT

Background: Breast cancer is considered the most common cancer that affects women all around the world. **Objective:** Our study was designed to measure the level of awareness of breast cancer among women in Saudi Arabia. **Methods:** Our study is a cross-sectional one. Participants were invited to fill online questionnaires written in the Arabic language and selected randomly from different cities in Saudi Arabia. **Results:** The majority of the participants (96%) in the study were Saudi women, 27.6% between 16-24 years, 63.3% had a diploma/university degree, 84.7% knew the fact that breast cancer is the most common cancer among females, 51.6% thought females under 30 could not develop breast cancer, 71.9% knew how to perform the examination, 55.1% knew that the best time for breast self-examination was after menstruation, 75.4% were familiar with the signs of breast cancer, especially in nipple related changes, 9.5% were aware that the chance of recovery from breast cancer was very high if detected early, 75.4% believed that family history of breast cancer might be a risk factor, 75.4% knew the influence of hormone replacement therapy in increasing the risk of the disease, 73.8% knew the relation between eating fat and fewer vegetables and increase of the risk of breast cancer, 71% believed that using oral contraceptives would not increase the risk of having breast cancer, and 36.1% of women knew that radiation exposure could increase the risk of breast cancer. **Conclusion:** This study offers evidence of the need to improve awareness about breast cancer because of the inadequate knowledge about it. More resources desire to increase awareness and offer an aimed level of knowledge about breast cancer in the Saudi females' population.

Key Words: *Breast cancer, Breast cancer awareness, Breast cancer screening*

eIJPPR 2020; 10(5):163-169

HOW TO CITE THIS ARTICLE: Anas Abdulqader Fathuldeen, Salha Saud Al-Motiri, Sara Hamad Almogren, Alaa Ahmed Al-Saegh (2020). "Public Awareness of Breast Cancer Screening and Risk Factors among Women in Saudi Arabia", International Journal of Pharmaceutical and Phytopharmacological Research, 10(5), pp.163-169.

INTRODUCTION

Breast cancer is the most common cancer among women around the world, claiming the lives of most of them annually and influencing the countries at all levels of modernization [1]. Either in developed or less developed countries women suffer from breast cancer. It is guesstimated that over 508,000 women passed away in 2011 as a result of breast cancer, worldwide. Though breast cancer is considered to be a disease of the developed world, nearly half of the cases and 58% of deaths happen in less developed countries [2]. Occurrence amounts vary considerably from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe. In the majority of the developing countries, the occurrence amounts are less than 40 per 100,000 [2]. The

Corresponding author: Salha Saud Al-Motiri

Address: Intern Doctor, College of Medicine, University of Hail, Kingdom of Saudi Arabia.

E-mail: salasaud.m @ gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 30 May 2020; **Revised:** 17 October 2020; **Accepted:** 19 October 2020

lowest occurrence rates are found in most African countries but in these countries also the breast cancer occurrence rates are enhancing. The survival rates of this cancer change to a high extent throughout the world, ranging from 80% or over in North America, Sweden, and Japan, to about 60% in middle-income countries, and less than 40% in low-income countries [3]. Lacks of early detection programs that result in a high proportion of women presenting with late-stage disease, as well as the lack of adequate diagnosis and treatment facilities are the causes of low survival amounts in less developed countries [4]. During the 5 years from 2012 to 2016, the breast cancer occurrence rate raised somewhat by 0.3% annually, usually because of the increasing rates of local stage and hormone receptor-positive disease. On the contrary, the breast cancer death rate continues to decrease, dropping by 40% from 1989 to 2017 and averting 375,900 breast cancer deaths. Especially, the pace of the decrease has slowed from an annual decrease of 1.9% from 1998-2011 to 1.3% during 2011-2017, largely driven by the trend in white women. Hence, the black-white disparity in breast cancer mortality has remained constant since 2011 after widening over the past 3 decades. Nevertheless, the death rate remains 40% more in blacks (28.4 vs. 20.3 deaths per 100,000) despite a lower occurrence rate (126.7 vs. 130.8); this disparity is magnified among black women aged <50 years, who have a death rate double that of whites [5]. An early and efficient breast cancer diagnosis is a vital part of any strategy aimed at reducing breast cancer mortality in developing countries. In these countries, the influence of breast cancer screening has never been formally measured, and data from the major screening trials need to be considered in this context. Screening asymptomatic women via breast self-examination, clinical examination, or mammography can play a critical role in reducing breast-cancer mortality in developing countries. However, major programs should not be fulfilled until enough diagnostic and therapeutic facilities exist. The most basic interventions in early detection, diagnosis, surgery, radiation therapy, and drug therapy must be integrated, organized, and resourced appropriately within existing healthcare structures [6]. When resources become available for screening, they should be invested in screening mammography, as it is the only modality that has been shown to decrease breast cancer mortality thus far. Clinical breast examination (CBE) and breast self-examination (BSE) are the significant parts of routine breast care in countries with access to mammography and are critical for general breast health education in all countries [7].

