

Awareness of Breast Cancer Risk Factors, Symptoms, and Self-Examination Among Jordanian Women

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ABSTRACT

Breast cancer has become the most common form of cancer in women after skin cancer, and its incidence exceeds other cancers. This study aims to assess the level of awareness among Jordanian women regarding breast cancer risk factors and symptoms and the practice of breast self-examination (BSE). Between May and June 2025, an online cross-sectional survey assessed the awareness level among Jordanian females regarding breast cancer self-screening, risk factors and symptoms. Logistic regression analysis was performed to identify factors associated with breast cancer awareness and early detection. A total of 126 participants were involved in this research. The awareness mean score was 50.8 (SD: 14.59), and a good level was reported by 63 participants (50.0%). Notably, individuals aged 41-50 show a significantly higher odds ratio (OR = 7.22, 95% CI: 1.58-32.91, $p = 0.01$) for awareness compared to participants aged 18-30 years. Those involved in the medical field, either as working professionals (OR = 24.04, 95% CI: 2.67-216.46, $p = 0.005$) or students (OR = 3.22, 95% CI: 1.00-10.34, $p = 0.04$), have much higher odds of being aware. Based on the findings of this study, the level of awareness of breast cancer is good, especially in the age group of 41 to 50 years, in addition to an increase in the percentage of awareness among medical staff compared to others. Therefore, more awareness campaigns are needed to increase awareness among all segments of society and all ages that are vulnerable to breast cancer.

Keywords: breast cancer, risk factors, self-screening, Jordan

INTRODUCTION

Several factors, both genetic and nongenetic, can lead to breast cancer (BC)¹. Recently, BC has become the most predominant cancer, and the incidence of BC exceeds other cancers, such as lung cancer. In 2020, 11.7% of newly diagnosed cancers were BC². Although BC treatments are developing rapidly, BC remains a significant global health concern³.

In addition to family history and genetic factors, risk factors include obesity, a high-fat diet, smoking and drinking. Additionally, ionizing radiation, menstruation, childbearing, and lactation are factors that can increase the incidence of BC⁴.

Studies have shown that early diagnosis increases the likelihood of survival. Specifically, relative survival rates for BC detected at an early stage were higher than disease-specific survival, even exceeding 100% in populations experiencing higher rates of screening: women diagnosed during the era of widespread uptake of mammography, women aged above 40, and women with health insurance coverage⁵. This emphasizes the significance of programs for BC screening^{4,6}.

The World Health Organization recommends cancer prevention as an essential component of all cancer control plans because about 40% of all cancer deaths can be prevented^{7,8}. BSE has been promoted for many years as a screening method for BC at an early stage, to decrease the risk of dying from BC^{9,10}. Additionally, early BC detection results in better prognoses and lower costs compared to advanced stages and other forms of cancer^{11,12}.

The underlying purpose of screening is to detect BC at an early stage, before it becomes palpable. Screening is typically performed on

asymptomatic individuals who are at high risk of developing BC, and it may not be beneficial for all women diagnosed with BC. Screening is crucial for reducing morbidity and mortality rates and for the early detection of BC¹³. In 1997, the American Cancer Society updated its BC screening guidelines, recommending that women begin annual mammography screening at age 40. They also emphasized that the decision to discontinue annual screening should not be based solely on age^{14,15}. This study aims to assess the level of awareness among Jordanian women regarding BC risk factors, symptoms, and the practice of BSE.

METHOD

Study design: A cross-sectional survey study design was used to assess awareness levels among Jordanian females regarding BC self-screening, risk factors and symptoms.

Sampling: A total of 127 females in Jordan completed the survey and recorded their responses on an online pre-tested self-administered questionnaire. The survey was distributed online. The link was shared on social media platforms between May and June 2025. This study employed a convenience sampling technique through social media platforms. The sampling frame included adults residing in Jordan who had access to social media, with inclusion criteria requiring participants to be 18 years or older, able to read Arabic, and willing to provide informed consent. The final sample size was 127, which was determined pragmatically based on available resources and participant accessibility. The questionnaire was adapted from previously published studies.

Questionnaire tool: The questions were designed based on previously published studies in the same field. The questionnaire consisted of five

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sections. The first section covered the demographic characteristics of the respondents, including age, educational level, family history of BC, and area of residence. The second section focused on assessing awareness related to BC examination and diagnosis. It consisted of 15 items that employed a five-point Likert scale, ranging from weak to excellent. The third section covered knowledge of symptoms regarding BC, such as changes in the size or shape of one or both breasts, severe pain, and the appearance of flakes, red discharge, differences in texture, or redness. The fourth section items assessed the knowledge regarding BC risk factors, including smoking, postmenopausal age, obesity, hormonal contraception, vitamin D deficiency, presentation of other cancers, age, recent abortion, and family history. The last section consisted of items to assess the respondents' beliefs about early detection.

