



# Breast Cancer Awareness Among Medical Students, University of Bisha, Saudi Arabia

Elhadi Miskeen <sup>1</sup>, Abdullah M Al-Shahrani <sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, College of Medicine, University of Bisha, Bisha, Saudi Arabia; <sup>2</sup>Department of Family Medicine, College of Medicine, University of Bisha, Bisha, Saudi Arabia

Correspondence: Elhadi Miskeen, Head Department of Obstetrics and Gynecology, College of Medicine, University of Bisha, P. O. Box 515, Bisha, 67614, Saudi Arabia, Email [emiskeen@ub.edu.sa](mailto:emiskeen@ub.edu.sa)

**Objective:** Breast cancer (BC) is a major public health problem in Saudi Arabia and worldwide and significantly affects the health of Saudi women. This study investigates the awareness and predictors of breast cancer among medical students at the University of Bisha, Saudi Arabia.

**Methods:** This cross-sectional study involved 391 medical students from the University of Bisha (Medicine and Applied Medical sciences) conducted from June to December 2022. Data were collected using a questionnaire with 27 questions. Data were analyzed using Stata/ BE 17.0 for Mac (Intel 64-bit) 1985–2021 Stata Corp LLC. All ethical issues were addressed honestly, including IRB and student consent.

**Results:** In our study, almost half of the participants (49.36%) had suboptimal knowledge of general BC awareness, which was statistically significantly related to gender and previous participation in BC education ( $p$ -value  $< 0.05$ ). Of the students (57%) showed a positive intention to participate in BC activities. Logistic regression models were used to identify factors that positively predicted student participation and engagement in BC activities. These factors showed a statistically significant relationship ( $p$ -value  $< 0.05$ ), including previous participation (OR =1.557143), female (OR =1.412844), living in rural areas (OR =1.7075471), and medical applied sciences students (OR =1.439252).

**Conclusion:** Despite half of the participants having suboptimal awareness of BC, there was a significant willingness to engage in BC prevention activities. Therefore, we recommend further analysis to identify gaps in the medical curriculum and update it accordingly, as well as to plan an extracurricular activity to increase student awareness of breast cancer as part of the University of Bisha's social accountability.

**Keywords:** breast cancer, awareness, predictors, medical students, Saudi Arabia

## Introduction

Breast cancer (BC) is a major public health concern, with high mortality and morbidity rates worldwide. About a quarter (25%) of cancers are diagnosed in women. The image is the same in both developed and developing nations.<sup>1</sup> Nevertheless, BC contributes significantly to the health of Saudi women. A recent study yielded alarming results regarding Saudi women's awareness of BC, perception of risk factors, and preventive measures.<sup>2</sup> A high incidence of BC was observed in central and western Saudi Arabia,<sup>3</sup> with more deterioration mortality and morbidities are expected in Saudi Arabia.<sup>4</sup>

Reasonable beliefs and awareness of warning signs for breast cancer prevention will enable women and their families to develop ideas about breast cancer prevention.<sup>5</sup> Negative perceptions of the curability of early detected cancer and the effectiveness of screening tests would lead to increased risk of morbidities and mortality related to BC.<sup>5</sup>

Prevention should have good knowledge to empower women in BC because there is a significant relationship between women's performance and perceived barriers to seeking health services. Women's inadequate knowledge suggests that formal educational programs are urgently needed to raise women's awareness. These educational programs should consider the factors influencing healthcare-seeking behavior.<sup>6,7</sup>

The level of awareness of BC has been investigated in many studies, which showed variations in the level of awareness; in most situations, a low level of awareness was found.<sup>8-12</sup> However, these studies have yet to focus on extracurricular and curricular updates and specific population development.

