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Perceived Risk of Breast Cancer in Relation to Precautionary Behavior among Females in Saudi Arabia

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Abstract

Background: For the last two decades, the number of women with breast cancer in Saudi Arabia increased steadily. Risk perceptions or an individual's perceived susceptibility to a threat are a key component of many health behavior change theories. Little is known about relationships between risk perceptions of breast cancer and performing preventive practices.

This descriptive study highlights the risk perception of breast cancer in relation to preventive interventions among females over 18 years old in Riyadh, Saudi Arabia.

Methods: Cross-sectional descriptive correlational design. An online questionnaire was conducted with 500 participants aged 18 years and older. The questionnaire was self-administrated electronic questionnaire designed by using Google Forms and it gated broadcast through social media channels such as WhatsApp and twitter.

Results: The study emphasized a low risk perceptions about breast cancer and performing preventive practices. Positive correlation was found between female's risk perceptions and doing the mammogram screening.

Conclusions: Findings will be helpful to use risk perception of breast cancer in the prediction of women adopting preventive measures.

Keywords: breast cancer; risk perception; preventive measures; Saudi Arabia

1. Introduction

Breast cancer is the second cause of cancer death, with the standardized mortality rate (ASMR) of 12.9 (per 100,000), after lung cancer in the world (Globocan ,2012). Breast cancer with the mortality rate of 12.9 is the first cause of cancer death in women (Pournamdar, Ghoncheh, & Salehiniya, 2016). According to GLOBOCAN estimates, approximately 14.1 million new cancer cases and 8.2 million deaths occurred in 2012 worldwide (Globocan (2012). However, the lowest incidence rates were in Middle Africa and Eastern Asia (Pournamdar, Ghoncheh, & Salehiniya, 2016).

For the last two decades, the number of women with breast cancer in Saudi Arabia increased steadily. There were 1152 female cases in 2008 in comparison with 1308 in 2009, and 1473 in 2010 (Saggu, Hasibur, Abbas, & Ansari, 2015). Among Saudi patients, there was a significant increase in the number of cases of breast cancer, which occurs at an earlier age compared with Western countries. Continued vigilance, mammographic screening, and patient education are needed to establish early diagnosis and perform optimal treatment (Saggu, Hasibur, Abbas, & Ansari, 2015). Ravichandran and Al-Zahrani (2009) investigated the incidence of female breast cancer in the Gulf Cooperation Council of (GCC) countries in relation to the established reproductive factors. A total of 4480 breast cancer cases were diagnosed in women during 1998- 2002 among GCC country nationals. Breast cancer was the most common malignancy ranging from 16.1% Oman to 35.4% in Bahrain. The age-standardized incidence rate per 100,000 was highest in Bahrain (46.4) (Al Qahtani et al., 2013). Breast Cancer is considered the most implacable malignancy and the leading cause of mortality in the Kingdom of Saudi Arabia. Saudi Arabia is no exception, where cancer of breast is most commonly prevalent. In one of the epidemiological studies conducted, Ravichandran and Al-Zahrani (2009) reported the incidence of breast cancer in Saudi Arabia was 19.8% of all the female cancers detected in the Kingdom.Al-Qahtani et al. (2013) reported that breast cancer as the second most common malignancy in women in Saudi. An earlier report according to Saudi National Cancer Registry reported

an increasing proportion of breast cancer among women of different ages from 10.2% (2000) to 24.3% (2005) (Al Qahtani et al., 2013). The percentage distribution of breast cancer appears to be increasing. There were 1152 female breast cancer cases in 2008 in comparison with 1308 in 2009, and 1473 in 2010. Breast cancer ranked first among females accounting for 27.4% of all newly diagnosed female cancers (5378) in the year 2010 (Saggu, Hasibur, Abbas, & Ansari, 2015).