Data analysis: Statistical analyses were conducted using SPSS Version 28. Descriptive statistics were used to summarize the demographic characteristics through frequencies and percentages, while continuous data, such as awareness scores, were presented as means and standard deviations. Logistic regression analysis was performed to identify factors associated with BC awareness and early detection, with OR and 95% confidence interval (CI) reported. Initially, awareness scores were dichotomized at the median (poor vs. good). However, to retain statistical power and reduce loss of information, we also analyzed awareness as a continuous outcome. Predictor variables were selected based on theoretical importance and previous literature. A significance level of $\alpha = 0.05$ was used.

Ethical approval: The research ethics committee at Isra University, Amman, Jordan, approved the study protocol (SREC/25/05/143). The participants provided informed consent before commencing the survey by reading an information sheet and clicking the "Agree" button. This study was conducted in accordance with the World Medical Association Declaration of Helsinki.

RESULTS

Among the 126 participants, the majority (91, 72.2%) were aged between 18 and 30 years, while 20 (15.9%) were between 31 and 40 years. Regarding residency, most participants were from Amman (73, 57.9%), followed by Karak (34, 27.0%). In terms of BC history, 30 (23.8%) reported that they or a family member had been diagnosed, whereas 96 (76.2%) had no prior diagnosis. Table 1 presents the demographic characteristics of the participants.

The participants self-assessed their awareness of BC screening, including self-detection and clinical tests. A significant proportion

demonstrated good to excellent awareness of self-detection in the breast area (117, 92.8%), breast volume changes (112, 88.9%), and the existence of lumps (101, 79.4%). Similarly, breast texture awareness was rated as good to excellent by 110 participants (87.3%), while nipple change awareness was high, with 108 (85.8%) reporting good to excellent knowledge. However, lower awareness was observed in distinguishing cysts from lumps, where only 89 (70.6%) had good to excellent awareness, and in understanding the difference between ultrasound and mammogram, with 86 (68.2%) rating their knowledge as good to excellent. Awareness of BC stages (78, 61.8%), hormonal tests (80, 63.5%), and the diagnosed period (85, 67.5%) was also relatively lower.

The most frequently recognized risk factors were other cancer present (88, 69.8%), smoking (87, 69.0%), hormonal contraception (79, 62.7%), and post menopause (75, 59.5%). However, awareness was significantly lower for vitamin D deficiency (1, 15.1%), recent abortion (24, 19.0%) and hypertension (11, 8.7%), indicating gaps in knowledge. Regarding BC complications, the most commonly identified were the spread of cancer (95, 75.4%), adenolymphomas (91, 72.2%), and fatigue (89, 70.6%). Conversely, fewer participants recognized infertility (29, 23.0%), infection (18, 14.3%), and weight loss (1, 0.8%) as potential complications (Table 2).

The majority of participants recognized several symptoms as reasons to visit a doctor. These included changes in breast size (121, 96.0%), severe pain (120, 95.2%), and red secretion (123, 97.6%). Other symptoms recognized include changes in breast shape (111, 88.1%), redness (101, 80.2%) and the appearance of flakes (95, 75.4%) (Table 3).

Most participants (125, 99.2%) believed that early detection facilitates treatment, while one (0.8%) disagreed. The greatest barrier to early detection is fear of having the disease (53, 42.1%), followed by lack of knowledge about symptoms (32, 25.4%). When asked about the best time for a manual check, most participants (88, 69.8%) chose after the menstrual period (Table 4).