The effectiveness of the education program in promoting women's health to prevent BC has been well documented in the literature. I have conducted a BC education program that has positively impacted the female college as a potential health educator. Therefore, implementing such educational programs will be of great value.<sup>13,14</sup>

One of the roles of Bisha University is to engage students as health educators in their communities during their studies and in the future as part of their professional development. The students come from the surrounding villages of the province of Bisha, where the University of Bisha is located. This is an ideal environment to participate in a health program that addresses BC awareness to transfer the knowledge acquired to rural women and prepare them for a future career in rural development, which is one of the priorities of the Saudi Vision 2030. Saudi health authorities are working hard to raise awareness about breast cancer prevention and early detection. This study aimed to investigate the knowledge, perception, and risk awareness of medical students at Bisha University in southern Saudi Arabia regarding breast cancer. The results of this study will be used to develop a breast cancer education program targeting women, with particular emphasis on rural areas. Also, it will provide valuable feedback in determining the gaps in students' knowledge and give an excellent opportunity to evaluate and update the current curriculum related to such health problems.

## Methods

### Setting and Study Design

This cross-sectional study included medical students from the medical schools of the University of Bisha (Medicine and Applied Medicine (MAS)). The enrolled students were from the surrounding villages of Bisha city in the south of Saudi Arabia. The University of Bisha was established in 2014 to provide the rural and local communities (240 villages and more than 300,000 inhabitants) with an expanded vision to meet the rapid development of the Saudi community.

### Study Population

Students enrolled for the academic year 2022 were considered potential participants in the study population. They live in the surrounding villages and influence community awareness of various health and social issues. The total number of students at Bisha University is 17,000, of which 900 are medical students. The education level of students is divided into clinical and pre-clinical. Both males and females were invited to participate in the study.

Before the participants filled out the questionnaire, they were given a brief introduction explaining the study's objectives and ethical issues. After the questionnaires were completed and collected, they were given another session to raise their awareness of BC and the intended role they should play in their communities. The outcome of the discussion was not recorded or used for analysis. They were given the plan for the educational program and the possibility of their participation in the educational campaign.

### Study Sample

However, all medical students were invited to participate in the study. 391 medical students completed the printed questionnaire. This number met the required sample size, calculated using the following equation with a margin of error of 0.05 and a 95% CI level:  $n = (z)^2 p (1-p) / d^2$ .

### Data Collection

The data were collected using a questionnaire with 27 questions from June to December 2022. There were four sections dealing with sociodemographic, general knowledge, risk factors, and symptoms of BC. The questionnaire was created after reviewing the relevant literature and related studies.<sup>15,16</sup> Expert colleagues further validated it. The data were entered into an excel spreadsheet for management. Those who scored 60% or more on the corrected response were considered to have optimal awareness. But those who scored less than 60% were considered to have poor awareness. For the final calculation, 20 questions were considered

(symptoms, risk factors, and general knowledge). There were points for each corrected response. The predictor questions were age, gender, residence, university, and education level. Previous participation and interest in studying BC were included.

## Data Analysis

Data were analyzed using Stata/ BE 17.0 for Mac (Intel 64-bit) 1985–2021 Stata Corp LLC. The (summarize) command was used to perform descriptive statistics. The command (tabulate, cchi2 chi2 row sort) was used to run the correlation and obtain the p-values by the chi-square test. The commands regress and logistics were used to determine the predictors of BC awareness. The (odds ratio, Std. err., z,  $P > |z|$ , and 95% CI) were calculated. A P value of 0.05 or less was considered a rejection of the null hypothesis.

## Ethical Issues

Ethical approval was obtained from the IRB of the University of Bisha. All ethical issues were addressed honestly, including students' consent and informed consent to participate in the study. The relevant institutions were informed, and their permission was obtained accordingly.

## Results

The total number of students who participated in this study was 391, most of whom were under 20 years of age (65%), female (67.3%), living in rural areas (73.4%), studying applied medical sciences (MAS) (66.8%), and in the preclinical phase of their studies (60.1%). Most of them had previously participated in BC education activities and were interested in engaging in BC education (54.2%) and (57%), respectively, as shown in Table 1.

