Effect of a Preventive Breast Cancer Guideline on Knowledge of Healthy Women with Family History

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Abstract: **Globally breast cancer is a leading cause of death among women. Cancer prevention strategies can provide appropriate and cost-effective opportunities to reduce cancer mortality in the next decades. Aim: Assess the effect of a preventive breast cancer guideline on knowledge of healthy women with family history. Study design: A quasi-experimental research design using pre-post one arm intervention study. Study Subjects: A purposive sample of fifty healthy women with family history of breast cancer attending the Oncology Center in Mansoura University Hospitals, Mansoura city, Dakahlia Governorate, Egypt. Tools of data collection: Three tools were used for data collection. The first was a Structured Interview Questionnaire to assess the woman's general characteristics, reproductive history and risk factors; the second was Knowledge Questionnaire regarding breast cancer; the third was Follow-up Card to check the participants' attendance at the follow-up visit. Results: The study findings revealed statistically significant improvement in the healthy women's knowledge regarding breast cancer prevention after utilization of the preventive guideline than before. Conclusion: The study hypothesis was accepted which indicated that the preventive cancer guideline was an effective tool to improve the healthy women's knowledge regarding breast cancer. Recommendation: Raising women's awareness regarding prevention of breast cancer by health-care providers.**

Keywords: **Breast cancer, Guideline, Knowledge, Prevention.**

1. INTRODUCTION

Worldwide, breast cancer is the second most common cancer and the most commonly occurring cancer in women. In Egypt, there were over 2.09 million new cases in 2018 *(Globocan, 2018).* Globally, there is an annual increases of 3.1% incidence, beginning with 641,000 cases in 1980 and increasing to more than 1.6 million in 2010 *(Bray et al., 2015).* In 2019, 268,600 invasive breast cancer new cases were diagnosed *(Breast Cancer Facts &Figures, 2019).* According to the American Cancer Society, approximately 41,760 women died from breast cancer *(American Cancer Society, 2019).* Previously, a small-scale, hospital-based study from Alexandria, Egypt had suggested an increase in incidence rate of breast cancer *(Gewaifel et al., 2019).* Breast cancer represents 18.9% of total cancer cases (32.04% in Egyptian women and 2.2% in Egyptian men). During cancer early treatable stage, breast cancer has a 97% probability of surviving 5 years *(Ibrahim et al., 2014).* However, woman's likelihood of surviving decreases to 20% once it spreads to other body parts *(Longley et al., 2015).*

Breast cancer (BC) is a group of diseases in which abnormal cells are mutated in the breast tissue and become uncontrolled, typically resulting in a lump or mass. Most breast cancers begin in the lobules or in the ducts that connect the lobules to the

nipple *(Breast Cancer Facts &Figures, 2019).* In General, breast cancer is often a symptomatic disease. If symptoms reported, the first noticeable symptom of breast cancer is seeing or feeling a lump that looks different from the rest of the breast tissue *(Rinker et al., 2017).* Changing in breast position, shape, or counter, abnormal nipple discharge and swelling under the axilla are also indicators for breast cancer *(Bentley, 2001).*

Cancer usually develops in elderly and women with family history. In addition, certain behaviors may increase the risk of breast cancer such as smoking, alcohol consumption, and increase body mass index. Furthermore, exposures to environmental risk factors among family members such as exposure to radiation or contact with chemicals substances may also increase the risk for breast cancer *(American Cancer Society, 2019).*

According to preventive American Cancer Society (ACS) guideline recommendations, maintenance of moderate intensity physical activity per week, decrease alcohol intake, decrease smoking and maintaining a body mass index (BMI) of 25 kg/m2 are preventive measures for breast cancer *(Kushi et al., 2012).* Adherence to these guidelines, it is reported that overall mortality in average-risk populations was lowered, but it is not known if mortality reduction extends to healthy women with family history of breast cancer or not *(Rock et al., 2020).* Meeting the ACS guideline recommendations was reported to be associated with reductions in cancer incidence in low-income and African American populations *(Warren Andersen et al., 2016).*

Increasing the incidence of breast cancer in our Arabic rejoin, make an urgent need for developing a preventive breast cancer guideline for cancer prevention and health promotion of healthy women with family history. Our preventive guideline consistent with our Arabic society lifestyle to reduce spread of breast cancer. To the best of our knowledge, this is the first study that assessed the effect of an Arabic preventive breast cancer guideline on knowledge of healthy women with family history. Our preventive breast cancer guideline was developed after reviewing the international preventive guideline *(WHO, 2017; American Cancer Society, 2019; Breast Cancer Facts &Figures, 2019; Rock et al., 2020).* The preventive guideline consisted of introduction about breast cancer, breast cancer symptoms, risk factors related to the woman, risk factors related to lifestyle and ways of breast cancer prevention.

