

Understanding Breast Health Awareness Among Nurses during conflict in Yemen

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Research

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Abstract

PURPOSE: The aim of this study was to determine the knowledge of risk factors and symptoms of breast cancer among Yemeni nurses during the conflict.

METHODOLOGY: A cross-sectional design was carried out among 392 randomly selected participants. The instrument consists of 20 items, 12 general awareness statements, and 8 curability statements with a 0.711 reliability coefficient. Data analysis was performed using SPSS version 25.

RESULTS: Most of the nurses were female (69.5%), with a mean age of 28.54, with monthly income less than 200 USD (54.3%). About 21.4% of the participants were smokers. Among all participants, the most frequently mentioned risk factor were breastfeeding, reducing the risk of breast development (86.2%), followed by physical activities lowers the developing risk of breast cancer (79.1%). Over time, the myth of the constant irritation due to the tight bra may cause breast cancer reported by women more than male nursing students. In this respect, men were better knowledgeable than women ($P=0.001$). Females, however, were more aware than males that women who bear their first child before 30 are more to develop breast cancer ($P=0.017$). Income is significantly associated with the level of knowledge among nurses. The most frequently mentioned breast symptoms among all participants were a pain in the breast (82.9%), followed by changes in the breast shape (79.1%).

CONCLUSIONS: Income is significantly associated with the level of knowledge among nurses. The myth about breast cancer is dominant among nurses in Yemen. Therefore, there is an urgent need to educate nurses on breast health.

Introduction

As a public health issue, cancer affects most of the world's population, and breast cancer is the most prevalent form of cancer in women. Breast cancer is the most diagnosed form of cancer in women¹, and there were 2.1 million cases of breast cancer globally in 2018². In developing countries, breast cancer is now considered the most common cause of cancer mortality in women³, and in Arabic countries, women are at a higher risk of mortality from breast cancer due to late diagnosis⁴. Risk factors for breast cancer include age, weight, diet, smoking, alcohol, family history, menarche-menopause age, general and reproductive health, and lifestyle⁵. In order to reduce mortality from breast cancer, early detection is necessary⁶, as when breast cancer is diagnosed early followed by appropriate treatment, a high cure rate can be achieved in well-resourced countries.

In many countries, improving awareness among health care workers has been shown to be an effective method for early diagnosis and treatment of breast cancer^{7&8}, however, the lack of education about breast cancer in both patients and providers of treatment may contribute to delays in care⁹. If breast cancer is detected early, it is possible to significantly reduce further complications of breast cancer. Early detection relies on knowledge of the signs and symptoms of breast cancer, which in turn relies on

knowledge of the methods of detection of breast cancer, such as clinical examination, self-examination, and mammography. Breast cancer survival rates vary globally, ranging from 40–80% in low-income nations and developing countries, respectively. The difference in developed nations is likely due to a high level of awareness that leads to early detection and treatment¹⁰.

Early detection of breast cancer using screening techniques such as mammography, clinical breast examination, and breast self-examination helps save women's lives each year¹¹. Breast self-examination plays a major role in early breast cancer detection (48%), compared to clinical breast examination (11%) and annual mammography (41%)¹². In all women over 20 years of age, breast self-examination should be performed on a monthly basis and the importance of raising awareness of breast cancer by breast self-examination¹³. Moreover, breast self-examination is straightforward and can be performed without the need of specialist equipment or trained clinicians – it is also an economic, safe and non-invasive process¹⁴. With early detection through breast self-examination, the prevalence of breast cancer can be minimized, however, the awareness of breast self-examination in females is low.

BREAST CANCER – A YEMENI PERSPECTIVE

Yemen has been reported to be among the poorest nations in the Arabic world, and one of the neediest nations globally. Following the acceleration of the multi-party war since 2015, the situation in Yemen has further deteriorated such that the health system in Yemen has been negatively affected by a humanitarian crisis. The conflict in Yemen was named the worst humanitarian crisis in the world, with almost half of the nation's population on the verge of starvation and hundreds of thousands affected by the disease. The Yemeni population is suffering from the world's largest cholera outbreak (affecting all but one province), the emergence of diphtheria, and the risk of polio re-introduction¹⁵. In Yemen, the public health sector dominates the health system, however, only half of the health facilities are serviceable and these face severe shortages¹⁶.