A woman's risk for breast cancer is higher if she has a mother, sister, or daughter (first-degree relative) or multiple family members on either her mother's or father's side of the family who have had breast cancer. Having a first-degree male relative with breast cancer also raises a woman's risk (Centers for Disease Control and Prevention [CDC], 2017). In 2003, researchers in the Million Women Study (MWS) in the United Kingdom reported that the current use of all types of post-menopausal Hormone Replacement Therapy (HRT) significantly increased the risk of breast cancer (Boyd, Martin, Yaffe, & Minkin, 2011). Again, the risk was greatest among users of estrogen-progestin combination therapy. Other research has confirmed the basic result that use of combined HRT increases risk of breast cancer in post-menopausal women, and that stopping use of the combination pill leads to decreased risk of developing breast cancer. One study in California found that county-wide decreased incidence in breast cancer was highest (22.6%) in counties with the greatest decline in using HRT, intermediate (13.9%) in counties with moderate decreases in HRT use, and smallest (8.8%) in counties with least decline in HRT use (Gray, Rasanayagam, Engel, & Rizzo, 2017). Smoking tobacco is well known to be carcinogenic, not only for breast cancer but for most types of cancer (Globocan, 2012). Its carcinogenic effects are caused by aromatic hydrocarbons contained in tobacco, which, together with genetic polymorphisms in the N-acetyltransferase-2, may influence breast cancer development. It is estimated that tobacco consumption is the cause of 21% of all cancer mortalities worldwide (Dieterich, Stubert, Reimer, Erickson, & Berling, 2014). Obesity, the association between an increased risk of developing postmenopausal breast cancer and body weight was well documented. Adult weight gain and a body fatness and distribution (defined as a body mass index (BMI) above 25 kg/m^2 and abdominal fatness) were all associated with an increased risk of postmenopausal breast cancer (Howell, Anderson, Clarke, Duffy, & Evans, 2014).

Risk perceptions or an individual's perceived susceptibility to a threat are a key component of many health behavior change theories. Risk perceptions are often targeted in health behavior change interventions, and recent meta-analytic evidence suggests that interventions that successfully engage and change risk perceptions produce subsequent increases in health behaviors (Ferrer & Klein, 2015). According to Rimer and Glanz (2008), positive behavior changes can be obtained by increasing individuals' perceptions of susceptibility or the chances of contracting the disease.

In Saudi Arabia, a study aimed in determining Saudi women knowledge of breast cancer, perception of occurrence, and behavior in relation to breast self-examination. A total of 1000 participants agreed to be involved, out of which 87.7% were females, 7.2% were males and 5.1% had undisclosed gender (Hussein, 2013). The age range for participants was 12-66 years. Out of all participants, 44% did not know that breast cancer is an abnormal growth and 78% failed to recognize its multi-factorial nature, with increased age being the least recognized single risk factor 4.8%. Scores showed that 61.5% had a low level of breast cancer related knowledge. Out of the participants who knew of someone who had breast cancer 73%, 50.1% reported that the disease was discovered at a late stage mainly by chance. Data for Breast Self-Examination (BSE) indicated that 50.1% of female participants >16 years old did not practice BSE, and fear was the main declared perceived reason. Low level of fundamental knowledge of breast cancer and fear to practice breast self-examination was demonstrated by this study (Hussein, 2013). In a study to assess the levels of breast cancer related knowledge among a Northern Saudi population, Alrashidi et al. (2017) noted that there was a great lack of knowledge about several breast cancer risk factors which needs an urgent implementation of health educational programs (Alrashidi et al., 2017). A preventive lifestyle offers valuable information for planning appropriate intervention programs for improving women's health.