1.1 Significance of the study

Many studies had reported that adherence to health prevention guidelines for diet, physical activity, maintenance of healthy body weight and avoidance of environmental risks may decrease breast cancer incidence and mortality *(Kohler et al., 2016).* There is a body of evidence that women who adhere to health prevention guidelines related to breast cancer had better health outcomes including reduced the risk of chronic disease, including diabetes, myocardial infarction, stroke, and cancer as well as reduced mortality *(Jones et al., 2016).*

Nationally breast cancer guidelines, were concerned with management of breast cancer or management of side effects of chemotherapy but there are limited guidelines concerned with breast cancer prevention. Therefore, we developed our breast cancer prevention guideline.

Prevention is better than cure. In Egypt, the cost of cancer treatment is exhausting for patients and for countries and depilating the health care system. Prevention of breast cancer among those women is crucial and adding such service among the prevention program in Mansoura University Hospital at Oncology Center will add to the quality of care provided and to the quality of women's life. Therefore, it is important to apply guideline to healthy women with a family history of breast cancer to prevent or limit breast cancer.

1.2 Aim of the study

The aim of the present study was to assess the effect of a preventive breast cancer guideline on knowledge of healthy women with family history.

1.3 Research Hypothesis

There is a significant improvement in the knowledge of healthy women with family history of breast cancer after implementing a breast cancer preventive guideline.

2. METHODOLOGY

2.1 Study design

The present study followed a quasi-experimental research design using pre and post one arm intervention study.

2.2 Study setting

This study conducted at clinics of the Oncology Center at Mansoura University Hospitals, Mansoura city, Dakahlia Governorate, Egypt. The Oncology Clinics consists of two floors; the first floor consists of six surgery clinics and the second floor consists of six medical clinics. Surgery clinics are working every day and so are the medical clinics except on Saturday and Tuesday. The waiting area is very wide, clean, and good ventilated. It consists of big resting rooms for patients with many seats for the patient relatives.

2.3 Sample size

A purposive sample of 56 healthy women with family history of breast cancer, after first phase of training program, 6 patients out of 56 refused to complete (The attrition rate was 10.7%). The sample size included 50 women attending the Oncology Center as a close relative with breast cancer patient were enrolled in the present study after fulfilling the following inclusion criteria; Their age were 18 years old or more, free of breast cancer, had first-degree relative with breast cancer patient.

2.4 Sample size calculation

A previous study showed that educational intervention had improved the knowledge of the women from 83% at baseline to 99% after treatment. The used formula was $n = [2(Z_{\alpha/2} + Z_{\beta})^2 \times p (1-p)]/(p1 - p2)^2$ where, n = sample size required in each group, p = pooled proportion (proportion of event in group 1 + proportion of event in group 2)/2, p1-p2 = difference in proportion of events in two groups, $Z_{\alpha/2}$: This depends on level of significance = for 5%;this is 1.96, Z_{β}. Based on the above formula the sample size required was estimated 56 participants.

2.5 Data collection tools

Three tools for data collection were utilized.

Tool I: A structured interview questionnaire (**Appendix I**), the researchers developed it after reviewing the related national and international literature *(Al Qadire & Alkhalaileh, 2018; Fondjo et al., 2018).* It consisted of three parts; **Part one** concerning socio-demographic data; **Part two** entailing menstrual and past obstetric history; **Part three** assessing participants' risk factors for breast cancer and also, participant's related risk factors.

Tool II: Knowledge questionnaire regarding breast cancer (**Appendix II**) that was adapted from *(Lodha et al., 2011; Taha et al., 2019)* and translated into Arabic language by researchers to assess participants' knowledge regarding breast cancer, it consists of 29 items and 4 parts. First part related to participant's general knowledge regarding breast cancer. It consists of six items; Second part concerning participants' knowledge regarding risk factors for breast cancer**,** it consists of six items; Third part: entailing participants' knowledge regarding prevention and early detection of BC, it consists of ten items; Fourth Part: assessing participants' knowledge regarding breast self -examination, it consists of seven items.