Objective:

Our study was designed to measure the level of awareness of breast cancer among women in Saudi Arabia. We involved causes, risk factors, signs and symptoms, BSE, and general perceptions about breast cancer.

METHODS:

Our study is a cross-sectional one and was designed to measure the level of awareness of breast cancer among women in Saudi Arabia. We involved causes, risk factors, signs and symptoms, BSE, and general perceptions about breast cancer. Participants were invited to fill online questionnaires written in the Arabic language and selected randomly from different cities in Saudi Arabia. A total of 1709 women aged above 16 volunteered and successfully filled the questionnaire d, during the period from 12-4-2020 to 1-5-2020. A self-administered close-ended questionnaire was designed. It consisted of 27 questions that were guided by study objectives and review of the literature and all personal information was kept confidential and used only for statistical analysis. The data were represented and statically analyzed using Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA) V.24. All categorical variables are presented as numbers and percentages. Permission was obtained from everyone at the beginning of the survey link, before starting to answer the questions. Ethical approval was obtained from the Institutional Review Board (IRB) of the University of Hail.

RESULTS:

The Socio-demographic Nature of the Sample

Details of the age structure of participants and other socio-demographic characteristics are shown in Table 1. Of the participants, 27.6% between 16-24 years, 63.3% of them had a diploma/university degree and most of them were married (59.3%). The majority of participants were from the Eastern region 41.8%. According to nationality, most of the respondents were Saudi (96%). Regarding the level of education, most women had a diploma/university degree (63.3%). The monthly income of half of the respondents was moderate (5000-10000 SR) (50.1%).

The Awareness about Signs and Risk Factors of Breast Cancer

Most of our participants knew that breast cancer was one of the most common cancers among females (84.7%). Approximately 50 percent of the respondents knew that breast cancer could occur in men (49.1%); and 51.6% of the participants revealed the wrong answer, which they thought that women under the age of 30 could not develop breast cancer. Moreover, 42.5% of participants believed that pain was not a common sign related to

breast cancer. 31.5% of the women were aware of the fact that exposure to chest injury could not cause breast cancer, while 42.2% of respondents did not know. 71.9% of the participants reported their knowledge about performing breast self-examination and by doing it monthly it could be detected in an early stage. More than 50 percent of the participants knew that the best time to do monthly breast examination was after menstruation (55.1%). The majority of women had good knowledge regarding nipple color or shape-changing in breast cancer (75.4%). Only 9.5% of the participants knew that the chance of recovery from breast cancer was very high if detected early, which reflected the poor knowledge according to this point about the disease. 75.4% of the participants thought that a family history of breast cancer could be an etiology to have the disease. Similarly, 75.4% of the women knew the impact of hormone replacement therapy in increasing the risk of the disease. Most of the participants (73.8%) believed that there was a relationship between eating fat and fewer vegetables and increasing the risk of having breast cancer. Most participants had wrong ideas in the relationship between exercise and breast cancer; they thought that exercise can enhance the risk of breast cancer, while only 12.8% did not agree. 49.2% of women had the wrong idea and thought that having children before the age of 30 could be a risk factor for breast cancer. The majority of respondents knew that using oral contraceptives would not increase the risk of having breast cancer (71%). 36.1% of women knew that exposure to radiation like x-ray could increase the risk of breast cancer. Most of the women thought that breastfeeding could increase the risk of breast cancer (71.7%), while only 21.1% knew that there was not a relationship between these two. 35.2% of the participants agreed that plastic and reconstructive surgeries of the breast caused breast cancer, and 33% of them did not agree.