Participants' overall knowledge of breast cancer risk factors is shown in Figure 1. Those who scored greater than or equal to 60% corrected responses were considered to have optimal knowledge. This was evident for the risk factors: old age (65.7%), family history (81.6%), and smoking (70.6%). On the other hand, a low-fat diet and breastfeeding were mentioned as protective factors (90.3% and 89.3%, respectively). On the other hand, low optimal knowledge of risk factors related to the birth of the first child after the age of 30 (37.6%), early onset of menarche (before the age of 12) (27.6%), late menopause (after the age of 55) (50.3%), use of oral contraceptives (52.4%), and large breasts (36.3%) were reported.

**Table 1** Characteristics of the Participating Students

Variables	Number (%)
Age in years	
< 20	254 (65)
≥20	137(35)
Gender	
Male	128 (32.7)
Female	263 (67.3)
Residency	
Urban	104 (26.6)
Rural	287 (73.4)
College	
Medicine	130 (33.2)
Medical Applied Science (MAS)	261 (66.8)

(Continued)

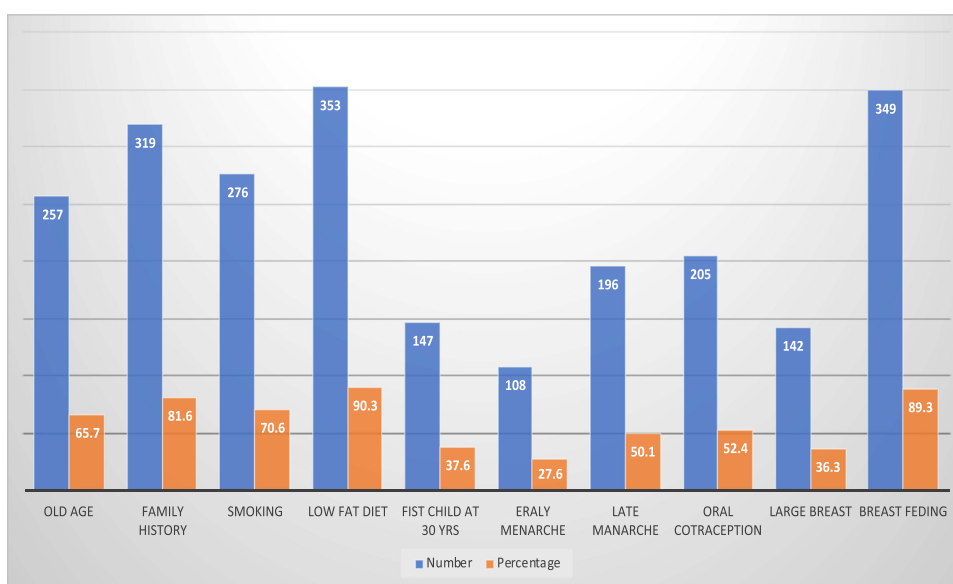
**Table 1** (Continued).

Variables	Number (%)
Education level	
Preclinical	235 (60.1)
Clinical	156 (39.9)
Previous participation of BC awareness	
Yes	212 (54.2)
No	179 (45.8)
Interest in engagement of BC awareness	
Yes	223 (57)
No	168 (43)

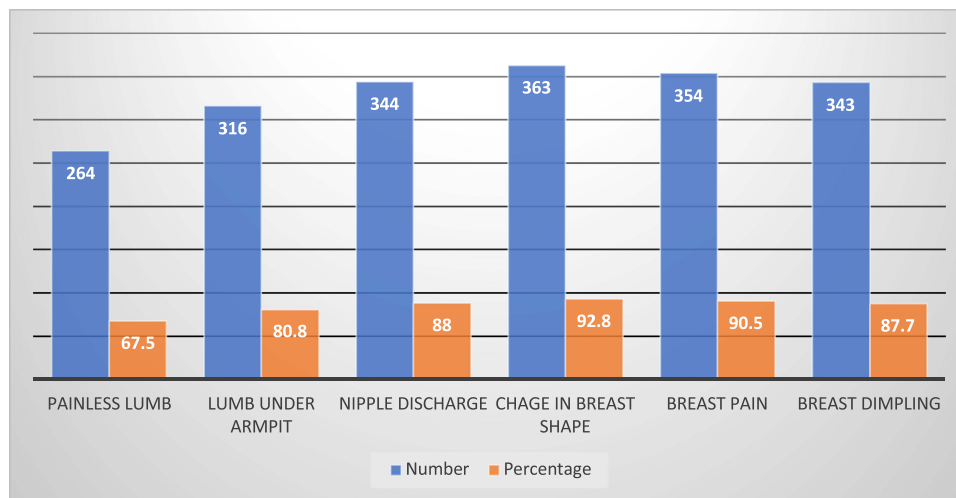
All study participants reported optimal knowledge of BC symptoms (see Figure 2), reflecting general awareness where they reported more than 60% of all items assessed.

