Available online at **www.ijmrhs.com**

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2021, 10(10): 90-107

Awareness and Knowledge of Breast Cancer among Women in Saudi Arabia

Mohammad A. Albanghali*

Department of Public Health, Faculty of Applied Medical Sciences, Al Baha University, Al Baha, Saudi Arabia

**Corresponding e-mail: mohammad.aref@bu.edu.sa*

ABSTRACT

Objectives: *Breast Cancer (BC) is a common disease in the Kingdom of Saudi Arabia and the world. Considered in the global context, it is primary cancer that affects women. Due to a sharp increase in the number of cases, it has become necessary to educate and create awareness of the general population regarding the BC symptoms, risk factors, and early detection methods. The main aim of this study was to conduct a literature review of the Knowledge on BC and risk factors affecting Saudi women.* ***Design and methodology:*** *studies were chosen for inclusion based on pre-identified inclusion criteria. A literature review was based on knowledge, risk factors, barriers, misconceptions, and the resources used by the respondent, knowledge of Breast Self-Examination (BSE) methods and practices were conducted. The primary search of articles was in English, and it focused on studies published between 2010 and 2020.* ***Results:*** *The study's emphasis was on the respondents' knowledge of BC. The respondents included university, medical students, and patients attending primary health care centers. The university and medical students possessed better knowledge than other respondents. In conclusion, there is a need to educate women in Saudi Arabia about BC and its prevention. Emphasis must be given on early BC detection with training on BSE methods.* ***Value of this review:*** *This review highlighted sub-groups of Saudi women populations with needs to improve BC's Knowledge and awareness.*

Keywords: Breast cancer, Awareness, Knowledge, Breast self-examination, Saudi Arabia

INTRODUCTION

Breast Cancer (BC) is one of the most common cancers, with the number of cases increasing globally. According to the World Health Organization, although this disease occurs in developed countries, its mortality is higher in underdeveloped countries [1]. In Saudi Arabia, BC is the most common cancer, ranked the second cause of cancer deaths among Saudi women. Besides, data between January and December 2015 showed that BC was common in the Kingdom of Saudi Arabia [2]. Among all cancers, there were 1,979 female BC cases with a percentage of 16.7%, and 30.1% of all cancers were reported among women of all ages. The Age-Standardized Incidence Rate (ASR) was 24.3/100,000 in the Saudi female population. The five regions with the highest ASR per 100,000 population were in the Eastern region at 37.1/100,000, followed by the Riyadh region with 33.0/100,000, the Makkah region with 26.4/100,000, and the Northern region 25.0/100,000, and Qassim region with 21.7/100,000. The median age at diagnosis was 50 years (range, 14-108 years) [2].

Increased BC awareness will prevent one-third of new cases and improve the survival rate for another one-third of cases detected at an early stage [3]. The low survival rates in less developed countries can be explained mainly by the lack of early detection programs, resulting in a high proportion of women presenting with late-stage disease and preliminary diagnosis. However, increased awareness of and information about BC, awareness of cancer signs and symptoms, and attitudes toward detection methods are an essential part of this strategy [4].

The early detection of BC is essential as mortality increases with late detection. Besides, BC also has an asymptomatic phase where early detection by screening reduces morbidity [5]. In summary, many of the detected cases were in advanced stages [6]. Clinical breast examination and mammograms are screening tools that help in early detection [7,8]. Women should be trained, possess good Knowledge of early BC detection, perform Breast Self-Examination

(BSE) and mammography, especially women, aged 40-65 [7]. In Saudi Arabia, very few studies have been carried out to assess the awareness of BC risk factors and screening procedures, the attitude toward the disease, and the BSE practice.

Awareness and education of individuals regarding BC are essential, as studies conducted in Saudi Arabia show a lack of education. Cultural barriers are a significant issue for health education, which affects awareness [9,10]. Women's knowledge and views of BC play a substantial role in the treatment and health-seeking behaviors, and less knowledge will lead to delayed case presentation with more advanced disease conditions and a poorer prognosis [11,12]. Thus, this research aimed to assess the BC knowledge and awareness in various studies that included Saudi women to reduce the morbidity and mortality of the BC by providing younger generations with understanding and educational programs. It is noteworthy that this work aims to evaluate how far we are from the goals of the Saudi 2030 Vision, which seeks to elevate the community health status.

Objective

This study aimed to conduct a literature review on the knowledge, awareness, and practice of BSE among Saudi women.

LITERATURE REVIEW

A literature review was conducted by searching the articles in English, focusing on databases and journal websites, including PubMed, Google Scholar, and ResearchGate, by hand-searching and snowballing on the references of the articles based on the inclusion criteria. Primary screening of studies was conducted by reviewing the titles and abstracts of the articles. The search of the article was conducted from August 2020 to October 2020. The vital search is based on BC awareness, Knowledge, self-examination methods, and Saudi Arabia.

Types of Participants

Studies included women who were interviewed about the BSE knowledge, awareness, and practice. The study subjects represented the whole population, including students, teachers, health care workers, and Primary Health Care (PHC) visitors.

Types of Interventions

Studies evaluated women's knowledge, attitudes, and practices in different parts of Saudi Arabia toward BC.

Types of Measured Outcomes

Studies that included outcome measures of knowledge, attitudes, and practices of women in different parts of Saudi Arabia toward BC.

Types of Studies

Cohort, cross-sectional, case-control, and descriptive studies were reviewed.

Search Strategy

The search strategy involved. The preliminary examination and registration search, detailed electronic searches using electronic search engines, and hand-search/snowballing were conducted based on the inclusion criteria of the preliminary examination and registration search. Searching was limited to studies published in English between January 2010 and October 2020.

Assessment of Methodological Quality

The reviewers used a checklist that included the study details, authors/year, objectives, participants, context, description of interest, sources of search, number of years (duration), number and type of studies, cities of the region, analysis, outcomes assessed, results, and comments.

Data Synthesis

From January 2020 to November 2020, data were based on descriptive findings in a narrative review with no meta-analysis. Two calibrated reviewers screened the initial topic and abstract based on the inclusion criteria before reading the full text. Data were extracted by the clear reading of the full text by the reviewers.