The awareness mean was 50.8 ± 14.59 , and 63 participants (50.0%) reported a good level of awareness. Notably, individuals aged 41-50 showed significantly higher awareness (OR = 7.22, 95% CI: 1.58-32.91, $p = 0.01$) than participants aged 18-30 years old. Those involved in the medical field, either as working professionals (OR = 24.04, 95% CI: 2.67-216.46, $p = 0.005$) or students (OR = 3.22, 95% CI: 1.00-10.34, $p = 0.04$), had much higher odds of being aware. The regression analysis sometimes demonstrated wide confidence intervals, reflecting the limited size of certain subgroups. When awareness scores

Table 1. Demographic characteristics of the participants

Demographic characteristics	N	%
Age (years)	18-30	91
	31-40	20
	41-50	15
Address	Irbid	3
	Amman	73
	Karak	34
	Others	16
Have you or one of your family members ever been diagnosed with BC?	No	96
	Yes	30
Are you involved in the medical field?	No	53
	Yes, Working	12
	Yes, Student	61

Table 2. Participants' knowledge of BC risk factors and complications

Variable		Yes	No
Select the risk factors that you know.	Having a family member with breast cancer	72 (57.1%)	54 (42.9%)
	Post menopause	75 (59.5%)	51 (40.5%)
	Age	61 (48.4%)	65 (51.6%)
	Overweight	40 (31.7%)	86 (68.3%)
	Hormonal contraception	79 (62.7%)	47 (37.3%)
	Other cancer present	88 (69.8%)	38 (30.2%)
	Vitamin D deficiency	19 (15.1%)	107 (84.9%)
	Bras	44 (34.9%)	82 (65.1%)
	Deodorant	55 (43.7%)	71 (56.3%)
	Recent abortion	24 (19.0%)	102 (81.0%)
	Breast volume	37 (29.4%)	89 (70.6%)
	Breast feeding	10 (7.9%)	116 (92.1%)
	Hypertension	11 (8.7%)	115 (91.3%)
	Smoking	87 (69.0%)	39 (31.0%)
	Fatigue	89 (70.6%)	37 (29.4%)
Which of the following are BC complications?	Adenolymphomas	91 (72.2%)	35 (27.8%)
	Spread of cancer	95 (75.4%)	31 (24.6%)
	Loss of sexual interest	60 (47.6%)	66 (52.4%)
	Insomnia	48 (38.1%)	78 (61.9%)
	Infertility	29 (23.0%)	97 (77.0%)
	Cardiac disorder	40 (31.7%)	86 (68.3%)
	Inflammation of the lungs	48 (38.1%)	78 (61.9%)
	Infection	18 (14.3%)	108 (85.7%)
	Weight loss	1 (0.8%)	125 (99.2%)

Table 3. Participants' perception of symptoms that necessitate a visit to the doctor

Choose the symptoms which would make you visit the doctor	Requires	Doesn't require
Changes in the size of one or both breasts	121 (96.0%)	5 (4.0%)
Severe pain	120 (95.2%)	6 (4.8%)
The presence of tissues with a different texture from their surroundings	126 (100.0%)	0 (0.0%)
Changes in breast shape	111 (88.1%)	15 (11.9%)
Appearance of flakes	95 (75.4%)	31 (24.6%)
A white secretion	94 (74.6%)	32 (25.4%)
A red secretion	123 (97.6%)	3 (2.4%)
Redness	101 (80.2%)	25 (19.8%)

Table 4. Perception and barriers to early BC detection

Variable		N	%
Do you think that early detection facilitates treatment?	No	1	0.8%
	Yes	125	99.2%
In your opinion, what is the main cause that prevents women from early detection?	Fear that they may have the disease	53	42.1%
	Fear of the treatment	12	9.5%
	Financial ability	15	11.9%
	Shame culture	8	6.3%
	Not knowing the symptoms	32	25.4%
	Not knowing about an examination center	6	4.8%
Is there an examination and follow-up center near your home?	No	70	55.6%
	Yes	56	44.4%
What is the right time for the manual check?	Before the menstrual period	27	21.4%
	During the menstrual period	11	8.7%
	After the menstrual period	88	69.8%

Table 5. Factors influencing BC awareness and early detection: odds and significance

Factor	Category	OR (95% CI)	p-value
Age (years)	18-30	Reference	
	31-40	2.05 (0.50-8.44)	0.319
	41-50	7.22 (1.58-32.91)	0.011
Have you or one of your family members ever been diagnosed with BC?	No	Reference	
	Yes	1.50 (0.61-3.71)	0.377
Do you think that early detection reduces the complications of BC?	No	Reference	
	Yes	0.39 (0.05-2.95)	0.361
Are you involved in the medical field?	No	Reference	
	Yes, Working	24.04 (2.67-216.46)	0.005
	Yes, Student	3.22 (1.00-10.34)	0.049
What is the right time for the manual check?	Before	Reference	
	During	1.15 (0.25-5.28)	0.860
	After	0.91 (0.35-2.36)	0.839
Address	Amman	Reference	
	Karak	1.25 (0.43-3.59)	0.681
	Other	1.13 (0.34-3.69)	0.843
	Constant	0.69 (0.00-0.00)	0.732

were analyzed as continuous variables, the direction of associations remained consistent, although effect estimates were more precise compared to the dichotomized model (Table 5).