Tool III: Follow-up Card: This card included the schedule of appointments for chemotherapy during the study period. In this card the researcher checked the participant's attendance with patient for further evaluation of the knowledge questionnaire.

2.6 Scoring system

Total scores of knowledge obtained and a cut of points estimated related to the median score.

a) Knowledge score: Scores estimated to evaluate the participants' knowledge regarding breast cancer; Knowledge questionnaire consisted of 29 items. Each item was assessed on three-point likert scale, ranging from 0 to 1, score 0 for the incorrect answer and score 2 for the correct answer. Total score of participants' knowledge regarding BC were 58. It classified into sufficient level of knowledge if the total scores was more than 60% and insufficient level of knowledge if the total scores was less than 60%.

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2.7 Tools Validity:

After reviewing the national and international literature, the tools were tasted for the content validity and reliability. Tools validity was reviewed by a panel of 3 experts in Maternity Nursing and 2 experts in Gynecological Medicine before introducing it to the participant women. Some modifications were done such as categorizing items related to knowledge and paraphrasing of some sentences.

2.8 Reliability of the tool

Cranach's alpha test for reliability and internal consistency were (0.830) for knowledge questionnaire regarding breast cancer, hence the questionnaire showed high reliability.

2.9 Pilot study

A Pilot study was done on 10 %(5 healthy women) of the study sample. The pilot was done to assess the tools relevance, clarity, and content validity. The pilot sample was excluded from the analyzed study sample. According to the analysis of the pilot study, the time required for each woman to illustrate the preventive guideline was 20 minutes individually and 45 minutes for a group of women for each session.

2.10 Method

After obtaining the ethical permission letter from Faculty of Nursing ethical committee, Mansoura University to conduct the study, an official letter from Faculty of Nursing directed to the director of the Oncology Center, Mansoura University Hospitals to obtain official permission to conduct the study after explaining its aim**.**

2.11 Field work

The actual fieldwork of the study conducted for 9 months period started on March 2019 until November 2019. The data were collected through four phases:

1) The first phase (Baseline assessment)

• The researchers introduced their selves and communicated with every woman who came with a breast cancer patient receiving chemotherapy to recruit the sample that fulfill the inclusion criteria at outpatient clinics three days per week (Sunday, Monday and Wednesday) which are the days of medical oncology clinics reception. During the waiting period until the participants' breast cancer patient receive the chemotherapy, the researchers explained the aim of the study and obtained the informed consent from every participant to carry out the research after clarification that the study is for improving the participants' knowledge regarding prevention of breast cancer.

• The researchers invited the participants individually or in small groups from (2-5) participant to fill in the questionnaires (pre-test baseline assessment) which included the interview and knowledge questionnaires. Then the researchers provided the first session of the preventive guideline after offering the preventive guideline booklet to each participant. The researchers' contact number was given to the participants and participants' phone number was taken to remind them of date, and place of next session, and time for collecting post intervention and follow-up data. The participants also had the permission to contact with the researcher at any time.

Description of the guideline

The guideline is a learning package that covers the following items (meaning of breast cancer, breast cancer risk factors, signs and symptoms of breast cancer, benefits of early detection, breast self-examination (BSE) training, diagnosis of breast cancer, an overview about clinical breast examination (CBE) and mammography, prevention of breast cancer. It was written in a simple Arabic Language and included colored pictures to grasp the participant's attention.

2) The second phase (implementing phase and follow up - second month)

The researchers explained the guideline to each participant individually or in small groups from (2-5) women.

3) The third phase (implementing phase and follow up - third month)

The researchers continuing giving information about breast cancer prevention, breast self-examination (BSE) training, how breast cancer is diagnosed, clinical breast examination (CBE) and mammography, prevention of breast cancer by life style modification and most important foods help to prevention of breast cancer.

4) The fourth phase (evaluation phase and follow up - fourth month)

Participants were followed by a follow-up card about four months after recruitment, once every month according to the time they attended to the clinic with their relative patient to complete explanation of the guideline. After four months, the researchers re-evaluated the participants' knowledge.

Ethical considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing – Mansoura University. An official permission to conduct the study was obtained from the responsible administration of the hospitals. Informal consents were obtained from participants after explaining the purpose of the study with clarifying that each woman has the right to withdraw from the study at any time. Privacy and confidentiality of the collected data were assured.

