Breast Self-Examination: Knowledge, Practice, and Beliefs Among Females in Jordan

Suhad Ahmad, MSc1, Aladeen Alloubani, PhD2, Ruba Abu-Sa’da, MSc3 and Yasar Qutaiba, MD4

Abstract

Introduction: Worldwide, breast cancer is one of the most common types of cancer. It is the leading cause of cancer-related deaths among females in Jordan.

Objective(s): The current study aimed to evaluate breast cancer knowledge levels and practice and assess health beliefs regarding the model supporting self-breast examination (BSE) in a group of females aged between 20 and 60 in Jordan.

Methods: Descriptive, cross-sectional, correlational design was used; Two hundred females participated in the study, employing convenient sampling. The adjusted version of the Champion’s Health Belief Model Scale (CHBMS) was utilized to collect the data.

Results: Most participants were married (F = 128, 64%), and the mean of the participants’ age was (36.18, SD = 10.87). About 73 participants (36.5%) don’t practice BSE; however, 53 participants (26.5%) plan to practice BSE in the future monthly. The logistic regression model showed that the impact of confidence as positive predictive value on practicing BSE in the last year (B = 0.141, p < .001) and this year (B = 0.130, p < .001) was statistically significant.

Conclusion: Implications for practice include identifying culturally specific barriers and improving health education programs to trigger breast self-examination utilization.

Keywords

breast self-examination, breast cancer, knowledge, beliefs, practice

Introduction/Background

Breast cancer is a critical illness in developing and developed countries. It is the primary type of cancer among females, and the risk rises with age (Francies et al., 2020). Specific hereditary genetic mutations, a personal and family history of breast cancer, and biopsy-confirmed hyperplasia are the main reasons that raise the risk of breast cancer in females (Feng et al., 2018). Other reasons that would contribute to breast cancer are menstrual history (menstrual cycles begin early or stopped late in life), obesity next to menopause, current use of oral contraceptives, postmenopausal hormone treatment, having the first baby after the age of 30 years, or never had babies, ethnicity features, exposure to radiation, or drinking of alcoholic drinks daily (Olsson & Olsson, 2020).

In 2020, it was estimated that the worldwide cancer rate has increased to 19.3 million new cases and 10 million deaths (International Agency for Research on Cancer, 2021). The top three cancer types are lung, colorectal, and female breast cancers in terms of incidence. They are among the top five (first, second, and fifth, respectively) in terms of mortality. Together, these three cancer types are responsible for one-third of all cancer incidence and mortality worldwide. (World Health Organization, 2018). In Jordan, breast cancer is estimated for 19.7% of total cancer

1Breast Clinics/Nursing, King Hussein Cancer Center, Amman, Jordan
2King Hussein Cancer Center, Amman, Jordan
3King Hussein Cancer Center, Amman, Jordan
4Early Detection Program, King Hussein Cancer Center, Amman, Jordan

Corresponding Author:
Aladeen Alloubani, King Hussein Cancer Center, Amman, Jordan.
Email: aa.12567@khcc.jo
cases diagnosed in 2018 (The Global Cancer Observatory, 2020).

Globally, breast cancer prevalence rates in women significantly outweigh those for other cancers. Moreover, the most frequently diagnosed cancer in women is breast cancer (24.2%), and in 154 of the 185 countries, breast cancer is the most prevalent. The leading cause of cancer mortality in females (15%) is still breast cancer (World Health Organization, 2018). An early breast cancer mortality in females (15%) is still breast cancer (24.2%), and in 154 of the 185 countries, breast cancer is the most prevalent. The leading cause of cancer mortality in females (15%) is still breast cancer (World Health Organization, 2018). An early breast cancer diagnosis will guide to a better prognosis, and early discovery of breast cancer aims to enhance the treatment’s outcome.

**Review of Literature**

Breast self-examination (BSE) is considered the cornerstone testing method for breast cancer screening and early detection (O’Donovan et al., 2020; World Health Organization, 2016). The Health Belief Model (HBM) is one of the frameworks for investigating health-related issues to accommodate behavioral health ideas. In the 1950s, a team of psychologists proposed this model to support the reasoning for whether women would or would not utilize preventive health care, such as cancer screening and influenza immunizations (Janz & Becker, 1984; Rosenstock, 1974). The HBM has been used as an analytical tool to study breast cancer screening practices such as BSE or mammography screening and attitudes relevant to cancer screening procedures (Dewi et al., 2019; Kirag & Kızılkaya, 2019).