The relationship between the general characteristics of the study participants and the awareness of BC revealed that 198 (50.64%) have optimal awareness of BC. On the other hand, 193 (49.36%) have suboptimal awareness. Those who have optimal awareness are under 20 years old (3.69%), female (34%), students living in rural areas (38.62%), MAS students (33.5%), and preclinical (29.16%). Those who had already participated in BC education programs were (27.37%), and those who were interested (27.88%). Optimal knowledge was statistically significantly related to gender (p-value 0.001 and previous participation in BC education (p-value 0.005). We can predict that female students who have previously participated in a BC education program are more likely to have optimal knowledge of BC (p-value < 0.05). For more details, see (Table 2).

Logistic regression models were used to identify factors that positively predict student participation and engagement in BC awareness. Further analysis revealed that females are 1.4 times more likely to be associated with positive intention to participate in BC than males (OR =1.412844, p-value=0.006, 96% CI=1.105474–1.805677). However, the willingness



**Figure 1** The overall knowledge of the participants regarding their awareness related to breast cancer risk factors (n=391).



**Figure 2** The overall knowledge of the participants regarding their awareness related to breast cancer symptoms (n=391).

to participate in an educational program is significantly high among students from rural and urban areas. Nevertheless, the desire to participate in a BC educational program is 1.7 times higher among those living in rural areas than those living in urban areas (OR =1.7075471.707547, p-value=0.001, 96% CI=1.343586–2.170101). Medical Applied Science

**Table 2** The Relationship Between the General Characteristics of the Study Participants and the Level of BC Awareness

Variables	Level of Awareness		Total N (%)	p-value*
	Optimal N (%)	Suboptimal N (%)		
Age in years				
< 20	120 (30.69)	134 (34.27)	254 (64.96)	0.06
≥20	78 (19.95)	59 (15.09)	137 (35.04)	
Gender				
Male	65 (16.62)	63 (16.11)	128 (32.74)	0.001
Female	133 (34.02)	130 (33.25)	263 (67.26)	
Residency				
Urban	74 (12.02)	57 (14.58)	104 (26.6)	0.19
Rural	151 (38.62)	136 (34.78)	287 (73.4)	
College				
Medicine	67 (17.14)	63 (16.11)	130 (33.25)	0.80
Medical Applied Science	131 (33.5)	130 (33.25)	261 (66.75)	
Education level				
Preclinical	114 (29.16)	121 (30.95)	235 (60.1)	0.30
Clinical	84 (21.48)	72 (18.41)	156 (39.9)	

(Continued)

**Table 2** (Continued).

Variables	Level of Awareness		Total N (%)	p-value*
	Optimal N (%)	Suboptimal N (%)		
Previous participation of BC awareness				
Yes	107 (27.37)	105 (26.85)	212 (54.22)	0.005
No	91 (23.27)	88 (22.51)	179 (45.78)	
Interest in engagement of BC awareness				
Yes	109 (27.88)	114 (29.16)	223 (57.03)	0.40
No	89 (22.76)	79 (20.2)	168 (42.97)	
Total	198 (50.64)	193 (49.36)	391 (100)	