Outcome Variables

Based on the standardization of the methodology quality, articles were selected based on the inclusion and exclusion criteria. The outcome variables were based on the chosen article. To maintain the uniformity of the results, they were grouped into Knowledge, awareness, and practice of BC with BSE and essential methods of prevention. Studies with a high risk of bias were excluded to reduce errors in the outcome.

Statistical Analysis

The interviewer agreement was analysed using Cohen Kappa statistics with results of <1 within the agreement.

Included Studies

During the search, keywords such as BC, Knowledge, the attitude of BC, practice of the BSE method for BC, and knowledge awareness of BC in Saudi Arabia were used. The volume of articles was assessed based on the inclusion criteria, full text, and availability of the articles, and a total of 26 articles were selected.

RESULTS

A total of 26 studies (Figure 1) with 14,211 respondents aged between 12 and 70 years were analysed. The respondents were university students, medical school students, nurses, and patients attending PHC (Table 1). The review of the article summary with the findings was based on (1) Knowledge of BC, which included the basic knowledge, risk factors, and barriers of BC and the available resources of BC; and (2) BSE practice and knowledge.

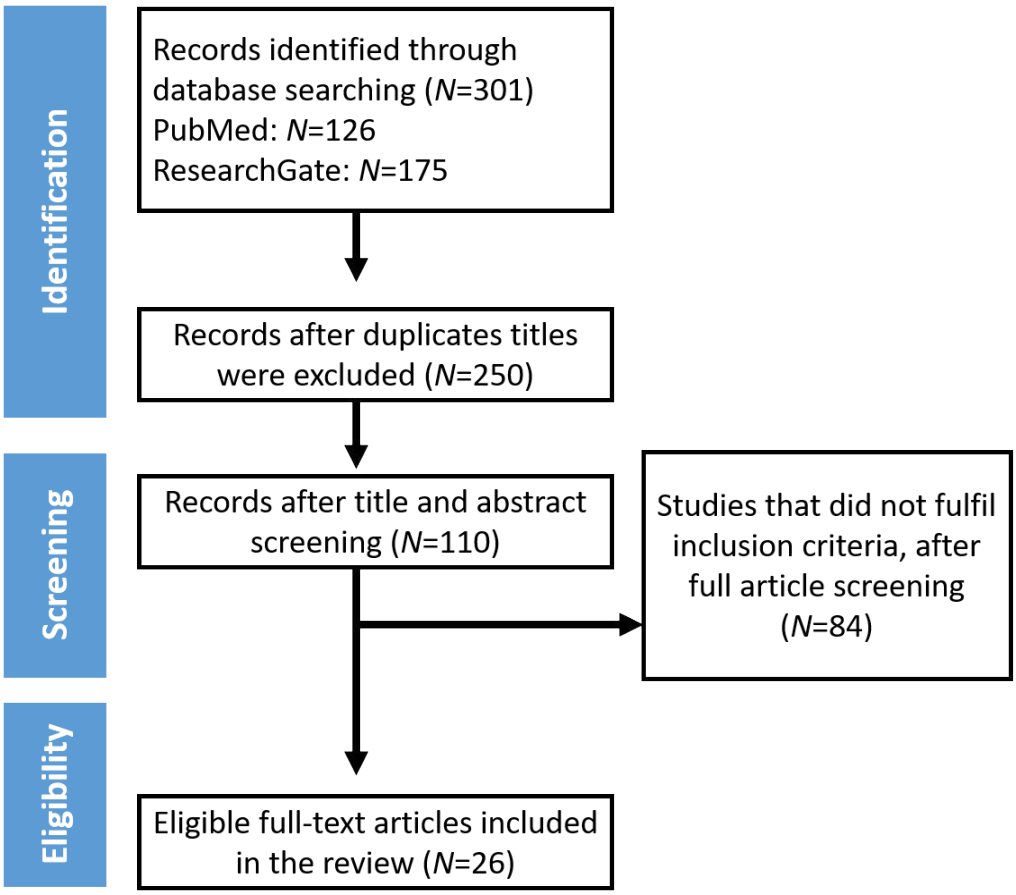

Figure 1 Summary of the search process and results of the literature review of awareness and Knowledge on breast cancer among women in Saudi Arabia

Table 1 Summary of findings from various studies, including the participant characteristics, conducted on the Saudi women based on the breast self-examination and knowledge of breast cancer

No	Studies /Year	City /Region	Subjects (N, type)	Marital Status	Age in Years (mean ± standard deviation)	Summary on BSE	Summary on BC Knowledge and Awareness
1	Habib, Salman [13]	Medina	(N=247) University students	85.4% single 10.5% married 4.1% divorced	18-39 (27 ± 12.1)	64.4% did not know the proper way to perform BSE 42.2% had never performed BSE	34% replied correctly regarding knowledge about the incidence of the disease None of the respondents expressed knowledge of the risk factors 51.8% knew that mammography was a screening tool for BC Source of information about BC: 56.2% television and radio 34.8% journals and newspaper 15.2% physicians
2	Ravi-chandran, Mohamed [4]	Riyadh	(N=719) Patients or their escorts visiting PHC centers	N/A	≥ 15 (38.5 ± 14.4)	Knowledge of BC was higher (significantly) in those performing BSE	67.6% had no knowledge of BC warning signals 80.7% believed some cancers could be cured if detected early 94.3% agreed about tobacco, and 80.4% knew that alcohol increased the risks of BC 86.7%, 86.2%, and 84.2% believed that intake of fruits and vegetables, breastfeeding, and physical activity, respectively, would not increase the BC risk 75.1% and 64.3% of the participants believed fate and curse could cause BC, respectively 47% believed that oral contraceptives increased the risk of BC 27.1% believed cancer meant the end of life 74.2% believed cancer could appear overnight Source of information about BC: 65.1% television/radio 55.4% friends and relatives 52.9% newspaper and magazines 29.4% physicians 7.9% of other health workers