To date, governmental organizations and non-governmental organizations are raising awareness of the burden of cancer in developing nations. For example, in Yemen, initiatives have been introduced to address the early detection, prevention, and treatment of breast cancer, and the palliative care of patients with breast cancer. However, these initiatives are introduced into an environment where there are no cancer patient registries, no nationwide strategies for cancer care, and no action plans for cancer treatment. Also, periodic monitoring of cancer is almost non-existent in Yemen which further adds to the disfunction of a limited health system. In Yemen, breast cancer awareness is very poor with only limited information available from studies on population centres such as Hadhramout, Aden, Al-Mukalla city, and Sana'a^{17–20}. Data from these studies report that as few as 11–17.4% of Yemeni women have practiced breast self-examination²¹, and only 1.6% of Yemeni women have had a mammogram examination. Countries neighbouring Yemen have also reported that inadequate knowledge, stigma and cultural beliefs were reasons for less use of breast cancer screening services^{22–24}.

BREAST CANCER – A ROLE FOR YEMENI NURSES

In order to improve population awareness of breast cancer and the importance of early detection of breast cancer in Yemen, health professionals play a major role. For example, Yemeni nurses are critical providers of health services in Yemen, and their knowledge and understanding of breast cancer is central to the success of any nationwide cancer strategy. Therefore, measuring the cancer-specific knowledge of nurses in Yemen is a crucial issue. In health promotion and the prevention of breast cancer, health care professionals, in particular, nurses, can act with an integrated view at different levels of health care, meeting the individual in their entirety, focusing on the development of their actions in primary health care²⁵. A knowledgeable and consistent understanding of health issues reflects positively on the nurses' attitude and professional practice. Yemeni nurses can develop practices aimed at breast cancer prevention, promote population awareness of breast cancer, and explain the importance of screening and early detection of breast cancer. Nurses must develop measures to combat mammary neoplasia, understand early detection methods, and carry out screening for the early identification of breast cancer or precursor lesions in asymptomatic individuals as quickly as possible in order to implement effective measures to reduce mortality²⁶. Nurses occupy an opportune space for diagnosis, early detection, treatment and prevention of many conditions including breast cancer²⁷, and it has been suggested that nurses are health professionals with reflexive-critical and humanized abilities able to intervene in the Yemeni national epidemiological profile²⁵.

Therefore, the aim of this study was to determine the knowledge of risk factors and symptoms of breast cancer among Yemeni nurses during the conflict and covid-19 pandemic.

Methodology

STUDY DESIGN AND SETTING

From October 1 to 20, 2020, a cross-sectional design was carried out among nurses at public and private health facilities including, hospitals, medical centers and private clinics in Sana'a city, Yemen. With an area of 2144 m², Sana'a is situated at an altitude of more than 2200 meters above sea level with a population of 3.9 million. Due to insecurity, access challenges, or lack of salaries, health workers are not sufficient, most of whom have migrated. To a large extent, the bonus offered by the humanitarian agents to support the remaining health professional are not sufficiency. Yemen is consists of 22 provinces, each of which has a local health department that reports to the Ministry of Health in Yemen.

Procedures Of Participants Selection

Given that 25% of nurses are aware of breast cancer risk factors and symptoms, a total of 392 was ideal for a desirable confidence interval (95%), taking into account 5 percent permissible error and 15% refusal rate. The procedure of selection was a random selection of nurses from all Public and private health facilities including, hospitals, medical centres and clinics. Namely: [Science and Technology University Hospital, Al-Motahedon Hospital, Al-Harameen Hospital, Al-Rafah Hospital, Al-Thawrah Hospital, Sihatak

Private clinic, Tunis Modern Hospital, Yemen-German Hospital, Safe motherhoods specialist Hospital Sawan, Kuwait University Hospital, Rebat Modern Hospital, Yemen Medical Tower Center, Assabeen Hospital, Al-Kohaly Medical center, Al-Jomhori teaching Hospital, Al-Olefi Medical center, Azal Hospital, Al-Motahedon Hospital, Maha Al-Bydhani Hospital, Sawan clinic, Ashefa clinic, and Nor Almalak Clinic]. The heads of each hospital, medical center and clinic were briefed about the study goals to get their permission to collect data from their facilities. The estimated number of nurses to be included in this study from each health facility in quotient to the total size was resolute to achieve the sample size. We used the computed method to select the number of nurses from each health facility randomly. Out of the 410 nurses approached, 18 refused to participate in this study.

Ethics

The Faculty of Medicine, Al-Hikma University, Yemen has approved this study. Permission was obtained from all heads of the health facilities in the city of Sana'a, Yemen, before data collection. Informed consent was obtained from the nurses after inform them about the study and its aim.

Data Collection

Once the authorization was given by directors of each hospital, medical center and clinics, the participants were randomly selected and approached to participate. The study's objective was clarified and the study tools were distributed to the nurses. In order to give their attention to the response to our survey, the nurses filled out the questionnaire in a separate and quiet room. The data collected by our trained medical students, which provided a complete explanation and guidance on how to collect data, emphasizing the confidentiality of the participants' information and anonymity.