While several organizations such as the American Cancer Society (American Cancer Society, 2019) and World Health Organization (Khatib & Modjtabai, 2006) do not endorse BSE as an effective screening measure for breast cancer diagnosis, it can raise awareness of breast cancer and warm females and doctors of the need to conduct more effective screening measures, particularly females with a family history of breast cancer. Screening preventive procedures for breast cancer, including BSE, clinical breast examination (CBE), and mammography are the primary measures for discovering breast cancer (Shah & Guraya, 2017). Despite the worldwide guideline for conducting breast cancer screening measures, routine practice is still low (Hajian-Tilaki & Auladi, 2014). It was also found that adherence to BSE, mammography, and CBE is comparatively poor in Turkey (Yılmaz & Durmuş, 2016). Another study in Saudi Arabia showed that 7.8% only practiced BSE regularly. Moreover, health beliefs may impact women’s behavior in practicing BSE (Gonzales et al., 2018). Other studies were conducted among female students in Jordan; these studies showed that the awareness of breast cancer and practice of BSE are inadequate, and they must be encouraged to practice BSE regularly (Al-Mousa et al., 2020; Al Odwan et al., 2016; Alsaraireh & Darawad, 2018; Suleiman, 2014).

Health beliefs strongly impact compliance with screening methods for breast cancer. The HBM is accepted internationally as a psychological model capable of predicting and optimizing prevention and health screening actions (Ogden, 2012). This model also offers a valuable context for interpreting health actions and has been widely used for breast screening (Champion, 1993). Several studies have assessed the awareness, attitudes, and knowledge level of the effect of health beliefs on BSE (Abolfotouh et al., 2015; Akhtari-Zavare et al., 2015; Yılmaz & Durmuş, 2016).

The HBM was used in a study conducted in Saudi Arabia to evaluate BSE practice’s knowledge level and attitudes. The knowledge level about breast cancer was marginal, with pessimistic views towards BSE and less than a quarter of Saudi Arabia women practicing BSE daily (Abolfotouh et al., 2015). Another research was carried out in Turkey to assess health beliefs on BSE practice of a group of health care professional women. More than 93% of females don’t perform CBE and mammography annually, and less than 43% practice BSE (Yılmaz & Durmuş, 2016).

The current study aimed to evaluate the level of knowledge and practice about breast cancer and assess the effect of health-related behaviors on BSE in a group of females aged 20–60 in Jordan. Moreover, to identify the relationship between health beliefs (Perceived susceptibility, barriers, seriousness, confidence, benefits, and health motivation) with the frequency of BSE among Jordanian women.

**Methods**

**Design**

Quantitative, cross-sectional, and correlational designs were utilized. A correlational study is an efficient and effective approach for obtaining large quantities of data about special phenomena (Polit & Beck, 2016).

**Sample**

The data were collected between June 2019 and December 2020 in Amman, Jordan. A convenience sample of 200 females aged between 20 and 60 living in Jordan participated in the study. The sample size was calculated with a 95% confidence level, 0.5 prevalence, and 0.05 margin of error using the Epi-info 2000 statistical software.

**Instrument**

The health beliefs model scale (HBMS) was developed by Champion, which has Cronbach’s alpha ranges from 0.73–0.93 (Champion, 1993). The Arabic revised version of the BMS was developed by Mikhail and Petro-Nustas (2001). The questionnaire includes sociodemographics, measuring breast cancer’s health beliefs, signs of breast
cancer, and risk factors, as well as Sociodemographic characteristics such as the participants’ age, income level, marital status, family type, health insurance, and education level, were assessed. The perceived income level was evaluated to recognize the family’s income level. The participants were asked about breast cancer knowledge and family history of breast cancer.

HBMS comprises 42 items to assess six domains, including susceptibility (five items), seriousness (seven items), benefits (six items), barriers (six items), health motivation (item questions), and confidence (11 items). A 5-level Likert scale was applied for scoring ranging from strongly disagree (1 point) to strongly agree (5 points), with the total score ranging between 42 and 220.

Inclusion/Exclusion Criteria
The inclusion criteria include females able to read, write, and understand because the data collection technique is a form of a self-report questionnaire. Additionally, BSE has suggested being adopted by 20–60 years females as a potential age group for an early detection practice for breast cancer (American Cancer Society, 2019).