3	Sait, Al-Amoudi [14]	Jeddah	(N=337) Students school and university	99% single 1% married	12-18 (16.2 ± 1.5)	61.1% of participant performed BSE 72.1% of the students were enthusiastic about receiving a training course to learn how to perform BSE 55% answered that BSE must be carried out after the monthly period and not before as recommended	9.8% admitted that they had a family history of BC 30% of the subjects were familiar with mammography use in BC Risk factor of BC: 32.6% oral contraceptive pill 60.8% radiation 65% smoking
4	Yousuf, Al Amoudi [15]	Jeddah	(N=210) PHC nurses	16.2% single 70.5% married 10.5% divorced 2.9% widowed	22-59 (36.9 ± 8.5)	37.2% of participants never practiced BSE 4% practiced BSE monthly 28% practiced BSE annually	44% believed that BC could be treated if detected early 40% of the nurses believed that women did not need mammography if they had a CBE 11% scored <50% of the total score for general epidemiological knowledge on BC 35% scored <50% of the total score for BC risk factors 67% scored> 75% of the total score on BC signs and symptoms
5	Al-Amoudi [16]	Jeddah	(N=48) Special need	68.8% single 20.8% married 8.3% divorced 2.1% widowed	15-50 (29.73 ± 8.51)	56.3 % knew of BSE 41.7% knew how to perform BSE 37.5% practiced BSE 70.3% did not know what the best time was to do BSE	66.7% heard of BC Regarding the risk factors, the participants showed less knowledge on genetic factors, age, and late pregnancy (41.7%, 12.5%, and 10.4%, respectively) Regarding the barriers preventing participants from seeking help for early BC detection, the following reasons were listed: 33.3% ignorance 31.3% shyness 16.7% distance from the health care center 16.7% unavailability of female doctors 10.4% refusal by the family 85.4% had less knowledge on the importance of the use of mammography. Source of information about BC: 16.7% television/radio/media 35.4% friends and relatives 31.3% physicians 2.1% other health workers
6	Hussein, Alorf [17]	Hail	(N=877) All	NM	12-66 (26.5 ± 8.2)	26.7% were fearful to perform the BSE 70% were willing to communicate with others regarding BSE based on personal awareness 30% of subjects were reluctant to communicate with others because of fear	56% perceived BC as abnormal growth Risk factors of BC: 18.8% oral contraceptive pill 13.1% poor diet 12.1% inheritance 10.5% lack of exercise 5.1% smoking 4.8% aging

7	Mahfouz, Hassanein [7]	Abha	(N=1092) Patients attending PHC centers	NM	15-65 (33.63 ± 11.91)	41.5% heard about BSE 29.7% performed BSE	22% heard about mammography BC protective factors: 92.8% breastfeeding 83.6% proper nutrition Knowledge of BC signs and symptoms: 66.8% changes in breast size 58.7% heaviness under the armpit 60.8% shape of nipples 55.5% discharge from nipples Risk factor of BC: 48.3% oral contraceptive pill 13.1% poor diet 74.4% hereditary 68.5% smoking 47.3% aging Source of information about BC: 36.2% television/radio/media 25.1% friends and relatives 20.1% of health workers 22.5% journals/books
8	Rasheed and Al -Sowielem [8]	Al-Khobar	(N=600) Patients attending PHC centers	9.2% single 85.3% married 5.5% divorced or widowed	25-70 (35.98 ± 9.05)	55.4 % did not practice BSE. College/university-educated women were four times more likely to be involved in the BSE practice than the less educated group The practice of BSE was less common among women whose perceived seriousness for BC was high in terms of the disease endangering their life (61.7% vs. 65%; p< 0.05) and marriage (41.9% vs. 46.7%; p <0.05) and who had no hope for BC cure (12.7% vs. 19.9%; p<0.05) 51.8% know the best time for BSE	48% of the women had poor knowledge of BC. 24.4% were aware of mammogram screening and the BC diagnosis 63.5% of women believed that BC endangered their life, and 45% believed their married life would be affected 26.4% of the respondent were not aware that BC was curable in some cases. Risk factor of BC: 58.5% oral contraceptive pill 13.1% poor diet 51.9% hereditary 83.2% smoking 37.2% aging Knowledge of BC signs and symptoms: 87% breast mass 64.5% shape of the nipples 68.5% discharge from the nipples Source of information about BC: 44.1% television/radio 27% friends and relatives 14.7% health care workers 38.5% printed media 14.4% Internet
9	Latif [18]	NM	(N=150) University students	92.7% single 7.3% married, divorced, or widowed	NM (19.2 ± 0.96)	50.7% participants admitted performing BSE	Knowledge of BC signs and symptoms: 55.3% painless lump in breast 58.7% pain in breast 53.4% shape of the nipples 65.3% discharge from the nipples Risk factor of BC: 31.3% early menarche 42.7% late menopause 77.3% hereditary 48% nulliparity 93.3% aging, 36% oral contraceptive pill 54% radiation 70% breastfeeding

10	Nemenqani, Abdel-maqsoud [19]	Taif	(N=378) Medical students	96.6% single 3.4% married	17-24 (19.9 ± 1.5)	89.2% of the participants knew that BSE was recommended to be done monthly 84% knew that the axilla should be examined when doing BSE 46.8% were aware of the correct BSE timing 67% reported a positive response to BS	Only 28.6% of the participants in the current study answered no when asked whether they knew that it was recommended to start mammography at the age of 20; however, most of them knew that CBE and mammogram were early detection methods (76.2% and 66.7%, respectively) Risk factors of BC: 58.5% oral contraceptive pill 38.4% poor diet 83.6% hereditary 54.8% smoking 72.5% aging 38.1% late menopause 38.1% early menarche 42.3% lack of exercise Knowledge of BC signs and symptoms: 48% lump in the breast 42.9% pain in the breast or armpit 42.6% changes in the shape of nipples or breast 50.20% discharge or bleeding from nipples 41.5% change in the size of nipples or breast 37.6% lump or thickening under the armpit 32.5% puckering or dimpling of breast skin 29% inverted nipples Source of information about BC: 46.3% television/radio 9.3% friends and relatives 30.1% of healthcare workers 42.2% lectures 16.1% Internet
11	Alsaeed, Tunio [20]	Riyadh	(N=600) All	37.2% single 57.0% married 4.0% divorced 1.83% widowed	19-60 (31.9 ± 10.49)	58% aware of BSE 48.3% were familiar with BSE 13.2% were regularly performing BSE 53.5% stated that the right time to perform BSE was after the end of the menstrual cycle	84.7% reported their awareness of mammograms Knowledge of BC signs and symptoms 62.7% change of color or texture of breast 53.7% breast pain 70.8% presence of lump or mass 60.2% underarm lump 51.8% nipple secretion 58.7% changes in nipple shape 38.3% cracks in the nipple 49.2% increase in breast size Source of information about BC: 34.2% television/radio 29% friends and relatives 54% Internet