The Correct and Incorrect Respondent Answers about the Risk Factors of Breast Cancer

Data revealed that almost half of the participants (49.1%) knew that breast cancer could occur in both women and men. Surprisingly, only 15% were aware that breast cancer could occur in early ages “under the age of 30”. Regarding symptoms of breast cancer, 42.5% of participants knew painless tumors in case of breast cancer; while 36.7% of the sample thought that it might be painful. Only 31.5% of respondents knew that exposure to chest injury would not cause breast cancer. 71.9% were aware of the breast self-examination, monthly, and knew that it was one of the best ways for early detection of cancer. Additionally, 55.1% of the women knew that the best time to do breast examination was immediately after their menstruation every month. The participants’ knowledge of warning signs including change in color/shape of nipple showed a high percentage (75.4%). Regarding the risk factors, our results revealed a poor knowledge about the correlation between the detection of breast cancer in the early stages and the chance of recovery; only 6% of participants answered the question correctly. 73.8% of respondents were not aware of the relationship between family history and increase risk of breast cancer, and did not have the idea that if the first relative degree was diagnosed with breast cancer it could double the risk of developing breast cancer. The majority of participants knew there was a link between an increased risk of breast cancer and the use of hormone replacement therapy (73.8%). 43.7% of the participants knew the relationship between eating habits and the increasing risk of breast cancer; some types of fat, such as polyunsaturated fat, increase the occurrence of breast tumors. About half of the respondents (49.2%) knew that emotional states like stress and tension would not increase the risk of having breast cancer. Only 7.0% and 6.1% of our sample knew that doing exercise and having children before the age of 30 were not associated with the increasing risk of breast cancer. 36.1% of the participants knew that obesity was known as a risk factor for the development of breast malignancy. Most women knew that using oral contraceptives would cause a slight rise in breast cancer occurrence (71.7%), especially in women who took them before the first pregnancy. Only 35.2% of the participants were aware of the fact that chest x-ray might increase the risk of developing breast cancer. Unfortunately, 84.0% of the participants thought that breastfeeding was linked with the increased risk of breast cancer; while in fact, breastfeeding did not have a significant correlation with increasing the occurrence of breast cancer.

Table 2. Shows that the majority of respondents (84.7%) said that breast cancer was one of the most common cancers among females around the world, while the women under the age of 30 could not develop breast cancer (recorded the lowest percentage of 15). In the part of the risk factors, 75.4% of respondents said that hormone replacement therapy increased the risk of breast cancer while using oral contraceptives increased the risk of breast cancer at the lowest recorded percentage (6%).

Table 3. Shows that the majority of respondents’ answers are correct about awareness of the signs and risk factors of breast cancer by a recorded high percent, and this means that the level of women’s awareness is high.

Table 4 clarifies the relationship between age group and awareness of breast cancer. There is a statistically significant relationship between age group and awareness of breast cancer (p. value >0.05).

Table 1. The Demographic Characteristics of Participants.

Characteristics	Frequency	Percent%
Age Group (Years)		
(16 – 24) Years	472	27.6
(25 – 34) Years	380	22.2
(16 – 24) Years	404	23.6
(45 – 54) Years	277	16.2
> 54 Years	176	10.3
Total	**1709**	**100.0**
Region		
Southern	149	8.7
Western	176	10.3
Northern	33	1.9
Eastern	714	41.8
Al-Wosta	637	37.3
Total	**1709**	**100.0**
Marital Status		
Widow	37	2.2
Single	585	34.2
Married	1013	59.3
Divorced	74	4.3
Total	**1709**	**100.0**
Nationality		
Saudi	1640	96.0
Non -Saudi	69	4.0
Total	**1709**	**100.0**
Educational Level		
Illiterate	12	0.7
Primary / Intermediate School	71	4.2
Secondary School	409	23.9
Diploma/University	1081	63.3
Post Graduate	136	8.0
Total	**1709**	**100.0**
Monthly Income		
Low < 5000 SAR	264	15.4
Moderate 5000 – 10000 SAR	857	50.1
High > 10000	588	34.4
Total	1709	**100.0**

Table 2. Knowledge of the respondents about, self-examination and risk factors of breast cancer