Statistical analysis

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD) Categorical data were expressed in number and percentage. Chi-square test was used for comparison of variables with categorical data. Statistical significance was set at $p<0.05$. For all previosly mentioned statistical tests used, significance is fixed at 5% level (p-value). The results was considered: When p-value ≤ 0.05 a significant level value was measured and a highly significant level value was indicated when p-value ≤ 0.001, but p-value > 0.05 shows non-significant results. The smaller the p-value found, the more significant are the results.

3. RESULTS

Table (1): Demographic data of the studied women (n=50)

Demographic data	No.	%
Age (years)		
≤ 20	8	16.0
> 20 – 30	15	30.0
> 30 – 40	14	28.0
> 40 – 50	8	16.0
> 50	5	10.0
Range	17 – 67	
Mean ±SD	34.6 ±11.9	
Residence		
Urban	30	60.0
Rural	20	40.0
Marital status		
Married	38	76.0
Single	12	24.0
Educational level		
Read and write	8	16.0
Basic education	2	4.0
Secondary education	24	48.0
University education	16	32.0
Occupational status		
Not working	42	84.0
Administrative Sector	5	10.0
Health Sector	3	6.0
Family income		
Not enough	4	8.0
Enough	40	80.0
Enough and can save	6	12.0

Table (1) reveals that slightly less than one-third (30%) of the studied women aged between twenty- first to thirty years, there-fifths (60%) of them were living in urban areas and slightly more than three-quarters (76%) of them were married. Almost half (48%) of the studied women had secondary education and more than four-fifths (84%) of them were housewives. Additionally, four-fifths (80%) of them had enough family income.

Table (2): Risk factors of breast cancer among the studied women (n=50)

Risk Factors related to the woman	No.	%
1- Age of Menarche		
≤12	8	16.0
> 12	42	84.0
2- Status of menstruation		
Regular	40	80.0
Irregular	10	20.0
3- Start menopause		
No	41	82.0
Yes	9	18.0
4- Age of menopause		
None	41	80.0
< 45 years	1	4.0
45 to 50 years	6	12.0
>50 years	2	4.0
5- Age of marriage (years) (n=38)		
≤ 25	21	55.3
> 25	17	44.7
6- Use of hormonal contraceptives		
No	29	58.0
Yes	21	42.0
7- Duration of use hormonal contraceptives (n=21)		
12 months or less	2	9.5
13 – 24 months	4	19.0
25 – 60 months	6	28.6
More than 60 months	9	42.9
8- Age at first pregnancy (year) (n=35)		
≤ 25	13	37.1
> 25	22	62.9
9- History of Breastfeeding (n=35)		
No	6	17.1
Yes	29	82.9
10- Number of breastfeeding /day (n=35)		
None	5	14.3
Once	4	11.4
Twice	9	25.7
Three or more	17	48.6
11- Duration of breastfeeding (month) for each time (n=30)		
≤ 12	27	90.0

> 12	3	10.0
12- History of abscess or benign breast tumor		
No	45	90.0
Yes	5	10.0
13- Previous exposure to radiation or chemical substances		
No	36	72.0
Yes	14	28.0
14- Presence of chronic diseases		
No	43	86.0
Hypertension	4	8.0
Diabetes mellitus	1	2.0
Kidney disease	2	4.0
family-Related Risk Factors	**No.**	**%**
1- Degree of proximity with the women		
Sister	15	30.0
Mother	28	56.0
Daughter	3	6.0
Aunt (mother sister)	2	4.0
Aunt (father sister)	2	4.0
2- Duration of cancer of the patient		
12 months or less	29	58.0
13 -24 months	10	20.0
25 -36 months	4	8.0
37 - 48 months	2	4.0
More than 48 months	5	10.0
3- Family History of any other type of cancer		
None	38	76.0
Uterine cancer	5	10.0
Benign breast tumors	7	14.0

Table (2) illustrates that the studied women were at risk for breast cancer at certain items.

Regarding risk factors related to the women

Part one: reveals that more than two fifths (42.9%) of the studied women used hormonal contraceptives more than sixty months, more than three-fifth (62.9%) of the studied women had their first pregnancy after the twenty fifth years. Majority (90%) of the studied women breastfed their babies less than twelve months.