DISCUSSION

This study was administered to assess the awareness of BC among Jordanian females. A significant proportion in the current study demonstrated good to excellent awareness of self-detection in the breast area (117, 92.8%), breast volume changes (112, 88.9%), and the presence of lumps (101, 79.4%). Similarly, breast texture awareness was rated as good to excellent by 110 participants (87.3%), while nipple change awareness was high, with 108 (85.8%) reporting good to excellent knowledge.

A prior study of female university students in Pakistan found overall poor knowledge regarding BC risk factors, signs and symptoms. However, another study conducted in Nepal found modest knowledge regarding prior risk factors (35.7%). The differences between their findings and ours may be attributed to the differences in the sample size and characteristics between the studies. Moreover, the knowledge was also poor regarding the best time for BC examination; 29.4% of the participants considered this a risk factor for developing BC¹⁶/ However, other studies found good knowledge in female university students in Nigeria (46.4%)¹⁷ and Uganda (48.5%)¹⁸. Additionally, studies in Turkey (54.8%)¹⁹ and China (63.6%) found good knowledge²⁰. According to this, good knowledge of risk factors can aid in the inhibition of BC in the female population. Moreover, a family history of BC in first-degree relatives is the main risk feature for BC²¹. Therefore, Jordan should emphasize increased awareness of BC and fund campaigns related to self-examination and examination under the supervision of a specialist. Based on these results, such campaigns can raise awareness and contribute to early detection of this disease, limiting its progression and improving the ability to treat it.

The most frequently recognized risk factors were other cancer present (69.8%), smoking (69.0%), hormonal contraception (62.7%), and post menopause (59.5%). However, awareness was significantly lower for vitamin D deficiency (15.1%), recent abortion (19.0%) and hypertension (8.7%), indicating gaps in knowledge. The most frequently identified BC complications were the spread of cancer (75.4%), adenolymphomas (72.2%), and fatigue (70.6%). Conversely,

fewer participants recognized infertility (23.0%), infection (14.3%), and weight loss (0.8%) as potential complications. In our study, only 14% of the female participants identified the prolonged use of oral contraceptives as a risk factor for this type of cancer. However, a study conducted in Nepal found modest knowledge regarding this prior risk factor (35.7%)²². Also, only 19.1% of female students at the University of Pakistan identified early menstruation as a risk factor for BC¹⁶. An almost identical figure of 19.2% of the female students in a study conducted in Nepal considered early menstruation a risk factor for BC²². Moreover, BC generally progresses in older people²³. In a study conducted in Pakistan, only 22% of the female participants recognized this¹⁶. This figure aligns with an earlier study of female university students in Uganda (25%)¹⁸. Overall, women's knowledge of BC risk factors is generally poorer in some countries than in others, which may be linked to differences in public awareness levels. Increasing awareness campaigns that clearly explain potential risk factors could help prevent the development and progression of BC. Such efforts would also support early diagnosis and improve treatment outcomes.

Most participants in the present study (99.2%) believed early detection facilitates treatment, while one (0.8%) disagreed. They identified the greatest barrier to early detection as fear of having the disease (42.1%), followed by lack of knowledge about symptoms (25.4%). When asked about the best time for a manual check, most participants (69.8%) chose after the menstrual period. In a Pakistani study, members were not familiar with the presence of a painless and palpable breast lump (38.6%) or a painless mass under the armpit (35.5%) as signs and symptoms of BC. A relatively higher knowledge about these signs and symptoms was described from Ethiopia (53.7%, 57% respectively)²⁴. In a study of higher secondary students in Western Nepal, a painless breast lump was correctly identified as a BC symptom²². However, in a study of female students in Pakistan, only a few identified morphological changes in the breast, like abrupt changes in size and shape¹⁶. Awareness of the signs and symptoms of BC was high (74.7%) in the United Arab Emirates and among female Ethiopian university students (74.3%)^{24,25}. In contrast, female students in Pakistan had poor knowledge about wounds around the nipple (25.7%) and bleeding or discharge from the nipple (28.4%)¹⁶. These results were consistent with a prior study conducted in China (37.2% and 29.4% respectively)²⁶. The results confirm that knowing the symptoms associated with BC is one of the greatest helps in diagnosing it: early detection of BC in women is not possible unless they are aware of its signs and symptoms.