No	Questions	Yes	Don't know	No
Signs of Breast Cancer				
1	Do you know someone with breast cancer?	1039 60.7%	0 0%	670 39.2 %
2	Is breast cancer one of the most common cancers among females around the world?	1448 84.7%	230 13.5%	31 1.8%
3	Does breast cancer occur in men?	839 49.1%	617 36.1%	253 14.8 %
4	Can women under the age of 30 develop breast cancer?	275 15.0%	270 33.4%	882 51.6 %
5	Is the breast tumor usually associated with pain?	627 36.7%	356 20.8%	726 42.5 %
6	Can the exposure to chest injury cause breast cancer?	449 26.3%	721 42.2%	539 31.5 %
7	Is one of the best ways to detect breast cancer early by examining your breast monthly?	1229 71.9%	200 11.7%	290 10.4 %
8	Is the best time to do a monthly breast examination after menstruation?	941 55.1%	606 35.5%	162 9.5%
9	Can the change in color or shape of the nipple be a sign of breast cancer?	1288 75.4%	318 18.5%	103 6.0%
Risk Factors of Breast Cancer				
10	Is the chance of recovery from breast cancer low even if detected early?	941 55.1%	606 35.5%	162 9.5%
11	Is the family history of breast cancer one of the etiologies of it?	1288 75.4%	318 18.6%	103 6.0%
12	Does Dies hormone replacement therapy enhance the risk of breast cancer?	1299 75.4%	319 18.6%	103 6.0%
13	Does eating fat and fewer vegetables enhance the risk of breast cancer?	201 11.8%	24.6 14.4%	1262 73.8 %
14	Do stress and tension lead to an increased risk of breast cancer?	1262 73.8%	127 7.4%	320 18.7 %

15	Can exercise enhance the risk of breast cancer?	74.6 43.7%	744 43.5%	219 12.8 %
16	Is having children before the age of 30 a risk factor for breast cancer?	824 49.2%	478 29.0%	407 23.8 %
17	Can obesity enhance the risk of breast cancer?	119 7.0%	257 15.0%	1333 78.0 %
18	Does the use of oral contraceptives increase the risk of breast cancer?	105 6.1%	399 23.3%	1205 71.0 %
19	Can the chest x-ray enhance the risk of breast cancer?	617 36.1%	495 29.0%	597 34.9 %
20	Does breastfeeding enhance the risk of breast cancer?	713 71.7%	6363 7.2%	360 21.1 %
21	Do plastic and reconstructive surgeries of the breast cause breast cancer?	602 35.2 %	543 31.8 %	564 33. 0%

Table 3. the correct and the incorrect answers about the knowledge of the respondents about the breast cancer

No	Questions	Correct	Incorrect
1	Does breast cancer occur in men?	839 49.1%	253 14.8%
2	Can women under the age of 30 develop breast cancer?	275 15.0%	882 51.6%
3	Is breast tumor usually associated with pain?	726 42.5%	627 36.7%
4	Can exposure to chest injury cause breast cancer?	539 31.5%	449 26.3%
5	Is one of the best ways for early detection of breast cancer by examining your breast monthly?	1229 71.9%	290 10.4%
6	Is the best time to do a monthly breast examination after menstruation?	941 55.1%	162 9.5%
7	Can the change in color or shape of the nipple be a sign of breast cancer?	1288 75.4%	103 6.0%
8	Is the chance of recovery from breast cancer low even if detected early?	103 6.0%	1299 75.4%
9	Is a family history of breast cancer one of the etiologies of breast cancer?	201 11.8%	1262 73.8%
10	Does hormone replacement therapy increase the risk of breast cancer?	1262 73.8%	320 19.7%
11	Does eating fat and fewer vegetables increase the risk of breast cancer?	74.6 43.7%	219 12.8%
12	Can stress and tension lead to an increased risk of breast cancer?	824 49.2%	407 23.8%
13	Can exercise increase the risk of breast cancer?	119 7.0%	13337 78.0%
14	Is having children before the age of 30 a risk factor for breast cancer?	105 6.1%	1205 71.0%
15	Can obesity increase the risk of breast cancer?	617 36.1%	597 34.9%
16	Does the use of oral contraceptives increase the risk of breast cancer?	713 71.7%	360 21.1%
17	Can chest x-ray increase the risk of breast cancer?	602 35.2%	564 33.0%
18	Does breastfeeding increase the risk of breast cancer?	88 5.1%	1436 84.0%
19	Do plastic and reconstructive surgeries of the breast cause breast cancer?	863 50.5%	285 16.7%

Table 4. The relationship between age group and awareness of breast cancer.