Data Collection Procedure
Participant recruitment was conducted face to face by the two female nurses for those who met the inclusion criteria. Informed consent was obtained from all subjects before the participation. Participants who met the inclusion criteria were invited to participate voluntarily in the study. They were assured that there were no consequences for their refusal; the participants were completely anonymous; hence at any time, participants had the option to withdraw from the study.

HBMS was numerically coded and provided with a closed envelope for each participant to assure confidentiality. Furthermore, the investigators were postings a flyer that calls for visitors interested in participating in opening contact with the data collector. In addition, the primary investigator has protected the confidentiality of the research participants’ personal information. Lastly, the data collector gave the participants adequate possibility to consider whether or not to enroll in the study.

Ethical Consideration
Ethical approval to conduct the study was obtained from the Institutional Review Board (IRB). All methods were performed in accordance with the relevant guidelines and regulations. The aim of the study was clearly described to the participants. Confidentiality was guaranteed, and the participants were assured about the anonymity of their data. Each participant was assigned an identification number on the tool. For more confidentiality, the collected data for this study were stored in a locked file cabinet.

Statistical Analysis
The Statistical Package for the Social Sciences (SPSS) version 22 was used to analyze the data. Descriptive statistics included (frequency, percentage, mean, and standard deviation) were used to analyze the demographic data. Binomial logistic regression was used to predict the probability of the practice of BSE in the last year, now, and in the future based on knowledge and demographic variables.

Results

Sample Characteristics
Most participants were married (F = 128, 64%), and around half of them had a bachelor’s degree (F = 95, 47.5%). The mean age of the participants was 36.18 (SD = 10.87). Regarding the history of breast cancer, most of them didn’t have a personal history (F = 174, 87%), and more than half of them had a family history of breast cancer (F = 114, 57%). Finally, 95 participants have private medical insurance. (Detailed information about demographics is presented in Table 1).

Knowledge and Practice on BSE
Table 2 presents the Knowledge and Practice of BSE. Around 35 participants heard about breast cancer from doctors or nurses, 18 participants from the media, and 14 participants from their families. At the same time, about 29.5% of participants heard about breast self-examination from doctors or nurses, followed by the media (11.5%) and 7% from newspapers.

About 73 participants don’t practice BSE; furthermore, 30% of the participants didn’t practice the BSE in the past, and 14% of the participants don’t have a plan to practice BSE in the future. In contrast, 16.5% of the participants practiced BSE on monthly basis. However, 26.5% have a plan to practice BSE monthly in the future. (Detailed information on BSE practice is presented in Table 2).

Health Belief
Table 3 showed the Participants’ Responses to HBM Subscale; the mean score for confidence to perform BSE was 23.52 (SD = 7.52). Moreover, the mean of the benefits of BSE is 17.02 (SD = 17.02). Also, the mean of the barriers to performing BSE was 6.3, SD = 3.85. (Detailed information about HBMS is presented in Table 3).

Prediction of BSE Practice by age and HBM Subscale
Binomial logistic regression was executed to determine the effects of age and HBMS on the likelihood that participants
practice BSE in the last year, now, and in the future. The logistic regression model showed that the impact of confidence on practicing BSE in the previous year was statistically significant ($B = 0.141$, odds ratio = 1.151, $p < .001$).

Regarding practicing BSE this year, the regression model showed only two predictors were statistically significant as presented in Table 4: barriers as negative predictive value ($B = -0.110$, odds ratio = 0.896, $p = .042$) and confidence as positive predictive value ($B = 0.130$, odds ratio = 1.193, $p < .001$). Concerning the participants’ plan to practice BSE in the future, BSE benefits were statistically significant as positive predictive value for practice BSE in the future ($B = 0.165$, odds ratio = 1.179, $p = .011$).

### Discussion

The current study aimed to evaluate the level of knowledge and practice about breast cancer and assess the effect of health related-behaviors on BSE in a group of females aged 20–60 in Jordan. Moreover, to identify the relationship between health beliefs (Perceived susceptibility, barriers, seriousness, confidence, benefits, and health motivation and BSE frequency among Jordanian women.