Regarding family related risk factors

Part two: Shows that more than half (56% & 58% respectively) of women, their mother had breast cancer and duration of cancer was twelve months or less, more than four-fifths (84% & 82% respectively) of them had menarche at the age more than twelve years, her period didn't stopped yet. Additionally, more than half (55.3%) of the studied women married at the age more than 25 years.
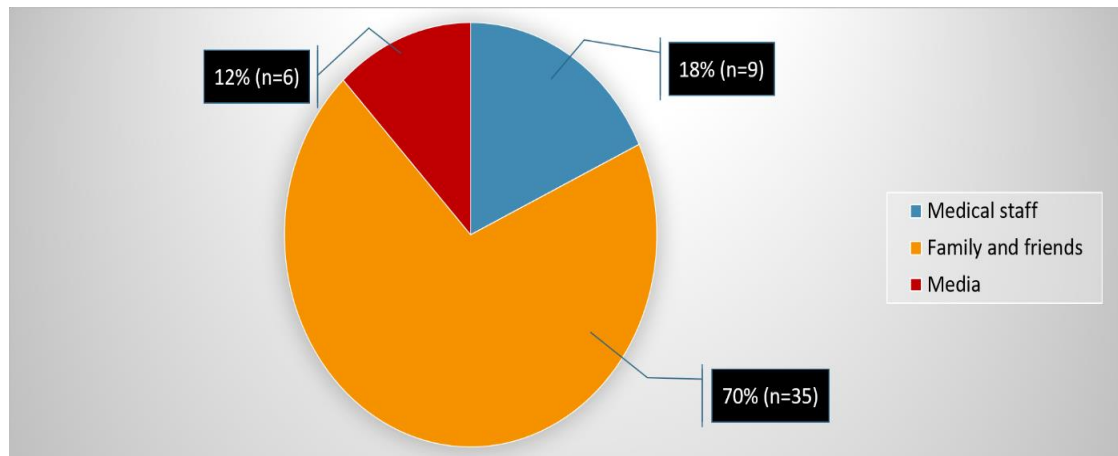
Figure (1): Source of the patient knowledge regarding breast cancer

Table (3): Comparison of general knowledge of breast cancer pre- and post-intervention among the studied women (n=50)

General knowledge regarding BC	Correct Knowledge				Chi square test	
	Pre intervention		Post intervention			
	No.	%	No.	%	X^2	P
1. Meaning of breast cancer	22	44.0	38	76.0	10.667	<0.001**
2. Breast cancer is the most common cancer affecting women	17	34.0	41	82.0	23.645	<0.001**
3. All breast lumps are cancer	12	24.0	38	76.0	27.040	<0.001**
4. Breast cancer cure rate depends on its stage at detection	18	36.0	46	92.0	34.028	<0.001**
5. Breast cancer is always associated with severe pain	20	40.0	34	68.0	7.890	0.005*
6. Having breast cancer means mastectomy	16	32.0	35	70.0	14.446	<0.001**

*<0.05 Statistical significant differences

**<0.001 highly statistical significant differences

Table (3) Demonstrates that, majority (92%) of the studied women had correct knowledge regarding breast cancer cure rate depending on its stage at detection post intervention compared to (36%) pre-intervention. Also, more than four-fifths (82%) of the studied women had correct answer regarding the breast cancer is the most common cancer affecting women post-intervention compared to (34%) pre-intervention. Moreover, more than three quarters (76%) had correct knowledge regarding meaning and symptoms of breast cancer pre-intervention compared to (44% & 24% respectively) post-intervention with highly statistically significant differences P <0.001.

Table (4): Comparison of correct knowledge regarding breast cancer risk factors pre- and post-intervention among the studied women (n=50)

Items of risk factors of BC	Correct Knowledge				Chi square test	
	Pre-intervention		Post-intervention			
	No.	%	No.	%	X^2	P
1. First degree relative with breast cancer, at higher risk of developing breast cancer	28	56.0	47	94.0	19.253	<0.001**
2. Bearing first child after the age of 30 years is more likely to develop breast cancer	18	36.0	31	62.0	6.763	0.009*

3.	The irritation of a tight bra can over time cause breast cancer	17	34.0	31	62.0	7.853	0.005*
4.	Breast cancer increases with older age.	20	40.0	43	86.0	22.694	<0.001**
5.	Breast trauma may cause breast cancer later in life	25	50.0	38	76.0	7.250	0.007*
6.	Breast cancer is a communicable disease	18	36.0	45	90.0	31.274	<0.001**

*<0.05 Statistical significant differences

**<0.001 Highly statistical significant differences

Table (4) illustrates that, the studied women knowledge regarding breast cancer risk factors improved significantly after the educational intervention than before. Majority (94%) of the studied women had correct knowledge regarding family history of BC is a risk factor of developing breast cancer post-intervention compared to 56% pre-intervention. Also, majority (90%) of the studied women had correct knowledge regarding breast cancer is non-communicable disease post-intervention compared to 36% pre-intervention. Moreover most (86%) of them had correct knowledge that breast cancer increases with older age post-intervention compared to (40%) pre-intervention with highly statistically significant differences p <0.001.