12	Abolfotouh, Bani-Mustafa [21]	Riyadh	(N=433) n=225 Health workers n=208 Relatives	47.6% single 45.2% married 7.2% divorced or widowed	18-NM (39.4 ± 7.2)	91.2% were aware of BSE 43.5% agreed the BSE must be performed monthly 53.3% knew how to perform BSE 47.3% did not know what the appropriate timing for BSE was 74.7% stated that the age to start BSE was>18 41.6% have done BSE 74% performed BSE at home	Risk factors of BC: 58.5% radiotherapy 31.3% hormonal replacement 28% obesity 67.8% physical exercise 53.6% smoking 44.6% aging 15.9% late menopause 36.5% oral contraceptive pills 71.2% family history Knowledge of BC signs and symptoms: 60.3% Nipple discharge is important. 14.6% A lump is cancer 74.8% breast lump 23.6% early menarche 73.7% sudden and abnormal changes in the breast size 67.4% discharge from nipples 67.6% changes in nipple shape. Source of information about BC: 40.5% television 9.9% friends and relatives 12.7% health care workers 54.7% educational public camping 38.2% Internet
13	Elsadig Yousif Mohamed, Waqas-Sami [22]	Majmaah	(N=325) University students	NM	NM	28.4% of medical students and 30.1% of non-medical students practiced BSE regularly	37.06% of medical students had good knowledge in comparison to 26.9% of non-medical students 5.2% of medical students and 14% of non-medical students performed a screening test for BC

14	Haddad, Al-Adwani [23]	NM	(N=826) University students	84.3% single 13.2% married 1.8% divorced 0.5% widowed	NM	28% of respondents practiced BSE 31% practiced BSE after the menstrual cycle, whereas 48% of them practiced BSE at any time Barriers to BSE practice: 49.1% “I do not have free time.” 57.5% “I still don’t know how to do BSE.” 54.1% “I do not feel that I am at risk of BC.” 51.8% “I am afraid that X-ray is harmful.” 48.1% “I do not get any encouragement from my family.” 17.1% “My husband did not approve my testing.” 50.8% “I am afraid of test results.” 37.1% “I think the examination is painful.” 38% “Lack of privacy.”	Risk factors of BC: 38.1% oral contraceptive pill 36.8% poor diet 46.2% hereditary 44.6% smoking 33.2% aging 18.9% late menopause 10.1% early menarche Knowledge of BC signs and symptoms 53.3% lump in the breast or axilla 51.6% discharge or bleeding from nipples 70.5% change in the size of nipples or breast 50.6% lump or thickening under the armpit 52.6% puckering or dimpling of breast skin 36.7% inverted nipples Source of information about BC: 34.2% television/radio 29% friends and relatives 54% Internet
15	Al Otaibi, Al Harbi M Fau - Al Kahmoas [24]	Riyadh	(N=137) All	18% single 58% married 15% divorced 9% widowed	18 -> 60 (NM)	54% claimed they were aware of BSE. 62% knew how to conduct BSE	38% knew mammography was a screening tool Source of information about BC: 22% television/radio 39% awareness campaigns
16	Alrashidi, Ahmed [25]	Hail	(N=401) All	NM	14-52 (NM)	NM	Risk factors of BC: Risk factors of BC: 38.1% oral contraceptive pill 75.4% hereditary 76% smoking 33.2% aging 37% late menopause/early menarche 36% obesity 83.6% radiation
17	Al-Wassia, Farsi [26]	All	(N=3245) All	78% married	40-60 (NM)	NM	40% of the participants reported never having a mammogram Mammography use decreased with age; 44% of women aged 41-50 never had a mammogram versus women aged 51-60 (33%) and women aged> 60 24%). Mammography use was greater among women with more than one child (42%)

18	Alreshidi [27]	Hail	(N=401) All	NM	14-52 (19.9 ± NM)	56.35% of participants demonstrated moderate to good knowledge about BSE 86.53% stated that BSE had a preventive role 67.69% showed the knowledge of signs and symptoms to consider while performing BSE Source of information on BSE: 25.19% university program 24.67% seminars 13.36% leaflets 25.96% media 10.79% friends Method for carrying BSE: 41.11% in front of the mirror 14.46% during shower 8.12% on a bed 13.7% all of the above 22.59% none of the above 52.61% of the participants believed that BSE had to start between 20 and 70 years. 34.68 % answered BSE had to be done every month	36.1% of the respondents had good knowledge. 28.2% had moderate knowledge of early detection and treatment Regarding the perception of the level of media contribution to the awareness about BC, 33.9% think that media have a good contribution to BC prevention and early detection 43.48% answered that the test should be done by the physicians annually 52% of respondents answered that mammograms should be performed annually for women older than 40