students are 1.4 times more likely to participate in BC Awareness than medical school students (OR =1.439252, p-value=0.004, 96% CI=1.12463–1.841893). Previous participation in the BC Awareness Program is an excellent predictor of participation in the BC Awareness Program. Those who previously participated are 1.5 times more likely to participate in future BC education activities (OR =1.557143, p-value=0.004, 96% CI=1.153328–2.102346). Women living in rural areas, MAS students, and those who have previously participated in a BC education program were more likely to desire to participate in a BC education program (p-value less than 0.05). For more details on the logistic regression analysis used to determine the predictors of medical students' willingness to participate in a BC education program, see (Table 3).

**Table 3** Logistic Regression for the Predictors of Medical Students' Engagement in the BC Awareness Activities (n=223, 57%)

Variables		Odds Ratio	Std. Err.	z-Statistic	p-value	[95% Confident Interval]	
						Upper	Lower
Age in years	< 20	1.41	0.3325722	1.46	0.145	0.8879997	2.238597
	≥20	0.93	0.319104	-0.20	0.839	0.4770114	1.823746
Gender	Male	1.17	0.2073727	0.88	0.377	0.8261581	1.655507
	Female	1.41	0.1768473	2.76	0.006	1.105474	1.805677
Residency	Urban	0.41	0.0978329	-3.73	0.001	0.2601155	0.6575027
	Rural	1.71	0.2088437	4.37	0.001	1.343586	2.170101
College	Medicine	1.13	0.1987932	0.70	0.483	0.8015398	1.596296
	MAS	1.44	0.1811361	2.89	0.004	1.12463	1.841893
Education level	Preclinical	1.22	0.1595401	1.50	0.134	0.9412296	1.573519
	Clinical	1.69	0.4966496	1.77	0.076	0.9459406	3.002829
Previous participation in BC awareness	Yes	1.56	0.2385024	2.89	0.004	1.153328	2.102346
	No	1.16	0.1602438	1.10	0.272	0.8880202	1.523824

## Discussion

In this study, we investigated breast cancer awareness and predictors of medical students' willingness to participate in a prevention program. It reflects important aspects to consider in future interventions, especially because we engage medical students to target their community. Factors influencing awareness and predictors of willingness to participate were identified and addressed as possible modifiable factors. There is limited evidence on the predictors associated with promoting medical student engagement in breast cancer awareness and community participation in general. This is because Bisha College medical students should be role models for their communities in their practice of public health and community development, with a particular focus on breast cancer.

In our study, almost half of the participants (49.36%) have suboptimal knowledge about general BC awareness. The knowledge should be at least 60% or more to be classified as optimal. This result is consistent with other studies from Saudi Arabia,<sup>16</sup> Egypt,<sup>17</sup> and Indonesia,<sup>18</sup> which reported suboptimal knowledge among medical students. On the other hand, contradictory results were reported from a study at the University of Albaha in Saudi Arabia, which reported high optimal knowledge of BC.<sup>19</sup> Another study from Bangladesh also reported suboptimal knowledge of about 66%.<sup>20</sup> These results are unexpected, especially for medical students. This means that a high percentage of students are aware of the symptoms of breast cancer, but their knowledge about the risk factors that can lead to breast cancer is low. This lack of knowledge about risk factors could lead to a delay in seeking medical attention or taking preventative measures. It highlights the need for more education and awareness campaigns about breast cancer risk factors to improve early detection and prevention efforts. These results could be used to plan an update of the curriculum by having the topic of BC at different levels of study. Reviewing the current curriculum requires deciding on the areas that need improvement. Above all, we want our students to play an important role as health promoters in their local communities.

The study results show that the knowledge of risk factors (less than 60%) is suboptimal. These include having the first child born at age 30, early menarche, late menopause, taking oral contraceptives, and having large breasts. These findings are considered insufficient knowledge and need to be considered in further interventions. These findings are consistent with studies conducted among medical students in the United Arab Emirates,<sup>12</sup> Pakistan,<sup>21</sup> and Bangladesh<sup>22</sup> that reported suboptimal knowledge of risk factors. The risk factors assessed are the most adjustable, so students should be aware of them to deal with future changes addressed by the support program adopted by Bisha University and applied by the students themselves. Because the knowledge of risk factors is essential for seeking medical advice.