Data Collection Tool

With some contextual modifications, the Comprehensive Breast Cancer Knowledge Test (CBCKT) was used. The initial instrument consists of 20 items, 12 general awareness statements and 8 curability statements with a 0.711 reliability coefficient²⁸⁻³⁰. Socio-demographic data were also obtained from the participants, such as age, sex, family history of breast cancer, father education, mother education, smoking and monthly income. Nurses were tested on the adequateness of their information about breast cancer. A listing of breast cancer symptoms was given to nurses, and they were asked to select the correct symptoms.

The responses included Yes, No and Don't know. The forward and backward translation of the questionnaire was translated by two professional translators and the final version of the Arabic questionnaire was agreed upon after resolving all wording and understanding issues with the accepted cultural norms.

DATA ANALYSIS

Data entry was performed using SPSS version 25. For knowledge and social-demographic characteristics, frequency and percentage were generated. In order to evaluate the knowledge, a score of one was given to the correct answer to any of the 23 statements. Those with an incorrect response or with a **'Don't know'** response was scored 0. The knowledge score was grouped into two categories after dichotomization: taking the mean as **'good knowledge'** and **'poor knowledge'**. The chi-squared test was used to compare the level of knowledge with the personal characteristic of the participants, with a p-value < 0.05 considered statistically significant.

Results

A total number of 392 nurses from all public and private hospitals, medical centers and private clinics participated in this study. Most of the nurses were female (69.5%), with a mean age of 28.54, with monthly income less than 200 USD (54.3%). Most participant's father's education was degree(40.3%). About 21.4% of the participants were smokers and the majority of them with no family history of cancer [Table 1].

Table 1
Socio-demographic characteristics of nurses in Yemen (N=392)

Variable	Categorize	N (%)
Age (years)	(28.54+-6.44)	
Sex	Male	120 (30.6%)
	Female	272 (69.4%)
Monthly income (USD)	<200	213 (54.3%)
	≥200	179 (45.7%)
Father education	Illiterate/Elementary	89 (22.7%)
	Middle school	45 (11.5%)
	High school	100 (25.5%)
	Degree	158 (40.3%)
Mother education	Illiterate/Elementary	170 (43.4%)
	Middle school	105 (26.8%)
	High school	78 (19.9%)
	Degree	39 (9.9%)
Smoker	Yes	84 (21.4%)
	No	308 (78.6%)
Family History of cancer	Yes	57 (14.5%)
	No	335 (85.5%)

Among all participants, the most frequently mentioned risk factor were breastfeeding, reducing the risk of breast development (86.2%), followed by physical activities lowers the developing risk of breast cancer (79.1%). Among all the participants, the least frequently mentioned statement among was women with no clear risk factors seldom acquire breast cancer (15.8%), followed by the continuous irritation due to a tight bra that may cause breast cancer (18.6%), then women 70 years old or older seldom get breast cancer (28.6%)” [Table 2].

Table 2
Participants response about risk factors of breast cancer (N=392)

No.	Statement	Response	Total	Male (N=120)	Female (N=272)	P-value
1	Early menarche increases the risk of breast cancer.	Yes	40(35.7)*	47 (11.99)	93 (23.72)	0.333
		No	142(36.2)		105(26.79)	
		Don't know	110(28.1)	37 (9.44)	74 (18.88)	
				36 (36.18)		
2	Women who have delayed menopause are at risk of breast cancer.	Yes	248(63.3*)	80 (20.41)	168(42.86)	0.442
		No	85 (21.7)		59 (15.05)	
		Don't know	59 (15.1)	26 (6.63)	45 (11.48)	
				14 (3.57)		
3	The use of oral contraceptives increases the risk of breast cancer.	Yes	218(55.6*)	74 (18.88)	144(36.73)	0.275
		No	116 (29.6)		85 (21.68)	
		Don't know	58 (14.8)	31 (7.91)	43 (10.97)	
				15 (3.83)		
4	Breastfeeding reduces the risk of breast cancer.	Yes	338(86.2)*	98 (25.0)	240(61.22)	0.136
		No	38 (9.7)		21 (5.36)	
		Don't know	16 (4.1)	17 (4.3%)	11 (2.81)	
				5 (1.28)		
5	Physical exercise reduces the risk of breast cancer.	Yes	310(79.1)*	91 (32.21)	219 (55.87)	0.576
		No	48 (12.2)		31 (7.91)	
		Don't know	34 (8.7)	17 (4.34)	22 (5.61)	
				12 (3.06)		