19	Binhussien and Ghoraba [28]	Riyadh	(N=384) All	68.7% married 29.7% single 1.6% divorced or widowed	18-55 (31.9 ± 8.6)	60.9% knew BSE and (CBE) were the methods of early BC detection About 53.1% of women have heard about CBE	75.8% of participants had good knowledge of BC risk factors Knowledge of BC signs and symptoms: 57% lump or thickening in the breast 49.2% lump or thickening in the armpit 68% bleeding or discharge from the nipple 44.5% pulling of the nipple 35.9% changes in the position of the nipple 41.1% rash of or around the nipple 32% redness of breast skin 43% change in the size of the breast or nipple 53.9% changes in the shape of the breast or nipple 43.8% pain in one of breasts or armpit 43% dimpling of the breast skin Source of information about BC: 16.4% television/radio 15.6% health care workers 10.9% Internet/printed material/books 20.3% social media
20	Alshareef, Yaseen [29]	Makkah	(N=400) School teachers	17.8 % single 70.5 % married 8% divorced 3.8% widowed	25-55 (NM)	Performing BSE is significantly associated with high knowledge score	Risk factor of BC: 38.1% oral contraceptive pill 33.5% poor diet 69.5% hereditary 62.8% smoking 26% aging 25.3% early menopause 5.8% early menarche 28.3% obesity Knowledge of BC signs and symptoms 65.4% painless breast lump 48.1% changes in the size of breast or nipple 50.9% changes in the shape of breast or nipple 52.6% bleeding or discharge from the nipple 42.1% pulling of the nipple 35.6% nipple pain 42.9% redness of breast skin 75.2% lump under the armpit

21	Alsowiyan, Almotyri [30]	Al-Qassim	(N=519) All	39.5 % single 52.4 % married 3.9% divorced 4.2% widowed	18 -> 40 (NM)	NM	Knowledge of BC signs and symptoms: 65.7% size and shape changes 62% lump or thinking in breast or armpit 52.6% skin changes 52.4% breast pain 49.1% nipple changes 48.4% discharge from the nipple 39.3% pain in the breast and armpit 37.2% swelling under the armpit 34.7% rash around the nipple Risk factors of BC: 43.5% oral contraceptive pill 77.8% hereditary 36.4% smoking 28.5% aging 14.1% late menopause 13.7% early menarche Source of information about BC: 69.7% television/Internet 26.1% health care workers 19.2% newspaper 7.3% radio 52.5% friends and relatives
22	Heena, Durrani [31]	Riyadh	(N=395) Health care workers	36.2 % single 60.5% married 2.8% divorced 0.3% widowed	NM (34.7 ± 8.3)	93.7% aware of BSE 74.2% agreed that BSE must be performed monthly 53.3% knew how to perform BSE 80.3% agreed that the best time to perform BSE was a week after the menstrual cycle 43% stated that puberty was the age to start BSE 74.7% had practiced BSE 74.4% of participants carried BSE at home by themselves	Knowledge of BC signs and symptoms: 1.8% lump in the breast 1.5% discharge from the beast 1.8% pain or soreness in the breast 3.3% change in the size of the breast 1.8% discoloration/dimpling of the breast 3.8% ulceration of the breast 4.1% changes in the shape of the breast 8.9% inversion/pulling of the nipple 4.1% swelling or enlargement of the breast 4.6% lump under the armpit 12.4% scaling/dry skin in the nipple region Risk factor of BC: 43.5% oral contraceptive pill 1.8% hereditary 9.1% smoking 4.6% aging 26.1% late menopause 126.1% early menarche 14.4% obesity

23	Alshahrani, Alhammam [32]	Najran	(N=500) PHC visitors	12 % single 70% married 11% divorced 7% widowed	NM	56.8% of participants demonstrated a low level of knowledge on BSE 19% of participants demonstrated a high level of knowledge on BSE. 35% of women that attended the PHC performed BSE 20.6% of women avoided BSE due to lack of training, and 17.6% were afraid of the findings	54.4% of participants demonstrated a low level of BC knowledge 90.4% of women displayed a low level of mammogram knowledge 83.8% demonstrated a low level of knowledge related to clinical breast examination 10.2% of participants demonstrated a high level of BC knowledge, 1.6% for a mammogram, and 4.8% for clinical breast examinations 19.8% of women visited their physician for a clinical breast examination, while 30.2% never had a breast screening method Barriers preventing participants from seeking help for early detection of BC: 9.4% pain 26.4% no female doctors 8.6% no facilities Source of information about BC: 19.8% television/radio/Internet 52.4% social media 8.8% of health care workers 6.2% magazines and newspaper 13% other sources
24	Hegazy, Alamri [33]	Jeddah	(N=466) University students (health sciences)	3.4% married 96.5% single	18-24 (20.7 ± 1.2)	94.5% knew that BSE was a method for early BC detection. 41% reported that they had practiced BSE.	78% of the students had good knowledge about the symptoms and signs of BC. 75.5% of students mentioned mammography as an early screening method, Risk factors of BC: 61.4% oral contraceptive pill 50.9% poor diet 91% hereditary 73.8% smoking 78% aging 55.2% late menopause 40.8% early menarche 53.9% obesity Knowledge of BC signs and symptoms: 91% lump in the breast 78.8% pain or soreness in the breast 86.3% discharge from the breast 81.8% change in the size of the breast 84.8% discoloration/dimpling of the breast 71.2% ulceration of the breast 48.9% weight loss 88.6% change in the shape of the breast 80.3% inversion/pulling in of the nipple 88% swelling or enlargement of the breast 70.1% lump under armpit 65.2% scaling/dry skin in the nipple region Source of information about BC: 46.78% television/radio/Internet 6.86% books, 42.27% university lectures 4% friends and relatives

25	Alsareii, Alqahtani [24]	Najran	(N=300) University Students and Faculty	76.67% single 20.67% married 2.67% divorced	NM	75% of participants knew about BSE. 77% attended BSE educational sessions.	91% knew that smoking causes BC 73.7% agreed that early detection helps in treatment 81% knew about mammograms Knowledge of BC signs and symptoms: 11.7% nipple discharge 9.7% breast mass 11.3% skin changes 9% changes in the nipple shape and size 10.3% changes in breast size 10% changes in breast height 5.7% axillary mass Source of information about BC: 43% study 30.7% media 33% Internet 17.3% of patients and relatives 11.3% health care workers 7.3% training course
26	Alghamdi, Abukhelaif [22]	Albaha	(N=221) University students	75.1% single 24.9% married	17->22 (NM)	47.5% heard about breast BSE 74% knew how to perform BSE 58.3% knew how often BSE should be performed 12.6% knew the appropriate time to perform a BSE 85.4% practice breast BSE	Knowledge of BC signs and symptoms 53.5% painless breast lump 60.4% discharge or blood from nipples 58.7% changes in the shape of the nipple