In the current study, most participants were aware of breast cancer and agreed that social media was the main source of information for their knowledge. Other studies conducted in Saudi Arabia in 2015 and 2020 stated that most participants displayed a moderate knowledge level concerning breast cancer, and the primary source of information about breast cancer is social media (Al-Haji et al., 2015; Alomair et al., 2020). Another study by Ewaid et al. in Iraq showed that most respondents had information about breast cancer risk factors. In addition, the internet and television were the primary sources of information about breast cancer (Ewaid et al., 2018). Furthermore, similar to the current study results, Ibnawadh et al. reported that social media was the main source of BSE knowledge (Ibnawadh et al., 2017). Other studies reported inconsistent results with the present study’s findings; Dundar et al. conducted a study in western Turkey that stated that the primary source of information about breast cancer is health care professionals (Dündar et al., 2006).

Most participants in the current study assumed that they had heard about BSE; however, around one-third of the participants did not practice it. Ewaid et al. stated that the BSE practice of females in Iraq was poor because they have insufficient knowledge about breast cancer, and around a quarter of the students practiced BSE (Ewaid et al., 2018). Another study conducted in Iraq stated that less than half of the participants practiced BSE. A lack of understanding of how to correctly perform the BSE technique was the most common explanation for not doing so. Nearly 84% of the participants were able to teach others in the BSE methodology (Alwan et al., 2012).

A study conducted in Iran stated that participants’ knowledge regarding breast cancer and BSE is insufficient, and knowledge level of breast cancer was significantly linked with BSE performance (Akhtari-Zavare et al., 2014). Another study conducted in Jordan indicated

### Table 1. Participants’ Demographic Characteristics.

|                          | Frequency | Percentage |
|--------------------------|-----------|------------|
| **Education**            |           |            |
| High school              | 40        | 20%        |
| Diploma                  | 27        | 13.5%      |
| Part of Bachelor         | 10        | 5%         |
| Bachelor degree          | 95        | 47.5%      |
| Higher education         | 28        | 14%        |
| **Marital Status**       |           |            |
| Single                   | 64        | 32%        |
| Married                  | 128       | 64%        |
| Divorce or Widow         | 7         | 3.5%       |
| **Family History about Breast Cancer** |   |            |
| No                       | 114       | 57%        |
| Mother                   | 31        | 15.5%      |
| Sister                   | 21        | 10.5%      |
| Second degree relatives  | 34        | 17%        |
| **Personal History of breast cancer** |   |            |
| Yes                      | 26        | 13%        |
| No                       | 174       | 87%        |
| **Medical Insurance**    |           |            |
| No                       | 45        | 22.5%      |
| Private                  | 95        | 47.5%      |
| Governmental             | 23        | 11.5%      |
| Military                 | 12        | 6%         |
| Other                    | 25        | 12.5%      |
| **Mean**                 |           |            |
| Age                      | 36.18     | 20 - 60    |

4
that 34.9% were aware of BSE, but it was carried out by only 11%. So, the breast cancer awareness among female students in Jordan and BSE performance are insufficient (Suleiman, 2014). Furthermore, Jahan et al. reported that 69.7% of the women had never heard about BSE, and about 18.7% said that they practiced it (Jahan et al., 2006). Ahmed et al. stated that although about 71.4% of the females in Pakistan knew what BSE was, only 33.1% had performed it (Ahmed et al., 2018). Dadzi and Adam stated that about 64.9% of the females in Ghana had good knowledge of breast cancer and that only 37.6% of them practice BSE (Dadzi & Adam, 2019). Moreover, Koc et al. reported that around 73.3% of female university students in Turkey had heard about BSE, and only about half of them stated that they practice BSE (Koc et al., 2019). Moreover, El Bcheraoui et al. reported a higher incidence of non-compliance with breast cancer screening measures in Saudi Arabia (89%) (El Bcheraoui et al., 2015).