Does breast cancer affect men?	Age					Total	X^2	P. value
	>54	16 - 24	25 - 34	35 - 44	45 - 54			
No	253	28	56	59	64	46		
Don't know	617	82	106	138	183	108		
Yes	839	66	310	183	157	123	84.931	0.000
Total	176	1709	472	380	404	277		
Can women under the age of 30 develop breast cancer?								
No	59	300	213	175	135	882		
Don't know	77	116	113	173	91	570	73.194	0.000
Yes	40	56	54	56	51	257		
Total	176	472	380	404	277	1709		
Is breast cancer usually associated with pain?								
No	75	149	178	178	146	726	51.998	0.000
Don't know	49	125	70	64	48	356		

Yes	52	198	132	162	83	627		
Total	176	472	380	404	277	1709		
Is a family history of breast cancer one of the etiologies of breast cancer?								
No	44	70	79	69	58	320		
Don't know	11	42	25	26	23	127	34.399	0.043
Yes	121	360	276	309	196	1262		
Total	176	472	380	404	277	1709		
Can hormone replacement therapy cause breast cancer?								
No	24	63	57	36	39	219		
Don't know	78	221	144	195	106	744	18.382	0.019
Yes	74	188	179	173	132	746		
Total	176	472	380	404	277	1709		
Can eating fat and fewer vegetables cause breast cancer?								
No	45	129	118	70	79	441		
Don't know	57	154	102	153	70	536	30.037	0.000
Yes	74	189	160	181	128	732		
Total	176	472	380	404	277	1709		
Can stress and tension lead to the incidence of breast cancer?								
No	41	126	108	76	56	41		
Don't know	42	147	99	133	57	42	45.885	0.000
Yes	93	199	173	195	164	93		
Total	176	472	380	404	277	1709		

DISCUSSION:

The purpose of this study was to assess breast cancer awareness and knowledge among women in Saudi Arabia. The results of our study showed a general lack of knowledge and awareness of breast cancer among women regardless of their age, marital status, region, educational level, or nationality in agreement with previous studies done in different parts of the world [8, 9]. In the present study, 61.8% of participants reported knowledge of someone with breast cancer, while the study that was done in Riyadh showed only 14% [10]. This is possibly due to increasing the level of awareness among women who are affected by breast cancer to share their experiences and activation of their role to elevate the level of public awareness of breast cancer.

84% of our participants agreed that breast cancer is one of the most common cancers among females around the world which indicates that they have a good background about this cancer expansion and this can help them to be aware and take a step to prevent themselves from being victims of breast cancer in agreement with the study that was done in UAE [11]. In contrast, 51.6% of our participants did not agree that breast cancer can affect women under the age of 30, which may lead to ignoring breast cancer screening among women in this age group that has a bad outcome and can lead to late detection of cancer.

To assess the awareness of women in Saudi Arabia about breast cancer's signs and symptoms, we asked them about the association of pain and breast cancer and only 42.5 of our participants answered that they were not associated while 75.4 % reported that the changes in the color size or shape of the nipple could be a sign of breast cancer. This percentage indicates that there is a group of women who cannot be aware if they have any of the breast cancer signs and they may detect it late if they become affected.

On the other hand, 71.9 % of our participants have good knowledge about the importance of breast self-examination (BSE) in early detection of breast cancer while the study done in Riyadh showed poor knowledge [10].

This is due to the presence of health education programs that produced by the ministry of health on social media and TV channels to elevate the level of awareness and educate women about BSE even though only 55.1 % of our participants know the proper time to do BSE, and this indicates the importance of education of women about proper time and way to do BSE.

Most of the participants showed a low level of knowledge about breast cancer risk factors including family history, hormonal replacement therapy, diet, lack of exercise, obesity, and radiation exposure although the majority of them were easily modifiable and avoidable. In this study, only 75.4% of women were aware of the risk associated with family history and increased level of probability to develop breast cancer in the women who had a family history of this cancer which would be reflected in their commitment to early breast cancer screening .49.2% of our participants were aware of the fact that early having children might decrease the risk of breast cancer. Moreover, 71.7% of participants did not believe in the

role of breastfeeding in the reduction of breast cancer risk in addition to other major benefits for the mother and the baby. However, only 6.1% agreed that the use of oral contraceptive pills increased the risk of breast cancer while 36.1 agreed that exposure to chest X-rays increased this risk. Besides, 35.2 % agreed that plastic and reconstructive surgeries of the breast could cause breast cancer.