BC: Breast Cancer; BSE: Breast Self-Examination; PHC: Primary Health Care; indicates values calculated for males and females; NM: not mentioned in the original article; CBE, clinical breast examination; all: indicates that participants are involved from the general population

Basic Knowledge, Risk Factors, Barriers, and Educational Resources of Breast Cancer

Based on the collective study data, the basic knowledge included whether the respondent knew about BC; 34% of the university students responded positively, whereas 67.9% of the patients and their escorts were not aware of BC [4,13]. In a similar study, 48% of patients from the PHC were unaware of BC, and 66.7% of respondents with special needs were aware of BC [8,15]. Also, Hussein, Alorf reported that 56% of the university students and homemakers perceived BC as abnormal growth [17]. According to Latif, the majority of university students showed good BC awareness [18]. In a recent study conducted by Al Otaibi, Al Harbi, the university students and the general public showed that 56% of women were aware of BC [34]. Medical students had better knowledge of BC than non-medical students, 37.06% and 26.9%, respectively [35].

Misconceptions of BC were observed, with 27.1% of respondents believing that cancer meant the end of life and 74.2% thought it could appear overnight. In addition, 75.1% and 64.3% believed that fate and curses were the reasons for BC, whereas 25.3% of respondents believed that an evil spirit and 12.4% believed that being suspicious could cause BC [4]. The use of cosmetics was considered one of the risk factors among 37% of respondents [25].

Data on the awareness of BC risk factors were obtained from various studies conducted based on observational and cross-sectional questionnaire surveys; 76%-94% of PHC patients believed that tobacco and 80% believed that alcohol was the major BC risk factor. 54% of respondents considered excessive radiation as one of the risk factors, whereas 8.5% thought that pollution and 47% that oral contraceptives were among the risk factors, similar to observations by Hussein, Alorf with 19% and Haddad, Al-Adwani 38% for the exact cause; oral contraceptive [4,17,21,23]. Advanced age and late pregnancy were seen as BC causes by 13% and 10% of respondents, respectively, and 46% of the common public agreed [25]. Regarding post-menopause, 48% believed that BC risk increased with it, along with being overweight (36%) [7,25]. Genetic factors were seen as a risk factor for BC by 74% of respondents. In comparison, 42% of respondents with special needs believed the same, with 9.8 % with family history, 46% of university students responded the same [14,16,23].

Over 80% of the respondents believed that a good lifestyle, which included a good diet with fruits and vegetables (87%), breastfeeding (86%), and physical activity (84%), reduced the risk of BC [4]. A similar study reported respondents with poor diet (13%), lack of exercise (11%), and improper dressing (28%) [17]. The majority of respondents supported the above finding in a study conducted by Nemenqani, Abdelmaqsoud and Rasheed, and Al-Sowielem [8,19]. Patients attending the PHC were unaware that BC could be curable (26%) [8]. Interestingly, 43% of respondents showed interest in genetic testing to check the risk factors, with 12% showing conditional interest in testing [36].

The awareness of the importance of mammography in BC detection ranged between 22% and 30%, which is in contrast with the observation among medical students (67%) [7,8,14,19]. The percentage of respondents who underwent mammography was 14%; the use of mammography was higher in women with more than one child, and it decreased with age, as reported by Al-Wassia, Farsi [26,36].

Considering the awareness of the BC signs and symptoms, 57% of the respondents were aware that a lump or thickness in the breast was a sign of BC, 68% responded that bleeding or nipple discharge was a sign of BC, and 78% of university students showed good Knowledge on the BC signs and symptoms [28,33]. The majority of participants were not aware of the necessity to seek medical help if a lump was felt in the breast [37].

Considering the question about the educational resources regarding BC awareness, university students reported television and radio at 56% and 65%, respectively, journals at 56%, newspaper at 35%, and physicians at 15% [4,13]. As a barrier for the BC referral, Al-Amoudi reported shyness at 33%, unavailability of female doctors at 31%, and refusal by the family at 10% [16].

Breast Self-Examination Practice and Knowledge

The respondents' data showed that the Knowledge of BSE was 42% among women attending the PHC and 61% among the general public compared to 92% among university students [7,18,28]. Regarding the spread of the Knowledge on BSE, Hussein, Alorf reported that 70% of participants were willing to communicate with others than 30% who were fearful of spreading knowledge on or discussing BC, and 50% feared the test results [15,21]. Sait, Al-Amoudi reported that 72% of students were very interested in an SEM training course [14].

Regarding the awareness of BSE methods, 4% of the nurses and 30% of respondents attending the PHC practiced the BSE methods compared to 62% of university students [7,15,23]. Regarding monthly BSE practices, 89.2% of medical students and 55% of university students confirmed carrying BSE monthly [14,19]. One of Al-Amoudi's studies on women with special needs revealed that 41.7% of women who were deaf and mute practiced BSE [16]. According to Sait, Al-Amoudi, 55% of respondents answered that BSE should be performed after the monthly period and not before, as recommended [14]. Rasheed and Al-Sowielem reported that women aged ≥ 46 years practiced BSE 2 times more frequently than women in their 30s [8]. There was a statically significant finding on the BSE practice according to which college/university-educated women were 4 times more likely to be involved than the less educated group; workers in the health care field and homemakers were almost 3.5 times more likely to practice BSE than students, but in contrast with Elsadig Yousif Mohamed, Waqas Sami, who found that 28% of medical students and 30% of non-medical students practiced BSE regularly [8,22]. A total of 5% of medical students had undergone a screening test, compared to 14% of non-medical students [25].

DISCUSSION

A total of 14,211 respondents (university students, medical school students, nurses, and patients who were attending

PHC centers) aged 12-70 were included in the study. The respondents came from different parts of the Mecca, Riyadh, Hail, Taif, Abha, Asir, and Najran regions. The Knowledge of BC varied across the regions according to respondents' answers.