* = The correct answer ; **= statistically significant

No.	Statement	Response	Total	Male (N=120)	Female (N=272)	P-value
6	A hard blow to the breast may cause breast cancer	Yes	217 (55.4)	64 (16.33)	153 (39.03)	0.696
		No	100(25.5)*	34 (8.67)	66 (16.84)	
		Don't know	75 (19.1)	22 (5.61)	53 (13.52)	
7	The constant irritation of a tight bra cause breast cancer.	Yes	267 (68.1)	68 (17.35)	199 (50.77)	0.001**
		No	73 (18.6)*	35 (8.93)	38 (9.69)	
		Don't know	52 (13.3)	17 (4.34)	35 (8.93)	
8	Being overweight is a risk of breast cancer.	Yes	193(49.2)*	59 (15.05)	134 (34.18)	0.993
		No	126 (32.1)	39 (9.95)	87 (22.19)	
		Don't know	73 (18.6)	22 (5.61)	51 (13.01)	
9	A woman who bears her first child before the age of 30 is at risk more than a woman who bears her first child after 30.	Yes	100 (25.5)	42 (10.71)	58 (14.80)	0.017**
		No	213(54.3)*	57 (14.54)	156 (39.80)	
		Don't know	79 (20.2)	21 (5.36)	58 (14.80)	
10	Women with no known risk factors rarely get breast cancer.	Yes	279 (71.2)	88 (22.45)	191 (48.72)	0.670
		No	62 (15.8)*	16 (4.08)	45 (11.73)	
		Don't know	51 (13.0)	16 (4.08)	35 (8.93)	
11	fibrocystic (noncancerous breast lumps) increase the risk of breast cancer.	Yes	244(62.2)*	76 (19.39)	168 (42.86)	0.193
		No	84 (21.4)	20 (5.10)	64 (16.33)	
		Don't know	64 (16.3)	24 (6.12)	40 (10.20)	

* = The correct answer ; **= statistically significant

No.	Statement	Response	Total	Male (N=120)	Female (N=272)	P-value
12	Breast cancer is more common in 65-year-old women than in 40-year-old women.	Yes	195(49.7)*	59 (15.05)	136 (34.69)	0.625
		No	129 (32.9)	37 (9.44)	92 (23.47)	
		Don't know	68 (17.3)	24 (6.12)	44 (11.22)	
13	Breast cancer is the most frequently occurring cancer in women.	Yes	308(78.6)*	96 (24.49)	212 (54.08)	0.891
		No	57 (14.5)	61 (4.08)	41 (10.46)	
		Don't know	27 (6.9)	8 (2.04)	19 (4.85)	
14	Women over age 70 rarely get breast cancer.	Yes	190 (48.5)	57 (14.54)	133 (33.93)	0.307
		No	112(28.6)*	30 (7.65)	82 (20.92)	
		Don't know	90 (23.0)	33 (8.42)	57 (14.54)	
15	Most breast lumps are cancerous.	Yes	173 (44.1)	56 (14.29)	117 (29.85)	0.706
		No	192(49.0)*	55 (14.03)	137 (34.95)	
		Don't know	27 (6.9)	9 (2.30)	18 (4.59)	

* = The correct answer ; **= statistically significant

Over time, the myth of the **constant irritation** due to the tight bra may cause breast cancer reported by women more than male nursing students. In this respect, men were better knowledgeable than women (P=0.001). Females, however, were more aware than males that a woman who bears their first child before 30 is more to develop breast cancer (P=0.017) [Table 2].

There is no association between the participant's knowledge and their socio-demographic characteristic except for income. In this study, income is significantly associated with the level of knowledge among nurses [Table 3].

Table 3
Characteristics of participants and their knowledge level

Variable	Good knowledge	Poor knowledge	P-value
Age	238 (60.71)	15 (3.83)	0.208
<30	126 (32.14)	13 (3.32)	
≥30			
Sex	114 (29.08)	6 (1.53)	0.274
Male	250 (63.78)	22 (5.61)	
Female			
Family history of cancer	52 (13.27)	5 (1.28)	0.605
Yes	312 (79.59)	23 (5.87)	
No			
Smoker	78 (19.61)	6 (1.53)	0.910
Yes	286 (72.96)	22 (5.61)	
No			
Monthly income (USD)	203 (51.79)	10 (2.55)	0.040**
<200	161 (41.07)	18 (4.59)	
≥200			
**=Statistically significant			

Table 4
Response of participants to statements on the curability of breast cancer