In a study to find out the preventive measures of breast cancer, the participants were 10,735, women aged 50–74 years old, only 25% of the respondents reported knowing about breast self-exam. Among these, 57% reported performing a breast self-exam. About 89% of the women reported not having a clinical breast exam in the past year, and 92% of women aged 50–74 years old reported never having a mammogram (Charbel et al., 2015). Women living in Al Sharqia, Saudi Arabia had the highest rate of mammography use. Women who were educated, those who had received a routine medical exam within the last two years, and those who were diagnosed with hypertension were more likely to have had a mammogram in the past two years (Charbel et al., 2015). In Saudi Arabia, studies related to knowledge, attitudes, and practices about breast cancer were conducted. Milaat (2000) revealed a very low level of knowledge of breast cancer and its associated risk factors among female high-school students. However, an older female population from Riyadh was found to be more knowledgeable about breast

cancer. Among 864 women aged 20–50 years old and living in Riyadh, 82% knew about breast self-examination, and 61% knew about mammography. However, 41.2% had performed breast self-examination, and only 18.2% had ever had a mammogram (Milaat, 2000). In Al Hassa governorate, a population-based study found lower rates of mammography, 5.1% among 1,315 women aged 18–65 years old (Milaat, 2000). Another study of teachers in their thirties also showed low levels of breast-cancer-related knowledge, with only 32·4% being aware of breast self-examination (Charbel El Bcheraoui, 2015).

It is imperative to highlight the issues of breast cancer among Saudi Arabian women in relation to their risk perception and preventive behaviors as breast cancer has increased throughout the last decade in Saudi Arabia (Al Qahtani, et al., 2013). It is the goal of this study to investigate the risk perceptions of breast cancer among women in Saudi Arabia and make recommendations for educational programs to increase the knowledge of breast cancer risks to decrease the incidence of breast cancer among the target population. According to Schwarzer (2011), risk perception represents the most obvious motivation for overcoming a risk behavior. Investigating the risk perceptions of breast cancer is a key predictor of Saudi Arabian women's likelihood of performing screening mammogram in order to prevent breast cancer. Breast cancer risk factor awareness and risk perception are considered to be prerequisites for adopting preventive behaviors. The present study will play an important role in providing a research-based framework for lowering risks for breast cancer based on the identified perceptions. Furthermore, the results of this study will support greater awareness and prevention of breast cancer, and create targeted areas for future health promotion and education efforts. Findings of the study will be helpful to use risk perception of breast cancer in the prediction of Saudi Arabian women adopting preventive measures.

2. Methods

The purpose of this study was to investigate the risk perceptions of breast cancer in relation to the adoption of health-protective behaviors among women in Saudi Arabia.

This study included the research question: What will be the risk perceptions of breast cancer among women who are over 18 years old in Riyadh, Saudi Arabia?

2.1 Objectives of the Study

- To identify women's perception about breast cancer risks.
- To explore the relation between age and the perception of risk of breast cancer.
- To explore the relation between age and taking breast cancer preventive behaviors.
- To investigate if there is an association between perception of risk of breast cancer and taking preventive behaviors such as monthly breast self-exam and mammogram screening.

2.2 Research Design

This study used a cross-sectional descriptive correlational design to explore the relationship between perceived risk, the demographic variables and taking preventive behaviors. The survey was used as the research tool to measure participants' risk perceptions of breast cancer. An online survey was conducted with 500 participants aged 18 years and older. The survey included information about demographic characteristics, subject's risk perception of breast cancer, and breast cancer preventive behaviors. A total of 500 participants completed the online survey. All participants were living in Riyadh, Saudi Arabia. Study variables included demographic characteristics, (age, marital, education level, occupation, and family history), risk perception of breast cancer and participants breast cancer preventive behaviors.