From the public health point of view, it is necessary to know the impact of BC in the community, as BC is one of the most common diseases both globally and in the Kingdom of Saudi Arabia [33]. Some data have revealed the rising mortality and steps needed to increase awareness and reduce morbidity and mortality rates. The present study found that awareness programs regarding the basic pathogenesis and etiology of BC and basic BSE methods were necessary, as stated by Hegazy, Alamri, who mentioned that an increase in awareness would lead to the right message in uplifting, positive knowledge [33]. The present study showed data from 26 articles in which it was observed that the Knowledge of BC and basic BSE methods were higher among medical students compared to the general public or patients attending PHC, possibly because of a lack of education or available resources. The strong Knowledge among medical students can be used to create awareness among women in the community, which agrees with findings by [38].

Overall, the studies revealed less knowledge of the various risk factors associated with BC. Few respondents showed misconceptions accompanied by fear, one of the significant barriers to health awareness and health promotion. This is in agreement with a study conducted in Kenya, which identified barriers to the awareness of BC risk factors [39]. The awareness of mammography in the detection of BC was better in medical than in non-medical students. An effective screening method using mammography is essential in early detection, as confirmed by the Cochrane study, which showed that mammography screening leads to a sharp increase in the earlier cases younger group and a sharp decrease in the number of advanced cases, which indicates a reduction in mortality and morbidity [40]. The practice of BSE was good among medical students in comparison with other groups. This finding helps to motivate medical students to practice BSE methods among themselves and their patients.

This review has a few limitations; the uniformity of the studies was not considered, as all the studies included had different designs and respondents. Since our study focused on Knowledge and awareness, this was not considered in the inclusion criteria. Thus, further meta-analysis of each research is necessary based on uniformity.

CONCLUSION

The present study's findings suggest that it is necessary to encourage and educate younger generations in major cities and small towns on the basics of BC, prevention, and BSE practice. More Knowledge on the risk factors will help to reduce BC morbidity and mortality. However, it is necessary to conduct a nationwide study on awareness and knowledge focusing on involving all women communities in Saudi Arabia, especially those in rural cities, and plan a program for their education and training on BSE methods. There is a need for targeted awareness and practice for health regarding early screening, onsite counseling, and cost mitigation. In addition, precaution should be taken not to hurt cultural sentiments and educate the women community considering all demographic parameters and support from religious organizations. The Saudi Vision 2030 should be education, screening, motivation, and good lifestyle practices.

DECLARATIONS

Conflicts of Interest

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

Funding

This study was funded by the deanship of scientific research, Albaha University, Albaha, SA, project number (3/1439).

REFERENCES

[1] Tsu, Vivien Davis, Jose Jeronimo, and Benjamin O. Anderson. "Why the time is right to tackle breast and cervical cancer in low-resource settings." *Bulletin of the World Health Organization,* Vol. 91, No. 9, 2013, pp. 683-90.

[2] Saudi Cancer Registry. "Cancer incidence report Saudi Arabia." Saudi Arabia: Saudi_Health_Council, 2015.

[3] Rahman, Syed Azizur, et al. "Awareness about breast cancer and breast self-examination among female students at the University of Sharjah: A cross-sectional study." *Asian Pacific Journal of Cancer Prevention: APJCP,* Vol. 20, No. 6, 2019, pp. 1901-08.

[4] Ravichandran, Kandasamy, Gamal Mohamed, and Nasser Abdulrahman Al-Hamdan. "Public knowledge on cancer and its determinants among Saudis in the Riyadh Region of Saudi Arabia." *Asian Pacific Journal of Cancer Prevention,* Vol. 11, No. 5, 2010, pp. 1175-80.

[5] Alotaibi, Refah Mohammed, et al. "Breast cancer mortality in Saudi Arabia: Modelling observed and unobserved factors." *PloS One,* Vol. 13, No. 10, 2018, p. e0206148.

[6] Ezzat, Adnan A., et al. "High complete pathological response in locally advanced breast cancer using paclitaxel and cisplatin." *Breast Cancer Research and Treatment,* Vol. 62, No. 3, 2000, pp. 237-44.

[7] Mahfouz, Ahmed A., et al. "Breast cancer knowledge and related behaviors among women in Abha city, southwestern Saudi Arabia." *Journal of Cancer Education,* Vol. 28, No. 3, 2013, pp. 516-20.

[8] Rasheed, Parveen, and L. S. Soweilum. "Knowledge and perception of breast cancer and practice of breast self-examination among female patients attending primary health care centers in Al Khobar City, Saudi Arabia." *Journal of the Kuwait Medical Association,* Vol. 45, 2013, pp. 123-29.

[9] Gandeh, Mohammad BS, and Waleed A. Milaat. "Effect of a breast cancer health education program on the awareness and practice of Jeddah female secondary school students." *Journal of Family & Community Medicine,* Vol. 7, No. 1, 2000, pp. 31-36.

[10] Abdel-Aziz, S. B., et al. "Perceived barriers to breast cancer screening among Saudi women at primary care setting." *Journal of Preventive Medicine and Hygiene,* Vol. 59, No. 1, 2018, pp. E20-29.

[11] O. Odusanya, Olufemi O. Tayo, Olumuyiwa. "Breast cancer knowledge, attitudes and practice among nurses in Lagos, Nigeria." *Acta Oncologica,* Vol. 40, No. 7, 2001, pp. 844-48.

[12] Horn-Ross, Pamela L., et al. "Recent diet and breast cancer risk: The California Teachers Study (USA)." *Cancer Causes & Control,* Vol. 13, No. 5, 2002, pp. 407-15.

[13] Habib, Fawzia, et al. "Awareness and knowledge of breast cancer among university students in Al Madina Al Munawara region." *Middle East Journal of Cancer*, Vol. 1, No. 4, 2010, pp. 159-66.

[14] Sait, Wafa A., et al. "The knowledge of breast cancer among young Saudi females." *Saudi Medical Journal*, Vol. 31, No. 11, 2010, pp. 1242-44.

[15] Yousuf, Shadia Abdullah, et al. "Do Saudi nurses in primary health care centres have breast cancer knowledge to promote breast cancer awareness?" *Asian Pacific Journal of Cancer Prevention,* Vol. 13, No. 9, 2012, pp. 4459-64.