Statement	Response	Male (N=120)	Female (N=272)	P- value
Breast cancer can now be successfully treated without breast removal (mastectomy).	Yes*	77 (19.64)	180 (45.90)	0.927
	No	26 (6.63)	56 (14.29)	
	Don't Know	17 (4.34)	36 (9.18)	
By the time a cancerous breast lump is painful, it is too late to be successfully treated.	Yes	49 (12.50)	105 (26.79)	0.732
	No*	52 (13.27)	115 (29.34)	
	Don't know	19 (4.85)	52 (13.27)	
If all lymph glands around the breast and under the arm are not removed, breast cancer cannot be cured.	Yes	63 (16.07)	135 (34.44)	0.509
	No*	33 (8.42)	68 (17.35)	
	Don't know	24 (6.12)	69 (17.60)	
Breast cancer is sometimes treated successfully by removal of the lump (lumpectomy) and radiation therapy.	Yes*	90 (22.96)	227 (57.91)	0.122
	No	16 (4.08)	21 (5.36)	
	Don't know	14 (3.57)	24 (6.12)	
Breast cancer is less likely to be cured in women with a family history of breast cancer than in women with no family history of breast cancer.	Yes	73(18.62)	164 (41.84)	0.893
	No*	31 (7.91)	67 (17.09)	
	Don't know	16 (4.08)	41 (10.46)	
By the time a woman can feel a cancerous breast lump, it is too late to treat it effectively.	Yes	49 (12.50)	89 (22.70)	0.182
	No*	62 (15.82)	150 (38.27)	
	Don't know	9 (2.30)	33 (8.42)	

Statement	Response	Male	Female	P-value
		(N=120)	(N=272)	
Even if breast cancer is caught very early, the chances for cure are much better if the whole breast is removed.	Yes	77(19.64)	174 (44.39)	0.964
	No*	32 (8.16)	75 (19.13)	
	Don't know	11 (2.81)	23 (5.87)	
Even if detected and treated early, a woman with breast cancer is unlikely to live a normal life span.	Yes	50(12.76)	108(27.55)	0.288
	No*	47 (11.99)	126(32.14)	
	Don't know	23 (5.87)	38 (9.69)	

The most frequently mentioned breast symptoms among all participants were pain in the breast (82.9%), followed by changes in the breast shape (79.1%). The symptom most commonly perceived by the male to be associated with breast cancer was a pain in the breast (25.26%), followed by changes in the breast shape (24.49%). A similar pattern was reported among females, the most frequent symptom was a pain in the breast (57.65%) followed by changes in the breast shape (54.59%) [Figure 1].

Discussion

This study was conducted among Yemeni nurses to determine the knowledge about breast cancer during the conflict. The most frequently mentioned risk factors among the participants were breastfeeding reduces the risk of developing breast cancer (86.2%), followed by physical activities cut down the risk of developing breast cancer (79.1%). However, the least frequent risk factors were women with no obvious risk for breast cancer who rarely developed breast cancer (15.8%), followed by irritation due to a tight bra may cause breast cancer (18.6%), then women over age 70 rarely get breast cancer (28.6%). Through all available media (TV, Radio, Internet, Magazines and Newspapers), these myths need to be corrected for both men and women. In order to educate the public about breast cancer, education materials in hospitals, universities and secondary schools are essential.

For breast cancer prevention, breastfeeding is of particular interest because breastfeeding is considered a modifiable risk factor. Not only does breastfeeding cut down the risk of breast cancer, but mothers can also reduce the risk of endometrial and ovarian cancers and decrease the risk of chronic diseases such as hypertension and diabetes³¹. In addition, breastfeeding provides the infant with many benefits, including less happening of diarrhea, ear infections, lower respiratory infections and a reduced risk of sudden infant death, diabetes, childhood obesity and asthma³².

In this study, 86.2% of the participants reported that breastfeeding reduced the risk of breast cancer. For two reasons, breastfeeding in Yemen is still a dominant culture, it is cheap and it is difficult to buy baby milk formulas due to the economic status of the families. Yemen's Ministry of Public Health and Population reported that the average woman breastfed her child for approximately 22 months³³. The long duration of breastfeeding shown as a preventive against breast cancer, breastfeeding for one year decreased the risk of breast cancer by 4%³⁴. A study conducted in Karachi reported a higher percentage of participants who knew that breastfeeding reduced the risk of developing breast cancer (96.4%)³⁵.

In several studies, a lower percentage of participants who knew that breastfeeding reduced the risk of developing breast cancer was reported 75.3% by Dey et al.³⁶ 46.6% among higher secondary students from Nepal³⁷, 59.2% in school teachers³⁸, 6.8% in another Indian study³⁹. The explanation of this distinction may be that the study population consisted of nurses working in a hospital and they know more about breast cancer. This demonstrates the need for continuous education about the benefits of breastfeeding, as both the mother and baby benefit from this practice in more than one way.

Many researches reported the benefits of breastfeeding for public health in reducing cancer risk, the mechanisms behind this relationship are still not clear. However, due to the relationship between breastfeeding and adiposity, parity, ovulation, and other co-founders. Therefore, it is difficult to isolate the contribution of breastfeeding on reducing the risk of breast cancer⁴⁰⁻⁴¹. Furthermore, the age of women at her first experience of pregnancy and breastfeeding, as well as her lifetime parity and breastfeeding, may impact the differentiation as it relates to the risk of breast cancer⁴¹. In addition, breastfeeding and processes involved during the cessation of breastfeeding may decrease cancer risk by removing cells with initial DNA damage from the breast tissue⁴².