In developing nations, females seek medical care when cancer has already entered an advanced phase. There may be several explanations for this delayed practice: Lack of awareness and knowledge of the importance of cancer screening measures are the frequently described reasons for paying no attention to screening measures (Elkum et al., 2007). So, developing an early detection program for breast cancer could be the most viable technique in a population where most cancers eligible for early detection are detected in the late stages. From its late stages (III and IV) to its early stages (0, I, and II), where the condition is more

| Table 2. Knowledge and Practice on Breast Self-Examination. | Frequency | Percentage |
|----------------|-----------|------------|
| Did you practice BSE in the last year | No | 60 | 30% |
| | Monthly | 33 | 16.5% |
| | Once per 2-3 months | 22 | 11% |
| | Once every 6 months | 29 | 14.5% |
| | Once per year | 40 | 20% |
| | Others | 16 | 8% |
| | Yes | 66 | 33% |
| | No | 73 | 36.5% |
| | Sometimes | 61 | 30.5% |

| Table 3. Participants’ Responses to Health Belief Model Subscale. | Minimum | Maximum | Mean | Std. Deviation |
|----------------|---------|---------|------|---------------|
| Susceptibility | 0 | 20 | 9.68 | 3.49 |
| Seriousness | 0 | 28 | 13.65 | 5.57 |
| Benefits | 0 | 24 | 17.02 | 4.15 |
| Barriers | 0 | 22 | 6.30 | 3.85 |
| Confidence | 0 | 42 | 23.52 | 7.52 |
| Motivation | 0 | 28 | 18.95 | 4.30 |

| Table 4. Prediction of BSE practice by age and Health Belief Model Subscale Using binomial logistic regression. | B | S.E. | P value | Odds Ratio | 95% C.I. Lower | Upper |
|----------------|---|------|---------|------------|---------------|-------|
| Did you practice BSE in the last year | Susceptibility | -.016 | .057 | .057 | .984 | .880 | 1.100 |
| | Seriousness | .019 | .035 | .580 | 1.020 | .952 | 1.093 |
| | Benefits | -.012 | .052 | .818 | .988 | .893 | 1.093 |
| | Barriers | -.063 | .052 | .228 | .939 | .848 | 1.040 |
| | Confidence | .141 | .030 | .001 | 1.151 | 1.086 | 1.220 |
| | Motivation | .006 | .047 | .906 | 1.006 | .917 | 1.103 |
| | Age | .030 | .018 | .102 | 1.030 | .994 | 1.067 |

| Are you practicing BSE | Susceptibility | -.048 | .054 | .378 | .953 | .858 | 1.060 |
| | Seriousness | .050 | .035 | .145 | 1.052 | .983 | 1.126 |
| | Benefits | .004 | .051 | .940 | 1.004 | .908 | 1.109 |
| | Barriers | -.110 | .054 | .042 | .896 | .807 | 1.096 |
| | Confidence | .130 | .028 | .001 | 1.131 | 1.078 | 1.204 |
| | Motivation | .033 | .048 | .966 | .486 | 1.034 | .942 | 1.135 |
| | Age | -.001 | .015 | .996 | .945 | .969 | 1.030 |

| Do you have a plan to practice BSE in the future | Susceptibility | .060 | .069 | .386 | 1.062 | .927 | 1.217 |
| | Seriousness | -.084 | .046 | .069 | 1.152 | .840 | 1.007 |
| | Benefits | .165 | .065 | .011 | 1.179 | 1.039 | 1.338 |
| | Barriers | -.064 | .059 | .277 | .938 | .836 | 1.053 |
| | Confidence | .068 | .037 | .067 | 1.070 | .995 | 1.151 |
| | Motivation | -.008 | .059 | .887 | .992 | .883 | 1.114 |
| | Age | .003 | .023 | .896 | 1.003 | .959 | 1.049 |
curable, survival rates are highest, and care costs are lowest, the early detection program can downgrade the present status of a breast cancer diagnosis.

**Strengths and Limitations**

The current study includes some limitations concerning the study design; cross-sectional or descriptive designs can limit inferences of causality (Brady Germain & Cummings, 2010). Another limitation of this study’s findings is not intended to be generalized but rather to be used to understand the experiences of BSE practices and attitudes among females in Jordan.

**Implications for Practice**

The Health beliefs model can promote early detection of breast cancer by enhancing knowledge and awareness of BSE. As a result, women should be advised to self-monitor their breasts in order to recognize abnormalities. Effective educational strategies are needed to enable women to participate in daily BSE.

**Conclusion**

To summarize, breast cancer is the most prevalent cancer in females and can be fatal if not detected early. Advance detection can help people live longer and have a better quality of life. Various diagnostic tools have been developed to assist in the early detection of cancer. CBE and mammography are recommended as primary diagnostic methods by the World Health Organization, with BSE as a secondary method in the absence of CBE and mammography, even though BSE is still useful for increasing awareness and discovering any abnormal changes in the breast.