This study showed significant results regarding medical students' knowledge of BC symptoms. However, they all have an optimal knowledge of the symptoms of BC (from 67.5–92.8) and have a high knowledge (more than 90%) regarding the change in the shape of the breast and the presence of pain in the breast region. This finding is consistent with study findings among Malaysian university students.<sup>23</sup> Knowledge of the clinical features of breast cancer determines patients' behavior when seeking early medical attention. Breast cancer is a progressive disease that begins with a small lump and gradually enlarges. The prognosis is much better if the condition is detected as early as possible when students have the proper knowledge. We expect to equip women in their local community with the appropriate knowledge and thus change their behavior to seek early medical help through participation in the screening program and routine breast care. The late diagnosis of certain medical conditions can lead to poorer outcomes and increased mortality rates, so we rely on awareness for early diagnosis and better outcomes. Having good knowledge about breast cancer can help individuals identify the early symptoms of the disease and seek medical attention promptly. Early detection of breast cancer is crucial as it increases the chances of successful treatment and improves survival rates. Therefore, having good knowledge about breast cancer can help individuals recognize these symptoms and seek medical attention promptly. However, it is important to note that advanced breast cancer can occur despite early detection and treatment. Regular screening and follow-up appointments with healthcare professionals are essential for maintaining good breast health.

Using the logistic regression model to predict factors influencing the willingness of the students to participate in the BC awareness program that can be adopted by the University of Bisha or at the individual level in their villages. This study identifies the most significant predictor of students' willingness to participate in a health promotion program. Those who strongly intend to participate in a health promotion program are female students (OR=1.412844), rural residency (OR=1.707547), MAS students (OR=1.439252), and those who have already participated in awareness programs



(OR=1.557143). These results are consistent with the Egyptian study that examined the predictor and intention to participate in BC awareness activities.<sup>24</sup> Although the intention of students to participate has yet to be extensively studied, Turkish and Jordanian studies<sup>25,26</sup> evaluated educational level as a strong predictor of positive intention to participate in a BC health promotion program.

Breast cancer is the most common type of cancer and the primary cause of mortality in women worldwide and in Saudi Arabia. Education of women is recommended for early detection and treatment. Evidence of educational programs in developing countries was reported,<sup>27</sup> which raised early detection and prevention as a good practice. Significant modifications and renovation of the curriculum of the faculties of Medicine to be in tune with the significant announced changes in the Alasiri paper addressing healthcare transformation in Saudi Arabia.<sup>28</sup>

Breast cancer awareness among medical students at the University of Bisha, Saudi Arabia, is relatively acceptable. However, there is still room for improvement in knowledge about the importance of early detection. Medical schools in Saudi Arabia should consider incorporating more comprehensive breast cancer education into their curricula to ensure that future healthcare professionals are well-equipped to address this important health issue. Raising awareness about breast cancer is crucial in reducing its incidence and improving patient outcomes.

## Limitations of the Study

The study was conducted in a specific community, which is more rural, and the students live in the surrounding villages of the university. Therefore, the results of this study can only be extrapolated to the national level with significant modification. The study was conducted among the College of Medicine and the College of Applied Medicine students without including other colleges important for health promotion because they live in the same environment and play an important role in health promotion.

Although the findings of this study could be useful in developing a breast cancer education program (for the first time) in rural areas of Saudi Arabia, it is difficult to generalize at national levels. Rural areas in Saudi Arabia are similar to each other.

## Conclusion

In this study, half of the students had overall suboptimal awareness of BC, but at the same time, there was a significant willingness to engage in BC prevention activities. Therefore, we recommend further analysis to identify gaps in the medical curriculum and update it accordingly, as well as to plan an extracurricular activity to increase student awareness of breast cancer as part of the University of Bisha's social accountability, especially since most of our students were from the surrounding villages of Bisha in southern Saudi Arabia.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Funding

There is no funding to report.