2.3 Data Collection Methods and Instruments

Approval for conducting this study was obtained through the College of applied Medical Sciences Institutional Review Board (IRB). All answers have been dealt with confidentially and have been used for research purpose only. The questionnaire was self-administrated electronic questionnaire designed by using Google Forms and it gated broadcast through social media channels such as WhatsApp and twitter. Data were collected from 26 of March 2018 until 5th of April 2018. An online questionnaire has been developed to include three sections. First section is demographic characteristics, (age, marital status, education level, occupation, and family history). The second section was the risk perception of breast cancer; it was measured by asking three questions adopted by (Levy, Shea, Williams, Quistberg, & Armstrong, 2006). First question asked the participants what do they think their chance of developing breast cancer in their lifetime in percentage from 0% to more than 50%. Second question asked the participants how do they rate their chance of developing breast cancer (very low, moderately low, neither low nor high, moderately high, very high). Last question was about how they think their chance of developing breast cancer compares to the average women in same age (very much lower, much lower, about the

same, much higher, very much higher). The last section included questions in relation to breast cancer preventive behaviors measured by asking if the participants had performed mammogram, and breast self-examination, if their answered yes, they were asked to indicate how often (weekly, monthly, occasionally or rarely).

3. Results

A total of 500 women were included in the study. A total of 500 surveys were usable for data analysis. None of the survey were excluded because all the data was completed through an online questionnaire that works by the mechanism of non- sending the questionnaire unless all answers are completed. The survey was designed by using Google Forms and was distributed through social media channels such as WhatsApp, Twitter, Snapchat. Data were prepared for analysis in SPSS. Descriptive statistics, frequencies, and Pearson Correlation were used for statistical analyses. Demographic background of the study samples (n = 500) are presented in Table 1.

Table 1. Demographic Characteristics of Participants at Baseline (N =500)

Age	Frequency	Percent
18-29	197	39.4
30-49	226	45.2
50-65	77	15.4
Total	500	100.0
Social status	Frequency	Percent
single	156	31.2
married	326	65.2
divorced	11	2.2
widow	7	1.4
Total	500	100.0
Nationality	Frequency	Percent
Saudi	483	96.6
not Saudi	17	3.4
Total	500	100.0
Education level	Frequency	Percent
elementary	6	1.2
middle school	16	3.2
high school	111	22.2
academic	367	73.4
Total	500	100.0
Occupation	Frequency	Percent
house wife	143	28.6
employee	166	33.2
student	135	27.0
free business	8	1.6
unemployed	48	9.6
Total	500	100.0
Family history	Frequency	Percent
none	407	81.4
first degree relatives	30	6.0
second degree relatives	59	11.8
first and second degree relatives	4	.8
Total	500	100.0

Ages ranged from 18 to 65 years. As seen in Table 1, almost half of the participants were aged 30-49 years. Most of the participants were Saudis. Majority of the participants were married, followed by single, divorced, and widowed. Of this sample, majority of the participants do not have family history of breast cancer. Most of the participants (69.5%) indicated that they have a very low chance to develop breast cancer in their lives. The majority of participants rate their chance of developing breast cancer between 0-10%. The majority of participants reported that their chance in developing breast cancer is lower than other women in their average age. The study revealed that as the age increases, female's expectation of their chance of developing breast cancer decreases.

Table 2. Correlation between Age and Females Perception of Developing Breast Cancer

Spearman's rho		Age	How much do you think is your chance of developing breast cancer during your life?
Age	Correlation Coefficient	1.000	-.075
	Sig. (2-tailed)		.094
	N	500	500
How much do you think is your chance of developing breast cancer during your life?	CorrelationCoefficient	-.075	1.000
	Sig. (2-tailed)	.094	.
	N	500	500

As shown in Table 2, negative correlation (-.075) was found between age and risk perception of developing breast cancer, but it is not significant as the P value is more than 0.05. As the age increases, females risk perception decreases. Negative correlation (-.060) was found between age and females expectation of developing breast cancer, but it is not significant as the P value is more than 0.05. As the age increases, female's expectation of developing breast cancer decreases. Significance negative correlation (-.156) was found between age and females' expectation of their chance of developing breast cancer compared to other women in their average age as the P value is less than 0.05. Significance positive correlation (.384) was found between age and doing mammogram screening as the P value is less than 0.05. As the age increases, doing mammogram increases. Positive correlation (.029) was found between female's risk perceptions and doing the mammogram screening, however the correlation was not significant as the P value is more than 0.05.