Our study showed that 79.1% of the participants knew that exercise is beneficial in reducing breast cancer risk. Lower percent reported by previous studies which reported that 59.4% correctly knew that physical activity decreases the risk of breast cancer³⁷. Another study showed that 53% of the participants were correctly responded that exercise reduces the chances of breast cancer⁴³. For physical exercise as a protective factor, most of the participants know this fact because they are nurses and they may read it and remember it from their nursing schools curriculum during their study and they may update their knowledge through available media.

Many studies have shown that exercise inhibits the proliferation of cancer cells. Moderate intensity training can inhibit the proliferation of cancer cells and induce apoptosis which emphasizes the protective benefits of exercise^{44&45}. Ki-67 antigen expression also increases with an increase in exercise⁴⁶. A study showed that moderate and high-intensity exercise inhibits the proliferation of cancer cells, and levels of exercise lower than the recommended intensity are protective for cardiovascular health⁴⁷.

In addition, immune aging is the reason why older suffer from cancer. Immune aging refers to the decrease of NK-cells, the increase in inflammation, the damage to monocytes and dendritic cells and presentation of antigens, the increase in functionally impaired aging cells, and the decrease in the number of immature T- cells that respond to evolving cancer cells. Exercise can to some extent prevent immune aging because it can stimulate the activity of immune NK-cells, enhance antigen presentation, reduce inflammation, and prevent the accumulation of aging cells⁴⁸.

Only 35.7% of our respondents mentioned that the risk of developing breast cancer by early menarche in a woman. Moreover, 63.3% of the participants know that women who have delayed menopause are at higher risk for breast cancer. A lower percentage was reported by previous studies^{39&43}. Menarche and menopause are markers of ovarian onset and cessation and reproductive-associated endocrine activity. The ovary produces steroid hormones during women's reproductive years that directly affect the development and function of the breast. It is known that the risk of females developing breast cancer is increased by early menarche and late menopause³⁰. Females also need to know about the non-modifiable risk factors of breast cancer like menarche. It can help them understand the perceived risk of this disease better.

There is a concern about the misconceptions about breast cancer in our study population, 18.6% of our participants knew that breast cancer is not caused by tight bra irritation. Khokhar⁴⁹ reported that 9.9% of the participants knew it is not true that wearing a tight bra could lead to irritation and then breast cancer. Around 17.7% of those reported by Bhandari et al.³⁷, believed that bra tightness could be a risk factor for breast cancer. A smaller proportion of Indian women (6.2%), however, thought this to be true^{35,37&39}. Another misconception is reported among 25.5% of our participants wrongly believed that a breast blow increased the risk of breast cancer for a lady later in life. Similar findings reported by previous studies and their results were 24.6%, 35.3% and 2.35% respectively^{35,37,39}. Several misconceptions concerning the risk factors of breast cancer have been reported in either developed and developing countries like Australia, the Philippines and Korea^{50&51}. There are certain myths and misconceptions about chest trauma and tight bra wearing. Thus, educate the women and the need of clarified misconceptions is urgently needed for further investigation and education.

About 15.8% correctly knew in our study that overweight raised the risk of breast cancer. In a previous study by Khokhar³⁹ among school teachers in India, 11.6% of participants correctly understood that obesity could be a high-risk factor for breast cancer, while a higher percentage of participants (30.7%) responds correctly in a study by Bhandari and others³⁷.

Inflammation is a common factor among many co-morbidity associated with obesity, including cancer, suggesting that inflammation associated with obesity may be a common factor in the pathophysiology of several health risks associated with obesity⁵²⁻⁵⁴. Obesity contributes to chronic low-grade inflammation that affects various body organs, including the white adipose tissue, intestines, liver, muscle, pancreas and nervous system⁵⁵⁻⁵⁷.

In addition, adipocytes are a major breast component, ranging from 7–56% of the total breast volume⁵⁸. It is reasoned that the adiposity or changes associated with obesity that occurs in obese adipose tissue influence the development and progression of breast cancer. Several studies have demonstrated that adipocytes play a significant role in breast cancer^{58–60}. In addition to its role as energy storage, adipose tissue acts as a secretory organ, producing metabolic substrates, growth factors, hormones, and cytokines⁶¹. Studies have shown that these adipocytes-secreted factors can promote the initiation, growth, and migration of breast cancer^{62&63}.