## Disclosure

The authors report no conflicts of interest in this work.

---

## References

1. Malchrowicz-Moško E. Kinesiophobia among breast cancer survivors one year after hospital treatment. *Int J Environ Res Public Health*. 2022;19(21):14565. doi:10.3390/ijerph192114565
2. Qedair JT, Al Qurashi AA, Alfayea T, et al. Level and predictors of breast cancer awareness among Saudi women: a nationwide study. *Womens Health*. 2022;18:17455057221133835. doi:10.1177/1745505722113383
3. Alatawi YM, Alshomrani HA, Baeshen SM, et al. Evaluation of participation and performance indicators in a breast cancer screening program in Saudi Arabia. *Saudi Med J*. 2022;43(11):1260–1264. doi:10.15537/smj.2022.43.11.20220269



4. Alattas MT. Cancer control priorities and challenges in Saudi Arabia: a preliminary projection of cancer burden. *Lung*. 2019;6(29):1–70.
5. McCutchan G, Weiss B, Quinn-Scoggins H, et al. Psychosocial influences on help-seeking behaviour for cancer in low-income and lower middle-income countries: a mixed-methods systematic review. *BMJ Glob Health*. 2021;6(2):e004213. doi:10.1136/bmjgh-2020-004213
6. Masoudiyekta L, Rezaei-Bayatiyani H, Dashtbozorgi B, Gheibizadeh M, Malehi AS, Moradi M. Effect of education based on health belief model on the behavior of breast cancer screening in women. *Asia-Pacific J Oncol Nurs*. 2018;5(1):114–120. doi:10.4103/apjon.apjon\_36\_17
7. Donnelly TT, Al Khater AH, Al-Bader SB, et al. Factors that influence awareness of breast cancer screening among Arab women in Qatar: results from a cross sectional survey. *Asian Pacific J Cancer Prev*. 2015;15(23):10157–10164. doi:10.7314/APJCP.2014.15.23.10157
8. Sindi RA, Alzahrani AA, Alzahrani NA, Salman RA, Alshareef SA. Awareness level, knowledge and attitude towards breast cancer between medical and non-medical university students in Makkah Region: a cross sectional study. *Int J Cancer Clin Res*. 2019;6:106. doi:10.23937/2378-3419/1410106
9. Alotaibi JS, ElRazkey J, Albougami A, et al. Knowledge and practice of breast self-examination among female nursing students at Majmaah University, Saudi Arabia. 2022. doi:10.21833/ijaas.2022.05.020
10. Alanzi TM, Alobrah A, Alhumaidi R, Aloraifi S. Evaluation of the SnapChat mobile social networking application for breast cancer awareness among Saudi students in the Dammam Region of the Kingdom of Saudi Arabia. *Breast Cancer*. 2018;10:113. doi:10.2147/BCTT.S166135
11. Alomair AN, Felemban DG, Felemban MS, Awadain JA, Altowargi AS, Alfawzan NF. Knowledge, attitude and practice of breast self-examination toward breast cancer among female students at king Saud University in Riyadh, Saudi Arabia. *Int J Med Dev Countries*. 2020;4(2):429–434. doi:10.24911/IJMDC.51-1576668182
12. Rahman SA, Al-Marzouki A, Otim M, Khayat NE, Yousef R, Rahman P. Awareness about breast cancer and breast self-examination among female students at the University of Sharjah: a cross-sectional study. *Asian Pacific J Cancer Prev*. 2019;20(6):1901. doi:10.31557/APJCP.2019.20.6.1901
13. Mohammad FA, Bayoumi MM, Megahed MM. Efficacy of instructional training program in breast self-examination & breast screening for cancer among university students. *Public Health Res*. 2013;3(3):71–78. doi:10.5923/j.phr.20130303.06
14. Alsaraireh A, Darawad MW. Impact of a breast cancer educational program on female university students' knowledge, attitudes, and practices. *J Cancer Educ*. 2019;34(2):315–322. doi:10.1007/s13187-017-1304-6