4. Discussion

The study conducted to measure the risk perception of breast cancer among females over 18 years old in Riyadh, Saudi Arabia. The total female response rate was 100%. According to the results, most of the participants aged from 30-49 (45.2%) which may be due that the fact that most of online users in this group age. The majority of the participants were married (65.2%) and have the Saudi nationality (96.6%). Most of the participants were having the an academic degree that is due to the fact that the survey was spread through all college groups, and 33% from them were employees, 81% from the participants doesn't have any family history of breast cancer. The study showed that having a second degree relative with breast cancer is higher (11.8%) than having a first degree relative with breast cancer (6%). The study revealed a negative correlation between age and risk perception of developing breast cancer, but not statistically significant. As the age increases, females risk perception decreases. Responses given by the participants in this study showed a negative correlation between age and female expectation of their chance of developing breast cancer compared to other women in their average age. The correlation is statistically significant with a significance level of $p < 0.005$. According to the statistics, a negative correlation was found between age and doing breast self-exam. The correlation is statically significant at $p< 0.005$. The study indicated that majority of the participants had never had a mammogram in their life (78.4%). To answer the research question, what will be the risk perceptions of breast cancer among women who are over 18 years old in Riyadh, Saudi Arabia, participants were asked to answer questions related to their risk perceptions of the disease. Most of the participants (69.5%) believed that they have a very low chance to develop breast cancer in their lives. A comparison question was asked to measure the participants' perception of developing breast cancer compared of women to their age. Most of the participants reported that their chance will be much less than them (49.3%), followed by, the other less than them (27.5%), equal to them (19%), higher than them (3.8%), and much more than them (0.4%). The major findings of this study showed a negative correlation between risk perception of breast

cancer and age, suggesting that as people get older, their perception of developing breast cancer decrease. It sems that older women have a low perception of developing breast cancer. The study examined if there is an association between risk perception of breast cancer and taking preventive behaviors such as monthly breast self-exam and mammogram screening. According to the results, most women never did mammogram test in their lives (78.4%), some of them did it 1-3 times (18%), and only 18 women performed it more than 3 times (3.6%). It is possible that, due to that most of the participants reported having no family history of breast cancer. There was a positive correlation between risk perceptions and doing the mammogram screening, as the perception increases, taking preventive behaviors increases. However, the correlation was not statistically significant. Studies showed that performing screening test lowers incidence rate for advanced-stage breast cancer (Sankaranarayanan, 2013). In this study, most of the participants perform monthly breast self- examination (53.7%), we asked this group of participants how many times they perform the test, most of them perform it rarely (47.4%), those how perform it weekly 9%, monthly 32.2%, and yearly 11.5%. Correspondingly, previous research has indicated the number of mortality rates of breast cancer are decreasing this is due to early detection of mammography screening (Colditz, Bohlke, & Berkey, 2014).

The findings of this study pointed out the low perceived risk and low screening practices among females over 18 years old in Riyadh Saudi Arabia. This is consistent with other findings from previous studies, where women showed low knowledge, perceptions and performing preventive practices (screening and breast self-examination) (Hussein, 2013; Alrashidi et al., 2017). Consistency was noted in this study, as low risk perception was accompanied by a low preventive measure. As reported by Glanz, Rimer, & Viswanath (2008), people are more likely to engage in healthier behaviors if they perceive the risk of not doing so. That means perceived risk of breast cancer motivates people to uptake preventive practices and to perform screening to prevent breast cancer. The current risk perceptions and preventive behaviors of the sample could indicate a likelihood of an increased risk of breast cancer. It is therefore, important to promote awareness of the risks of breast cancer and the importance to uptake preventive measures, so that lower risk perception does not translate into lower preventive behavior. There is a need to address risk perceptions issues in order to increase the uptake of preventive measures. That can best be done by educating the women about the benefits of early screening, early detection, and its association with lower incidence and mortality rates from breast cancer.