[16] Al-Amoudi, Samia Mohammed. "Knowledge and attitude of women with special needs towards breast cancer in Saudi Arabia: A cross-sectional study." *Life Science Journal,* Vol. 9, No. 3, 2012, pp. 1348-62.

[17] Deema M, Hussein, et al. "Breast cancer awareness and breast self-examination in Northern Saudi Arabia. A preliminary survey." *Saudi Medical Journal*, Vol. 34, No. 7, 2013, pp. 681-88.

[18] Latif, Rabia. "Knowledge and attitude of Saudi female students towards breast cancer: A cross-sectional study." *Journal of Taibah University Medical Sciences,* Vol. 9, No. 4, 2014, pp. 328-34.

[19] Nemenqani, Dalal M., et al. "Knowledge, attitude and practice of breast self examination and breast cancer among female medical students in Taif, Saudi Arabia." *Open Journal of Preventive Medicine,* Vol. 2014, 2014.

[20] Eyad Fawzi, Al Saeed, et al. "Knowledge, attitudes and practices among urban women of Riyadh, Saudi Arabia, regarding breast cancer." *Kuwait Medical Journal*, Vol. 47, No. 3, 2015, pp. 215-20.

[21] Abolfotouh, Mostafa A., et al. "Using the health belief model to predict breast self examination among Saudi women." *BMC Public Health,* Vol. 15, No. 1, 2015, pp. 1-12.

[22] Mohamed, Elsadig Yousif, et al. "Breast cancer awareness and breast self-examination among future female

university graduates: comparison between medical and non-medical students." *International Journal of Research in Medical Sciences,* Vol. 4, No. 3, 2016, pp. 685-89.

[23] Al-Haddad, Mahmoud S., et al. "Knowledge and practice of university female students toward breast cancer." *Archives of Pharmacy Practice,* Vol. 7, No. 4, 2016, pp. 165-71.

[24] Al Otaibi, Shibl, et al. "General breast cancer awareness among women in Riyadh city." *Asian Pacific Journal of Cancer Prevention: APJCP,* Vol. 18, No. 1, 2017, pp. 159-63.

[25] Alghamdi, Thamer, et al. "Perception and awareness of Albaha University female students towards breast self-examination and breast cancer: A cross-sectional observational study." *Medical Science,* Vol. 24, No. 102, 2020, pp. 673-79.

[26] Al-Wassia, Rolina K., et al. "Patterns, knowledge, and barriers of mammography use among women in Saudi Arabia." *Saudi Medical Journal,* Vol. 38, No. 9, 2017, pp. 913-21.

[27] Alharbi, Saleh Hadi, et al. "Assessment of knowledge and perception towards breast cancer prevention and early detection." *International Journal of Medical Research & Health Sciences,* Vol. 7, No. 1, 2018, pp. 65-76.

[28] Binhussien, Bushra Fahad, and Medhat Ghoraba. "Awareness of breast cancer screening and risk factors among Saudi females at family medicine department in security forces hospital, Riyadh." *Journal of Family Medicine and Primary Care,* Vol. 7, No. 6, 2018, pp. 1283-87.

[29] Alshareef, Basem, et al. "Breast cancer awareness among female school teachers in Saudi Arabia: A population based survey." *Asian Pacific Journal of Cancer Prevention: APJCP,* Vol. 21, No. 2, 2020, pp. 337-42.

[30] Alsowiyan, Asma A., et al. "Breast cancer knowledge and awareness among females in Al-Qassim Region, Saudi Arabia in 2018." *Journal of Family Medicine and Primary Care,* Vol. 9, No. 3, 2020, pp. 1712-18.

[31] Heena, Humariya, et al. "Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: A cross sectional study." *BMC Women's Health,* Vol. 19, No. 1, 2019, pp. 1-11.

[32] Alshahrani, Majed, et al. "Knowledge, attitudes, and practices of breast cancer screening methods among female patients in primary healthcare centers in Najran, Saudi Arabia." *Journal of Cancer Education,* Vol. 34, No. 6, 2019, pp. 1167-72.

[33] Hegazy, Amal A., et al. "Female health college students' knowledge and attitude towards breast cancer." *Australasian Medical Journal,* Vol. 12, No. 9, 2019.

[34] Alrashidi, Ali Ghannam, et al. "Knowledge and perceptions of common breast cancer risk factors in Northern Saudi Arabia." *Asian Pacific Journal of Cancer Prevention: APJCP,* Vol. 18, No. 10, 2017, pp. 2755-61.

[35] Alsareii, Saeed Ali, et al. "Awareness of breast cancer among female students and faculty from Najran university, Najran, Saudi Arabia." *Asian Pacific Journal of Cancer Prevention: APJCP,* Vol. 21, No. 5, 2020, pp. 1415-21.

[36] Amin, Tarek Tawfik, et al. "Saudi women's interest in breast cancer gene testing: Possible influence of awareness, perceived risk and socio-demographic factors." *Asian Pacific Journal of Cancer Prevention,* Vol. 13, No. 8, 2012, pp. 3879-87.

[37] Nageeti, Tahani H., et al. "Perspective of Saudi women in the Makkah region on breast cancer awareness." *Journal of Family & Community Medicine,* Vol. 24, No. 2, 2017, pp. 97-101.

[38] Noreen, Mamoona, et al. "Knowledge and awareness about breast cancer and its early symptoms among medical and non-medical students of Southern Punjab, Pakistan." *Asian Pacific Journal of Cancer Prevention,* Vol. 16, No. 3, 2015, pp. 979-84.

[39] Gakunga, Robai, et al. "Identifying barriers and facilitators to breast cancer early detection and subsequent treatment engagement in Kenya: A qualitative approach." *The Oncologist,* Vol. 24, No. 12, 2019, pp. 1549-56.

[40] Gotzsche, Peter C., and Karsten Juhl Jorgensen. "Screening for breast cancer with mammography." *Cochrane Database of Systematic Reviews,* Vol. 6, 2013.