15. Al-Khasawneh EM, Leocadio M, Seshan V, Siddiqui ST, Khan AN, Al-Manaseer MM. Transcultural adaptation of the breast cancer awareness measure. *Int Nurs Rev*. 2016;63(3):445–454. doi:10.1111/inr.12265
16. Alsareii SA, Alqahtani SM, Alamri AM, et al. Awareness of breast cancer among female students and faculty from Najran university, Najran, Saudi Arabia. *Asian Pacific J Cancer Prev*. 2020;21(5):1415. doi:10.31557/APJCP.2020.21.5.1415
17. Mohamed A, Hassan H, Gamel W, Arafa A. Awareness about breast and cervical cancers among nursing students in Beni-Suef University. *J Nurs Educ Pract*. 2019;9(5):44–51. doi:10.5430/jnep.v9n5p44
18. Rezano A, Utama MS, Wiraswati HL, et al. Knowledge level towards breast cancer and breast self-examination among medical students of Indonesia. *Glob Med Health Commun*. 2022;10(1). doi:10.29313/gmhc.v10i1.8942
19. Alghamdi T, Abukhelaif AE, Alzahrani AA, et al. Perception and awareness of Albaha University female students towards breast self-examination and breast cancer: a cross-sectional observational study. *Med Sci*. 2020;24(102):673–679.
20. Sarker R, Islam MS, Moonajilin MS, Rahman M, Gesesew HA, Ward PR. Knowledge of breast cancer and breast self-examination practices and its barriers among university female students in Bangladesh: findings from a cross-sectional study. *PLoS One*. 2022;17(6):e0270417. doi:10.1371/journal.pone.0270417
21. 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):e0262030. doi:10.1371/journal.pone.0262030
22. Akter MF, Ullah MO. Awareness levels of breast cancer among female university and medical college students in Sylhet city of Bangladesh. *Cancer Rep*. 2022:e1608. doi:10.1002/cnr2.1608
23. Samah AA, Ahmadian M, Latiff LA. Insufficient knowledge of breast cancer risk factors among Malaysian female university students. *Glob J Health Sci*. 2016;8(1):277. doi:10.5539/gjhs.v8n1p277
24. Anwar MM, Khalil DM. Breast cancer knowledge, attitude and practice among medical and non-medical university students. *J Public Health (Bangkok)*. 2021;29:871–878. doi:10.1007/s10389-020-01197-z
25. Gürdal SÖ, Saraçoğlu Varol G, Sen Oran E, Yankol Y, Soybir GR. The effects of educational level on breast cancer awareness: a cross-sectional study in Turkey. *Asian Pacific J Cancer Prev*. 2012;13:295–300. doi:10.7314/APJCP.2012.13.1.295
26. Al-Mousa DS, Alakhra M, Hossain SZ, et al. Knowledge, attitude and practice around breast cancer and mammography screening among Jordanian women. *Breast Cancer*. 2020;12:231. doi:10.2147/BCTT.S275445
27. Panieri E. Breast cancer screening in developing countries. *Best Pract Res Clin Obstet Gynecol*. 2012;26(2):283–290. doi:10.1016/j.bpobgyn.2011.11.007
28. Alasiri AA, Mohammed V. Healthcare transformation in Saudi Arabia: an overview since the launch of vision 2030. *Health Services Insights*. 2022;15:117863292211212. doi:10.1177/11786329221121214

## Breast Cancer: Targets and Therapy

Dovepress

### Publish your work in this journal

Breast Cancer - Targets and Therapy is an international, peer-reviewed open access journal focusing on breast cancer research, identification of therapeutic targets and the optimal use of preventative and integrated treatment interventions to achieve improved outcomes, enhanced survival and quality of life for the cancer patient. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/breast-cancer—targets-and-therapy-journal>