This study has several implications for the development of educational interventions to motivate women to perform preventive practices. This study has shown that the study participants are not demonstrating healthy preventive measures to prevent breast cancer. Therefore, more programs with education intervention strategies to teach women about the benefits of early detection and severity of the disease may be warranted. Health care providers, such as health educators could help to promote effective adoption of preventive behaviors. The primary method of prevention involving risk perception changes and screening practices motivation should be targeted to these women, as their levels of risk perceptions of breast cancer and their performance of preventive practices were low. This study has implications for the Health Education Department, Ministry of Health in Saudi Arabia and for primary health care centers and clinics in Saudi Arabia. Its findings may help these institutions to promote an intervention that targets behavioral change and to educate and prompt the target population to adopt preventive measures that reduce the risk of breast cancer.

5. Conclusion

This study examined perception of risk to breast cancer of female in Saudi Arabia. The study offers new insights applicable to health institutions and health professional practice. Findings from the current study can inform health educators about Saudi Arabian women's risk perception of breast cancer. These findings can help health educators to design appropriate programs, awareness messages, and community campaigns to increase the knowledge and health beliefs about breast cancer and its consequences. Low awareness about the importance of preventive measures were linked to low performance of breast self-examination and mammography test. Women need to be educated about the benefits of breast cancer screening. Health education, counseling, outreach programs, and community-based interventions are recommended to improve the uptake of mammogram test in Saudi Arabia. The results of this study indicate that continued research in this area is warranted. Future research could, for example, determine factors affecting breast cancer screening test and how to overcome the barriers. It is important to study how perceptions are formed among women and why they do not practice behaviors that could reduce their chance of developing breast cancer and promote overall wellness and optimal health.

Ethical Considerations

None.

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Competing Interests Statement

The author declares that there are no competing or potential conflicts of interest.

References

Al Qahtani, F. H., Al Diab, A., Qureshi, h., Al Saleh, K. A., Aleem, A., Alghamdi, M. A., . . . Qureshi, M. R. (2013). *Review on Breast Cancer in the Kingdom of Saudi Arabia*. Retrieved from http://www.idosi.org/mejsr/mejsr14%284%2913/14.pdf

AL., N. (2013, 7 25). *Controversies regarding mammography, breast self-examination, and clinical breast examination*. Retrieved 4 23, 2018, from pubmed: https://www.ncbi.nlm.nih.gov/pubmed/24021250

Alrashidi, A. G., Ahmed, H. G., Alshammeri, K. J. K., Alrashedi, S. A., ALmutlaq, B. A., Alshammari, F. N. M., ... & Alshammari, E. F. H. (2017). Knowledge and perceptions of common breast cancer risk factors in Northern Saudi Arabia. *Asian Pacific journal of cancer prevention: APJCP*, *18*(10), 2755. Retrieved 2 26, 2018, from Pubmed: https://www.ncbi.nlm.nih.gov/pubmed/29072404

Boyd, N. F., Martin, L. J., Yaffe, M. J., & Minkin, S. (2011). Mammographic density and breast cancer risk: current understanding and future prospects. *Breast cancer research*, *13*, 1-12. https://doi.org/10.1186/bcr2942

Centers for Disease Control and Prevention. (2017). *What Are the Risk Factors for Breast Cancer*. Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/cancer/breast/basic_info/risk_factors.htm

El Bcheraoui, C., Basulaiman, M., Wilson, S., Daoud, F., Tuffaha, M., AlMazroa, M. A., ... & Mokdad, A. H. (2015). Breast cancer screening in Saudi Arabia: free but almost no takers. *Plos one*, *10*(3), e0119051. https://doi.org/10.1371/journal.pone.0119051