**Authors’ Contributions**

Suhad Alsater contributed for the conceptualization of the article. Yasar Qutaiba contributed for the validation and editing of the article. Ruba Abu-Sa’da contributed for the data curation and methodology of the article. Aladeen Alloubani contributed for the writing-original draft and formal analysis of the article.

**Availability of Data and Material**

The data is available upon request.

**Code Availability**

SPSS version 21 was used to analyze the data.

**Declaration of Conflicting Interests**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The authors received no financial support for the research, authorship, and/or publication of this article.

**Ethical Approval**

Ethical approval to conduct this study was received from the Institutional Review Board (IRB) at the King Hussein Cancer Center. All methods were performed in accordance with the relevant guidelines and regulations.

**Informed Consent**

Informed consent was obtained from all subjects prior to the participation.

**ORCID iD**

Aladeen Alloubani [https://orcid.org/0000-0002-5073-3152](https://orcid.org/0000-0002-5073-3152)

**References**

Abolfotouh, M. A., Banimustafa, A. A., Mahfouz, A. A., Al-Assiri, M. H., Al-Juhani, A. F., & Alaskar, A. S. (2015). Using the health belief model to predict breast self examination among Saudi women health behavior, health promotion and society. *BMC Public Health, 15*(1), 1–12. https://doi.org/10.1186/s12889-015-2510-y

Ahmed, A., Zahid, I., Ladiwala, Z. F., Sheikh, R., & Memon, A. (2018). Breast self-examination awareness and practices in young women in developing countries: A survey of female students in karachi, Pakistan. *Journal of Education and Health Promotion, 7*(1), 90. https://doi.org/10.4103/JEHP.JEHP_147_17

Akhtari-Zavare, M., Ghanbari Baghestan, A., Latiff, L. A., Matinina, N., & Hoseini, M. (2014). Knowledge of breast cancer and breast self-examination practice among Iranian women in Hamedan, Iran. *Asian Pacific Journal of Cancer Prevention, 15*, 6531–6534. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3203905

Akhtari-Zavare, M., Juni, M. H., Ismail, I. Z., Said, S. M., & Latif, L. A. (2015). Barriers to breast self examination practice among Malaysian female students: A cross sectional study. *SpringerPlus, 4*(1), 1–6. https://doi.org/10.1186/s40064-015-1491-8

Al Odwan, M. I., Khreisat, I. F., & Khreisat, A. F. (2016). Knowledge attitude and practice of breast self examination among female graduates in princess Muna college of nursing and royal medical services college of allied health professions. *Journal of the Royal Medical Services, 23*(4), 41–53. https://doi.org/10.12816/0032200

Al-Haji, K. M., Amoawed, S., & Mal-Haji, K. (2012). Breast Cancer, Breast Self-Examination Knowledge Among Female High School Students In Riyadh City. *Middle East Journal Of Nursing, 9*, 25–33. https://doi.org/10.12816/0032200

Al-Mousa, D. S., Alkharas, M., Hossain, S. Z., Al-Sa’di, A. G., Al Hasan, M., Al-Hayek, Y., & Brennan, P. C. (2020). Knowledge, attitude and practice around breast cancer and mammography screening among Jordanian women. *Breast Cancer: Targets and Therapy, 12*, 231–242. https://doi.org/10.2147/BCTT.S275445

Alomair, A., Felemban, D., Felemban, M., Awadain, J., Altowairqi, A., Alfwazan, N., Almazayen, F., Korkoman, A., & Alhrsuyis, N. (2020). Knowledge, attitude, and practice of breast self-examination toward breast cancer among female students at King Saud University in Riyadh, Saudi Arabia. *International Journal of Medicine in Developing Countries, 4*(2), 429–434. https://doi.org/10.24911/ijmdc.51-157668182
Alsaaraih, A., & Darawad, M. W. (2018). Breast cancer awareness, attitude and practices among female university students: A descriptive study from Jordan. *Health Care for Women International, 39*(5), 571–583. https://doi.org/10.1080/07393932.2017.1368516

Alwan, N. A. S., Al Attar, W. M., Eliessa, R. A., Madfaic, Z. A., & Awfeeq, F. N. (2012). Knowledge, attitude and practice regarding breast cancer and breast self-examination among a sample of the educated population in Iraq. *EHMJ-Eastern Mediterranean Health Journal, 18*(4), 337–345. https://www.sciencedirect.com/science/article/pii/S2305050013600986. doi:10.26719/2012.18.4.337

American Cancer Society (2019). *Breast Cancer Early Detection and Diagnosis*. https://www.cancer.org/content/dam/CRC/PDF/Public/8579.00.pdf.