Table (5): Comparison of correct knowledge regarding prevention and early detection of BC pre- and post-intervention among the studied women (n=50)

Items of prevention and early detection of BC	Correct Knowledge				Chi square test	
	Pre intervention		Post intervention			
	No.	%	No.	%	X^2	P
1. Performing BSE from the age of twenty.	15	30.0	43	86.0	32.184	<0.001**
2. Avoiding utilization of hormonal contraceptives.	12	24.0	38	76.0	27.040	<0.001**
3. Breast feeding more than one year for all lactating women.	20	40.0	43	86.0	22.694	<0.001**
4. Eating fruits and vegetables.	18	36.0	46	92.0	34.028	<0.001**
5. Avoiding fatty diet.	22	44.0	38	76.0	10.667	<0.001**
6. Seeking medical advice when feeling any abnormal changes in breasts.	24	48.0	46	92.0	23.048	<0.001**
7. Seeking medical help when noticing any abnormal nipple secretion.	20	40.0	34	68.0	7.890	0.005*
8. Between forty and fifty, mammogram should be done once every two years even if the previous mammogram results were normal	13	26.0	33	66.0	16.103	<0.001**
9. Imaging mammogram once every year after fifty years.	23	46.0	33	66.0	4.058	0.044*
10. Avoiding overweight and obesity.	16	32.0	35	70.0	14.446	<0.001**

*<0.05 Statistically significant differences

 **<0.001 Highly statistical significant differences

Table (5) Demonstrates that, majority (92%) of the studied women had correct knowledge regarding seeking medical advice when feeling abnormal changes in her breast and eating fruits and vegetables post-intervention compared to (48% & 36% respectively) pre-intervention. Moreover, most (86%) of the studied women had correct knowledge regarding the right age of starting BSE and that lactating women should breastfeed their babies more than one year post-intervention compared to (30% & 40% respectively) pre-intervention with highly statistically significant differences P <0.001.

Table (6): Comparison of correct knowledge regarding breast self-examination pre- and post-intervention among the studied women (n=50)

Knowledge regarding BSE	Correct Knowledge				Chi square test	
	Pre intervention		post intervention		X^2	P
	No.	%	No.	%		
1.　BSE is done by the women's own hand	30	60.0	49	98.0	21.760	<0.001**
2.　BSE is a practice to detect BC early	25	50.0	50	100.0	33.333	<0.001**
3.　Areas to examine when performing BSE are breast, underarm and between breasts.	23	46.0	47	94.0	27.429	<0.001**
4.　BSE must perform monthly	25	50.0	35	70.0	4.167	0.041*
5.　The right time to perform BSE immediately after menstruation.	24	48.0	43	86.0	16.327	<0.001**
6.　There are three postures for BSE	27	54.0	37	74.0	4.340	0.037*
7.　Mirror is required for BSE	14	28.0	33	66.0	14.492	<0.001**