Colditz, G. A., Bohlke, K., & Berkey, C. S. (2014, 5 13). *Breast cancer risk accumulation starts early*. Retrieved from Pubmed: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4079839/

Dieterich, M., Stubert, J., Reimer, T., Erickson, N., & Berling, A. (2014). Influence of lifestyle factors on breast cancer risk. *Breast care*, *9*(6), 407-414. https://doi.org/10.1159/000369571

Ferrer, R. A., & Klein, W. M. (2015). *Risk perceptions and health behavior. In Current Opinion in Psychology* (pp. 85-89). USA: National Cancer Institute, Medical Center Drive. https://doi.org/10.1016/j.copsyc.2015.03.012

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education theory, research, and practice* (4th ed). San Francisco: Jossey-Bass.

Globocan. (2012). *Breast Cance rEstimated Incidence, Mortality and Prevalence Worldwide in 2012*. Retrieved from globocan: http://globocan.iarc.fr/old/FactSheets/cancers/breast-new.asp

Gray, J. M., Rasanayagam, S., Engel, C., & Rizzo, J. (2017). State of the evidence 2017: an update on the connection between breast cancer and the environment. *Environmental Health*, *16*, 1-61. https://doi.org/10.1186/s12940-017-0287-4

Howell, A., Anderson, A. S., Clarke, R. B., Duffy, S. W., Evans, D. G., Garcia-Closas, M., ... & Harvie, M. N. (2014). Risk determination and prevention of breast cancer. *Breast Cancer Research*, *16*(5), 1-19. https://doi.org/10.1186/s13058-014-0446-2

Hussein, D. M., Alorf, H., Al-Sogaih, Y., Alorf, S., Alaskar, R., Al-Mahana, A., ... & Hindawi, S. (2013). Breast cancer awareness and breast self-examination in Northern Saudi Arabia. *Saudi Med J*, *34*(7), 681-688.

Haas, J. S., Kaplan, C. P., Des Jarlais, G., Gildengoin, V., Pérez-Stable, E. J., & Kerlikowske, K. (2005). Perceived risk of breast cancer among women at average and increased risk. *Journal of women's health*, *14*(9), 845-851. https://doi.org/10.1089/jwh.2005.14.845

Gurmankin Levy, A., Shea, J., Williams, S. V., Quistberg, A., & Armstrong, K. (2006). Measuring perceptions of breast cancer risk. *Cancer Epidemiology Biomarkers & Prevention*, *15*(10), 1893-1898. https://doi.org/10.1158/1055-9965.EPI-05-0482

Ghoncheh, M., Pournamdar, Z., & Salehiniya, H. (2016). Incidence and mortality and epidemiology of breast cancer in the world. *Asian Pacific journal of cancer prevention*, *17*(S3), 43-46. https://doi.org/10.7314/APJCP.2016.17.S3.43

Ravichandran, K., & Al Zahrani, A. S. (2009). Association of reproductive factors with the incidence of breast cancer in Gulf Cooperation Council countries. *EMHJ-Eastern Mediterranean Health Journal, 15*(3), 612-621, 2009. https://doi.org/10.26719/2009.15.3.612

Saggu, S., Rehman, H., Abbas, Z. K., & Ansari, A. A. (2015). Recent incidence and descriptive epidemiological survey of breast cancer in Saudi Arabia. *Saudi medical journal*, *36*(10), 1176. https://doi.org/10.15537/smj.2015.10.12268

Sankaranarayanan, R., Ramadas, K., Frie, K. G., & Qiao, Y. L. (2013). Challenges for Breast and Gynecological Cancer Control by Early Detection in Less-Developed Countries. *Breast and Gynecological Cancers: An Integrated Approach for Screening and Early Diagnosis in Developing Countries*, 215-227. https://doi.org/10.1007/978-1-4614-1876-4_12