This is achieved by raising women's level of awareness, support from the government and medical authorities on the importance of this information, and eliminating the societal culture of shame and embarrassment regarding this disease.

However, lower awareness was observed in distinguishing cysts from lumps, where only 89 participants in this study (70.6%) had good to excellent awareness, and in understanding the difference between ultrasound and mammogram, with 86 (68.2%) rating their knowledge as good to excellent. Awareness of BC stages (761.8%), hormonal tests (63.5%), and the diagnosed period (67.5%) was also relatively lower. The awareness mean was 50.8 ± 14.59 , and a good level was reported by 63 participants (50.0%). Notably, participants aged 41-50 show a significantly higher awareness (OR = 7.22, 95% CI: 1.58-32.91, $p = 0.01$) than those aged 18-30. Those involved in the medical field, either as working professionals (OR = 24.04, 95% CI: 2.67-216.46, $p = 0.005$) or students (OR = 3.22, 95% CI: 1.00-10.34, $p = 0.04$), have much higher odds of being aware. Familiarity with screening tests for BC is significantly related to the early discovery of BC. A vital recommendation by the United States Preventive Services Task Force (USPSTF) was that women between 20 and 30 years of age should undergo a clinical breast examination by a medical practitioner every three years, while females older than 40 years should have one annually²⁷. In contrast to the recommendation by the USPSTF, a study conducted in Pakistan stated that clinical breast examination by a medical professional should be performed regularly from the age of 20 years (55.6%)¹⁶. However, this incidence was lower than that in a study on nurses in the United Arab Emirates (96.1%). Nurses have more clinical experience, which may have influenced the results compared to other studies due to their increased awareness^{28,29}. The findings of this study, along with previous research, highlight the importance of increased awareness among women and of addressing the culture of shame surrounding BC. Knowledge of symptoms at an early stage plays a major role in enabling prompt treatment and preventing serious complications that could lead to death. The level of awareness is also higher among women working in the medical sector compared to others due to their experience in the clinical field. We must therefore support more awareness campaigns.

This study is limited in that it is cross-sectional and cannot measure specific relationships at specific times. The sample taken may also not represent the community, which affects the possibility of generalizing the results. The presence of wide confidence intervals in certain regression models reflects small subgroup sizes and potential instability of the model. Moreover, dichotomizing awareness scores at the median may have reduced the sensitivity of the analysis. However, we addressed this by examining awareness as a continuous variable. Larger and more representative samples are recommended to confirm these associations.

CONCLUSION

Based on the results of this research, the level of awareness of BC was good, particularly among those aged 41 to 50 years. In addition, the level of awareness among the medical staff was higher compared to others. Therefore, it is crucial to support awareness campaigns to increase awareness among all segments of society, especially at ages when women are most vulnerable to BC.

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REFERENCE

1. Sun YS, Zhao Z, Yang ZN, et al. Risk Factors and Preventions of Breast Cancer. *Int J Biol Sci* 2017;13(11):1387-97.
2. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA A Cancer J Clinicians* 2021;71(3):209-49.
3. Xu H, Xu B. Breast cancer: Epidemiology, risk factors and screening. *Chin J Cancer Res* 2023;35(6):565-83.
4. Obeagu EI, Obeagu GU. Breast cancer: A review of risk factors and diagnosis. *Medicine (Baltimore)* 2024;103(3):1-13.
5. Marcadis AR, Morris LGT, Marti JL. Relative Survival with Early-Stage Breast Cancer in Screened and Unscreened Populations. *Mayo Clin Proc* 2022;97(12):2316-23.
6. Van Ourti T, O'Donnell O, Koç H, et al. Effect of screening mammography on breast cancer mortality: Quasi-experimental evidence from rollout of the Dutch population-based program with 17-year follow-up of a cohort. *Int Journal of Cancer* 2020;146(8):2201-8.
7. World Health Organization. Cancer Control: Knowledge into Action: WHO Guide for Effective Programmes: Module 2: Prevention. World Health Organization [internet]. 2007 [accessed May 9, 2025].
8. AlRabeeh SM, Alzahrani EM, Aldhahir AM, et al. A population-based study of 15,000 people on Knowledge and awareness of lung cancer symptoms and risk factors in Saudi Arabia. *Front Oncol* 2024;14(1):1-12.
9. Yeshitila YG, Kassa GM, Gebeyehu S, et al. Breast self-examination practice and its determinants among women in Ethiopia: A systematic review and meta-analysis. *PLoS ONE* 2021;16(1):1-12.
10. Kösters JP, Göttsche PC. Regular self-examination or clinical examination for early detection of breast cancer. *Cochrane Breast Cancer Group, ed. Cochrane Database of Systematic Reviews* 2003;2010(1):1-10.
11. Adnan Hameed H, Naser AY, Mudheher Talib N. Clinical and therapeutic characteristics and medical cost of managing cancer patients in Al-Anbar, Iraq: A cross-sectional study. *SPJ* 2022;30(12):1802-8.
12. Alyami HS, Naser AY, Dahmash EZ, et al. Clinical and Therapeutic Characteristics of Cancer Patients in the Southern Region of Saudi Arabia: A Cross-Sectional Study. *IJERPH* 2021;18(12):1-16.
13. Smith RA, Saslow D, Andrews Sawyer K, et al. American Cancer Society Guidelines for Breast Cancer Screening: Update 2003. *CA: A Cancer Journal for Clinicians* 2003;53(3):141-69.
14. Oglat A, AbuKhalil T, Hasan H, et al. Evaluating the Use of Breast Self-Examination (BSE) for Recognizing Breast Cancer Awareness Among Jordanian Students and Workers in Medical Fields. *IJWH* 2024;16(1):1743-53.
15. Leitch AM, Dodd GD, Costanza M, et al. American Cancer Society guidelines for the early detection of breast cancer: update 1997. *CA: A Cancer Journal for Clinicians* 1997;47(3):150-3.
16. Hussain I, Majeed A, Masood I, et al. A national survey to assess breast cancer awareness among the female university students of Pakistan. *PLoS One* 2022;17(1):1-12.