Brady Germain, P., & Cummings, G. G. (2010). The influence of nursing leadership on nurse performance: A systematic literature review. *Journal of Nursing Management, 18*(4), 425–439. https://doi.org/10.1111/j.1365-2834.2010.01100.x

Champion, V. L. (1993). Instrument refinement for breast cancer screening behaviors. *Nursing Research, 42*(3), 139–143. https://doi.org/10.1097/00006199-199306000-00003

Dadzi, R., & Adam, A. (2019). Assessment of knowledge and practice of breast self-examination among reproductive age women in akatsi south district of volta region of Ghana. *Plos One, 14*(12), e0226925. https://doi.org/10.1371/JOURNAL.PONE.0226925

Dewi, T. K., Massar, K., Ruiter, R. A. C., & Leonardi, T. (2019). Determinants of breast self-examination practice among women in surabaya, Indonesia: An application of the health belief model. *BMC Public Health, 19*(1), 1581. https://doi.org/10.1186/s12889-019-7951-2

Dündar, P. E., Ozmen, D., Oztürk, B., Haspolat, G., Akyildiz, F., Çoban, S., & Çakiroğlu, G. (2006). The knowledge and attitudes of breast self-examination and mammography in a group of women in a rural area in western Turkey. *BMC Cancer, 6*(1), 1–9. https://doi.org/10.1186/1471-2407-6-43

El Bcheraoui, C., Basulaiman, M., Wilson, S., Daoud, F., Tuffaha, M., AlMazroa, M. A., Memish, Z. A., Saeedi, 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

Elkum, N., Dermime, S., Ajarim, D., Al-Zahrani, A., Alsayed, A., Tulbah, A., Al Malik, O., Alshabanah, M., Ezzat, A., & Al-Tweigeri, T. (2007). Being 40 or younger is an independent risk factor for relapse in operable breast cancer patients: The Saudi Arabia experience. *BMC Cancer, 7*(1), 1–8. https://doi.org/10.1186/1471-2474-7-222

Ewaid, S. H., Shanjar, A. M., & Mahdi, R. H. (2018). Knowledge and practice of breast self-examination among sample of women in shatra/dhi-qar/Iraq. *Alexandria Journal of Medicine, 54*(4), 315–317. https://doi.org/10.1016/j.ajme.2017.12.002

Feng, Y., Spezia, M., Huang, S., Yuan, C., Zeng, Z., Zhang, L., Ji, X., Liu, W., Huang, B., Luo, W., Liu, B., Lei, Y., Du, S., Vuppalapati, A., Luu, H. H., Haydon, R. C., He, T. C., & Ren, G. (2018). Breast cancer development and progression: Risk factors, cancer stem cells, signaling pathways, genomics, and molecular pathogenesis. *In Genes and Diseases, 5*(2), 77–106. https://doi.org/10.1016/j.gendis.2018.05.001

Francies, F. Z., Hull, R., Khanyile, R., & Dlamini, Z. (2020). Breast cancer in low-middle income countries: Abnormality in splicing and lack of targeted treatment options. *American Journal of Cancer Research, 10*(5), 1568–1591. http://www.ncbi.nlm.nih.gov/pubmed/32509398

The Global Cancer Observatory (2020). *Jordan: Globocan 2018*. World Health Organization. https://gco.who.int/today/data/factsheets/populations/400-jordan-fact-sheets.pdf.