CONCLUSION:

In Conclusion, the outcomes of our paper highlight the importance of **improving** the **knowledge** of females in Saudi Arabia about the modifiable and non-modifiable risk factors of breast cancer. While this study offers **evidence** of the need to **expand the awareness** because the knowledge about breast cancer is inadequate, as most of the participants showed a suboptimal level of understanding about breast cancer risk factors. **More resources** are needed to increase awareness and offer an aimed level of knowledge in the Saudi females' population about breast cancer. Teaching activities could be applied to raise breast cancer awareness and probably decrease its prevalence. Therefore, the findings of the up-to-date paper can aid health authorities and policymakers to be aware of the fundamental role of national and operative policies in breast cancer control and prevention.

Availability of data and materials: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: This study was supported by the College of Medicine, University of Hail

ACKNOWLEDGMENTS:

The authors gratefully acknowledge the efforts of Abdulaziz Zakaria Abdulhameed AlSaegh, Safaa Abdulmalik Fahad, Khalid Faisal Alharbi, Hakem Saud S. Almutairi, Mazen Abdulrahim Ahmed Alghamdi.

REFERENCES

[1] Schneider AP, Zainer CM, Kubat CK, Mullen NK, Windisch AK. The breast cancer epidemic: 10 facts. The Linacre Quarterly. 2014 Aug;81(3):244-77. doi: 10.1179/2050854914Y.0000000027. PMID: 25249706; PMCID: PMC4135458.

[2] Ghoncheh M, Soltani S, Salehiniya H. Disparities in Incidence and Mortality of Breast Cancer. Iran J Public Health. 2016 Feb;45(2):270-1. PMID: 27114997; PMCID: PMC4841887.

[3] Black E, Richmond R. Improving early detection of breast cancer in sub-Saharan Africa: why mammography may not be the way forward. Globalization and health. 2019 Dec 1;15(1):3. https://doi.org/10.1186/s12992-018-0446-6.

[4] Rivera-Franco MM, Leon-Rodriguez E. Delays in Breast Cancer Detection and Treatment in Developing Countries. Breast Cancer (Auckl). 2018 Jan 8;12:1178223417752677. doi: 10.1177/1178223417752677. Erratum in: Breast Cancer (Auckl). 2019 Mar 11;13:1178223419834790. PMID: 29434475; PMCID: PMC5802601.

[5] Galindo-Hernandez O. Rasal2, highlighting the importance of phosphorylation on function in tumour development. EBioMedicine. 2020 Jan 1;51.

[6] da Costa Vieira RA, Biller G, Uemura G, Ruiz CA, Curado MP. Breast cancer screening in developing countries. Clinics (Sao Paulo). 2017 Apr;72(4):244-253. doi: 10.6061/clinics/2017(04)09. PMID: 28492725; PMCID: PMC5401614.

[7] Anderson BO, Braun S, Lim S, Smith RA, Taplin S, Thomas DB; Global Summit Early Detection Panel. Early detection of breast cancer in countries with limited resources. Breast J. 2003 May-Jun;9 Suppl 2:S51-9. doi: 10.1046/j.1524-4741.9.s2.4.x. PMID: 12713497.

[8] 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. Journal of Cancer Education. 2016 Jul;33(1):201–7.

[9] Heena H, Durrani S, Riaz M, AlFayyad I, Tabasim R, Parvez G, Abu-Shaheen A. Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: a cross sectional study. BMC Womens Health. 2019 Oct 22;19(1):122. doi: 10.1186/s12905-019-0819-x. PMID: 31640681; PMCID: PMC6806575.

[10] Binhussien B, Ghoraba M. Awareness of breast cancer screening and risk factors among Saudi females at family medicine department in security forces hospital, Riyadh. Journal of Family Medicine and Primary Care. 2018;7(6):1283.

[11] Younis, M., AlRubaye, D., Haddad, H., Hammad, A., Hijazi, M. Knowledge and Awareness of Breast Cancer among Young Women in the United Arab Emirates. Advances in Breast Cancer Research, 2016; 5: 163- 176.