17. Motilewa O, Ekanem U, Ihesie C. Knowledge of breast cancer and practice of self-breast examination among female undergraduates in Uyo, Akwa Ibom State, Nigeria. *Int J Community Med Public Health* 2015; 1(1):361-6.
18. Godfrey K, Agatha T, Nankumbi J. Breast Cancer Knowledge and Breast Self-Examination Practices Among Female University Students in Kampala, Uganda: A Descriptive Study. *Oman Med J* 2016;31(2):129-34.
19. Altay B, Avci IA, Rizalar S, et al. Breast and cervical cancer knowledge and awareness among university students. *Asian Pac J Cancer Prev* 2015;16(5):1719-24.
20. Dinegde NG, Xuying L. Awareness of Breast Cancer among Female Care Givers in Tertiary Cancer Hospital, China. *Asian Pac J Cancer Prev* 2017;18(7):1-12.
21. Britt KL, Cuzick J, Phillips KA. Key steps for effective breast cancer prevention. *Nat Rev Cancer* 2020;20(8):417-36.
22. Bhandari PM, Thapa K, Dhakal S, et al. Breast cancer literacy among higher secondary students: results from a cross-sectional study in Western Nepal. *BMC Cancer* 2016;16(1):119-26.
23. Sun YS, Zhao Z, Yang ZN, et al. Risk Factors and Preventions of Breast Cancer. *Int J Biol Sci* 2017;13(11):1387-97.
24. Gebresillassie BM, Gebreyohannes EA, Belachew SA, et al. Evaluation of Knowledge, Perception, and Risk Awareness About Breast Cancer and Its Treatment Outcome Among University of Gondar Students, Northwest Ethiopia. *Front Oncol* 2018;8(1):1-15.
25. Rahman SA, Al-Marzouki A, Otim M, et al. Awareness about Breast Cancer and Breast Self-Examination among Female Students at the University of Sharjah: A Cross-Sectional Study. *Asian Pac J Cancer Prev* 2019;20(6):1901-8.
26. Liu LY, Wang YJ, Wang F, et al. Factors associated with insufficient awareness of breast cancer among women in Northern and Eastern China: a case-control study. *BMJ Open* 2018;8(2):1-18.
27. Banning M, Hafeez H. A Two-Center Study of Muslim Women's Views of Breast Cancer and Breast Health Practices in Pakistan and the UK. *J Canc Educ* 2010;25(3):349-53.
28. Memon ZA, Shaikh AN, Rizwan S, et al. Reasons for patient's delay in diagnosis of breast carcinoma in Pakistan. *Asian Pac J Cancer Prev* 2013;14(12):7409-14.
29. Alsaleh FM, Alsaeed S, Alsairafi ZK, et al. Medication Errors in Secondary Care Hospitals in Kuwait: The Perspectives of Healthcare Professionals. *Front Med (Lausanne)* 2021;8(1):1-17.