Gonzales, A., Alzaatreh, M., Mari, M., Saleh, A., & Alloubani, A. (2018). Beliefs and behavior of Saudi women in the university of tabuk toward breast self examination practice. *Asian Pacific Journal of Cancer Prevention (APJCP), 19*(1), 121–126. https://doi.org/10.22034/2018.19.1.121

Hajian-Tilaki, K., & Aulidi, S. (2014). Health belief model and practice of breast self-examination and breast cancer screening in Iranian women. *Breast Cancer (Tokyo, Japan), 21*(4), 429–434. https://doi.org/10.1007/s12282-012-0409-3

Ibnawadh, S. K., Alawad, M. A., Alharbi, S. B., Alduawwah, N., Alkwiter, F. S., Alsalhy, A. E., Alzahrani, A. A., & Alnizy, L. A. (2017). Knowledge, attitude and practice of breast self-examination among females in medical and non-medical colleges in qassim university. *Journal of Health Specialties, 5*(4), 219. https://www.thejhs.org/article.asp?issn=2468-6360;year=2017;volume=5;issue=4;spage=219;epage=224;auid=1. doi:10.4103/jhs.JHS_137_16

International Agency for Research on Cancer. (2021). *GLOBOCAN 2020: New Global Cancer Data*. https://www.uicc.org/news/globocan-2020-new-global-cancer-data.

Jahan, S., Al-Saigul, A. M., & Abdelgadir, M. H. (2006). Breast cancer. Knowledge, attitudes and practices of breast self examination among women in qassim region of Saudi Arabia. *Saudi Medical Journal, 27*(11), 1737–1741. https://pubmed.ncbi.nlm.nih.gov/17106553/

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education & Behavior, 11*(1), 1–47. https://doi.org/10.1177/109019818401100101

Khatib, O., & Modjtabai, A. (2006). Guidelines for the early detection and screening of breast cancer. *EMRO Technical Publications Series, 30*. World Health Organization.

Kirag, N., & Kızılkaya, M. (2019). Application of the Champion Health Belief Model to determine beliefs and behaviors of Turkish women academicians regarding breast cancer screening: A cross sectional descriptive study. *BMC Women’s Health, 19*(1), 1–10. https://doi.org/10.1186/s12905-019-0828-9

Koc, G., Guleen-Savas, H., Ergol, S., Yildirim-Cetinkaya, M., & Aydin, N. (2019). Female university students’ knowledge and practice of breast self-examination in Turkey. *Nigerian Journal of Clinical Practice, 22*(3), 410. https://doi.org/10.4103/NJCP.NJCP_341_18

Mikhail, B. I., & Petro-Nustas, W. I. (2001). Transcultural adaptation of champion’s health belief model scales. *Journal of Nursing Scholarship, 33*(2), 159–165. https://doi.org/10.1111/j.1547-5069.2001.00159.x

O’Donovan, J., Newcomb, A., Macrae, M. C., Vieira, D., Onyilofor, C., & Ginsburg, O. (2020). Community health workers and early detection of breast cancer in low-income and middle-income countries: A systematic scoping review of the literature. *BMJ Global Health, 5*(5), e002466. https://doi.org/10.1136/bmjgh-2020-002466

Ogden, J. (2012). *Health Psychology: A Textbook* (5th Edition). McGraw-Hill. https://books.google.jo/books?hl=en&lr
Olsson, H. L., & Olsson, M. L. (2020). The Menstrual Cycle and Risk of Breast Cancer: A Review. *Frontiers in Oncology*, 10, 21. https://doi.org/10.3389/fonc.2020.00021

Polit, D. F., & Beck, C. T. (2016). *Nursing research: generating and assessing evidence for nursing practice*.

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education & Behavior*, 2(4), 328–335. https://doi.org/10.1177/109019817400200403

Shah, T., & Guraya, S. (2017). Breast cancer screening programs: Review of merits, demerits, and recent recommendations practiced across the world. *Journal of Microscopy and Ultrastructure*, 5(2), 59. https://doi.org/10.1016/j.jmau.2016.10.002

Suleiman, A. (2014). Awareness and attitudes regarding breast cancer and breast self-examination among female Jordanian students. *Journal of Basic and Clinical Pharmacy*, 5(3), 74. https://doi.org/10.4103/0976-0105.139730

World Health Organization (2016). *Breast cancer: prevention and control*. WHO. http://www.who.int/cancer/detection/breastcancer/en/index2.html.

World Health Organization (2018). *Latest global cancer data: Cancer burden rises to 18.1 million new cases and 9.6 million cancer deaths in 2018*. International Agency for Research on Cancer. World Health Organization. http://gco.iarc.fr/.

Yilmaz, M., & Durmus, T. (2016). Health beliefs and breast cancer screening behavior among a group of female health professionals in Turkey. *Journal of Breast Health*, 12(1), 18–24. https://doi.org/10.5152/tjbh.2015.2715