In our study, 47.8% of the participants correctly knew that bearing a child before 30 years of age is not a risk factor for breast cancer. Previous studies reported different percentages 59% and 33%; respectively^{37&43}. Due to change in lifestyle and westernization age, more and more number of women are now having a first child after 30 years of age. In addition, in our study, only 12.5% of the participants correctly answered that a lady could have breast cancer even without any known risk factor for breast cancer. Similar observation reported that 13.1% of their participants a lady could have breast cancer even without any known risk factor for breast cancer³⁷. When our participants asked if women over 40 years of age are at a greater risk of breast cancer, 60.2% responded correctly. While a lower percentage (49.3%) reported by Dey et al³⁶. Only 13.9% of our participants knew that breast cancer could be successfully treated by mastectomy. zaA higher percentage of participants (39.9%) reported by Bhandari, et al.³⁷. In our study, the figure may be lower as women associate multiple modalities with breast cancer treatment and not just one. Therefore, it is necessary to emphasize the fact that all the women understand that they are at risk of breast cancer and not only those with a family history of cancer.

The myth about the **constant irritation** of a tight bra can, over time, cause breast cancer reported by females more than male nursing students. Males were significantly better informed than females in this regard ($P=0.001$). However, females were aware more than males that **“a woman who bears her first child before the age of 30 is more likely to develop breast cancer than a woman who bears her first child after the age of 30”** ($P=0.017$).

Like in our study, **income** was reported to be significantly associated with the knowledge level in previous studies^{64&65}. Similar results were reported among the Hispanic women population⁶⁶. An increasing level of awareness was reported in economically developing countries⁶⁷. The National American study found a correlation between breast cancer awareness and income with low knowledge among the poorest⁶⁸.

The risk factor “The constant irritation of a tight bra can, over time, cause breast cancer.” Female nurses were significantly better than male nurses ($P=0.001$). The risk factor “A woman who bears her first child before the age of 30 is more likely to develop breast cancer than a woman who bears her first child after the age of 30.” Female nurses were significantly better than male nurses ($P=0.017$).

Similar to our study, a previous study among 368 students determine their knowledge, attitude and practice of breast self-examination (BSE) on a regular basis among female health science students. The findings showed only 8.7% of the participants had reasonable knowledge about breast cancer⁶⁹. In a

previous study, the results showed that 45% believed that it normally affected women older than 40 years of age, 53% knew about the signs and symptoms and 57% knew about a breast lump as a sign of breast cancer⁷⁰. The steady increase in breast cancer incidence is alarming and constructive steps should be taken through informative and interactive education and campaigns to raise awareness of breast cancer.

Our study shows that the participants were not well-informed about the risk factors for breast cancer, which may be due to the poor health and education systems in Yemen due to the situation of instability due to war and conflict. Since the outbreak of conflict in 2011, Yemen's learners, teachers, and education staff have shown resilience to ensure the continuation of education. The devastating humanitarian crisis has taken its toll. Schools have been damaged or destroyed, occupied by armed groups, or used by displaced people as shelters. Almost two million children are out of school, over four million need support to access education, and over 20% of all basic and secondary schools are closed. As a consequence, children and young people are not getting the education they need to thrive. About half of Yemen's health facilities are operational but suffer from a severe shortage of medicine, equipment and personnel¹¹.

This study found that nurses have a poor understanding of many risk factors, curability and symptoms of breast cancer. Therefore, there is a need for nurses to increase their knowledge. Ministry of Health should design awareness programs to raise awareness of breast cancer and its early detection measures for women, men, families and the general community.

Knowledge of breast cancer symptoms is important. In our study, the two most commonly recognized symptoms were breast pain (82.9%), changes in the shape of the breast (79.1%). Our results are consistent with a previous study carried out among Australian women, in which a significant portion of the participants reported these two symptoms⁷¹.

About 46.35% of the participants correctly know that changes in the shape of the breast as a sign of breast cancer, painless lump in the breast as a symptom of breast cancer was known to 24.5% and pulling in of the nipple inside (43.3%). Knowledge of nipple blood discharge (84.2%). Similar findings reported in an study that the shape and size of the breast as a sign of breast cancer was known to 25.9%, the nipple shape changed 29.4% and nipple discharge 23.2%³⁹. This is the most important part of the literacy of breast cancer that a person can detect the disease at the earliest and that can only happen if she is correctly aware of all the signs and symptoms.

The limitations of this study are that the knowledge of symptoms and risk factors depends on the participants' ability to recall the answer during the data collection. In addition, the study is cross-sectional, so any causal relationship between dependent and independent variables can not be obtained. The study was carried out in only one institute, there is a possibility of selection bias since this does not represent what happens in other institutions. We recommended exploring in-depth investigation using qualitative study methods to assess this area for a better understanding of the problem.

Conclusions

The myth about breast cancer is dominant among nurses in Yemen. For insistent the myth that the constant irritation due to the tight bra may cause breast cancer reported by women more than male nursing students. Females, however, were more significantly aware than males that women who bear their first child before 30 is more to develop breast cancer. Income is significantly associated with the level of knowledge among nurses.

Declarations

Ethics approval and consent to participate: This study has been approved by the Ethics Committee Board at the Al-Hikma University.

Consent for publication: Not applicable.

Availability of data and material: The datasets generated and/or analyzed during the current study are not publicly available due to the institutional ownership of data, but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: RA led the conceptualization and design, data analysis and write up, and reviewed the final draft. HA was majorly involved in the write up of the original draft, editing, and review of the final draft. All authors read and approved the final manuscript.

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Figures

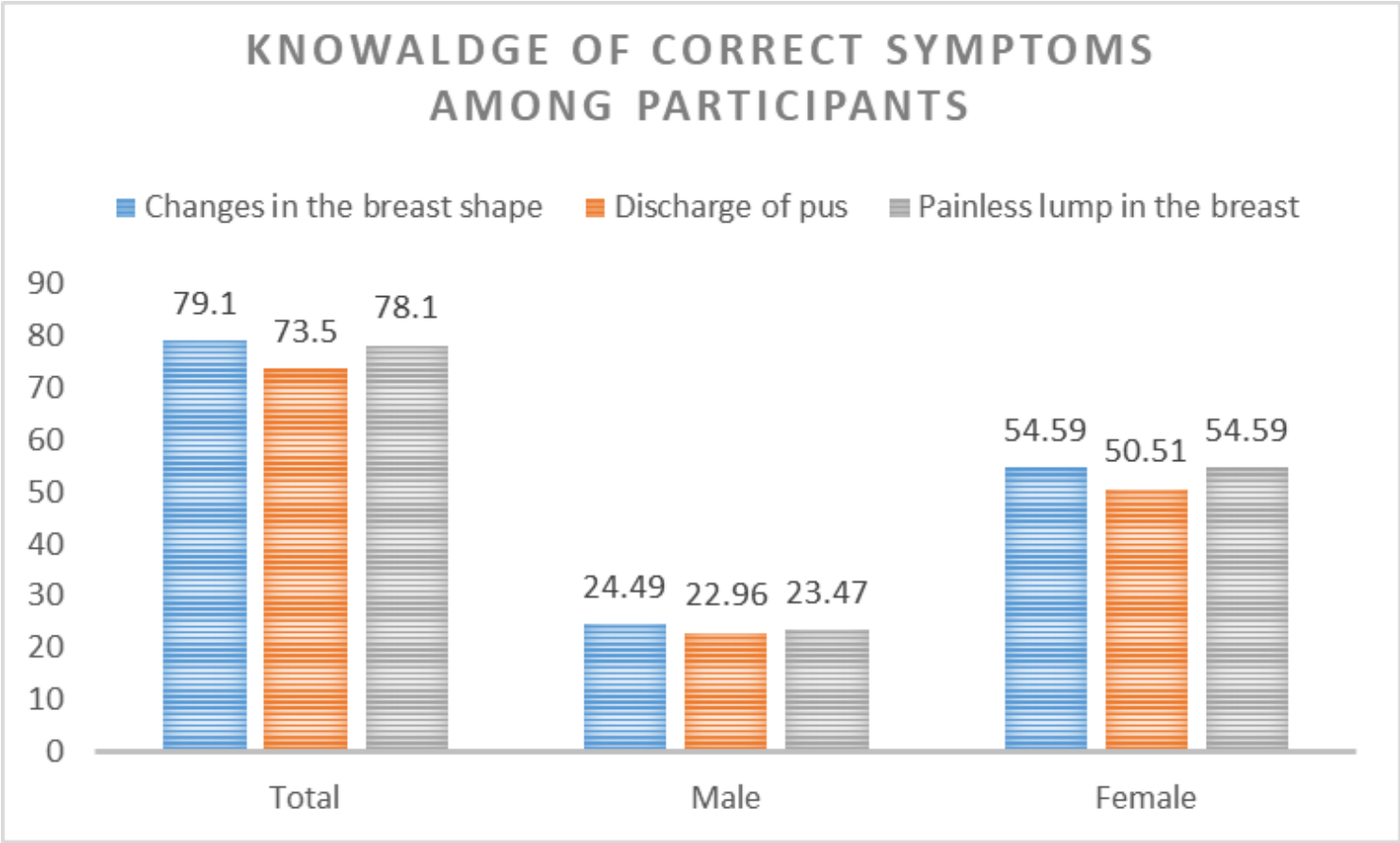


Figure 1

Knowledge of Breast cancer symptoms among the study participants