*<0.05 Statistical significant differences

**<0.001 Highly statistical significant differences

Table (6) presents that all (100%) of the studied women had correct knowledge regarding meaning of breast self-examination post-intervention compared to (50%) pre-intervention, also majority (98% & 94% respectively) of the studied women reported that it is done by the women own hand, and knew the examined areas when performing BSE post-intervention compared to (60% & 46%) pre-intervention. Most (86%) of them had correct knowledge regarding knowing the right time to perform BSE post-intervention compared to 48% pre-intervention with highly statistically significant differences p <0.001.
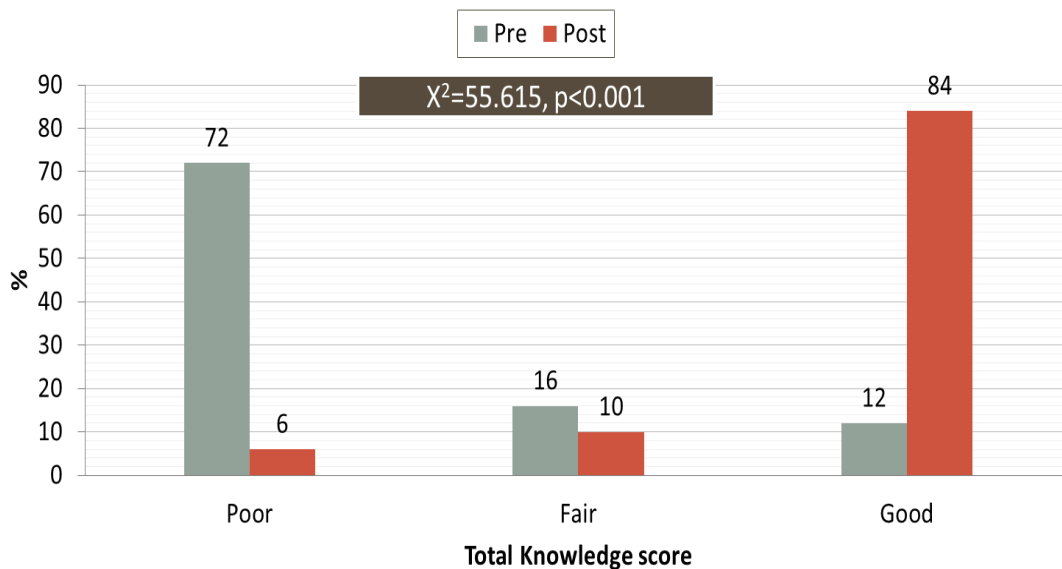

Figure 2: Women's total knowledge regarding breast cancer pre- and post-intervention

4.　DISCUSSION

This study aimed to assess the effect of breast cancer guideline on knowledge of healthy women with family history. The study aim was supported by the study findings. There was a highly statistically significant improvement in the participants' knowledge regarding breast cancer post implementing of the breast cancer guideline than before.

The present study revealed that, majority of participants had better knowledge regarding prevention of breast cancer after implementation of the breast cancer guideline than before with highly statistically significant differences P ≤0.001. Accordingly, the study hypothesis was confirmed.

Regarding the source of Information about breast cancer, the present study finding revealed that more than two-thirds of the studied women their source of information were family and friends and less than one-fifth of them their source of information was the medical staff. The present study finding was in agreement with two studies; the first study was conducted in Karachi, Pakistan by **Ahmed et al., (2018)** to assess breast self-examination awareness and practices in young women in developing countries, the second study; conducted in Jordan by **Suleiman (2014)** to assess awareness and attitudes regarding breast cancer and breast self-examination among Jordanian female students. They reported that, family and friends were the main source of their knowledge regarding prevention of breast cancer.

This study finding was in disagreement with the study conducted in Karachi, Pakistan by **Rasool et al., (2019)** to assess knowledge, attitude, and practice towards breast cancer and breast self-examination among female undergraduate students. They reported that the social media has played the most important role in spreading information. This disagreement may be attributed to their age and they spend more time in social media.

Concerning general knowledge of breast cancer, the present study finding revealed that there was highly statistically significant improvement in the women's general knowledge post implementation of the breast cancer guideline than before. This study finding was in agreement with the result of a study conducted in Kenya by *Kisuya et al. (2015)* who assess the impact of an educational intervention on women's general knowledge regarding breast cancer. They founded that there was significant improvement in women's general knowledge after implementation of the educational intervention than before.

Regarding the women's knowledge about breast cancer risk factors, the present study revealed that there was a highly statistically significant improvement in the women's knowledge regarding risk factors post implementation of the breast cancer guideline. The present study finding was in agreement with two studies; The first study was conducted in Colombia by *Masso-Calderón et al. (2018)* to assess effects of an educational intervention on breast cancer prevention-related knowledge and healthy lifestyles in scholars from a low-income area. The second study conducted in Egypt by *Abd El Aziz et al. (2009)* to assess the impact of a health education intervention program about breast cancer among Egyptian women, they reported that, breast cancer risk factors knowledge was particularly high post intervention.

As regard to prevention and early detection of BC, the present study found that majority of the studied women had correct knowledge regarding most of items of prevention and early detection. Such findings are supported by an experimental study conducted in Jazan area by *Alameer et al. (2018)* to assess the effect of health education on female knowledge regarding early breast cancer detection and prevention. They found that health education has proven to be effective in improving the participants' knowledge regarding breast cancer prevention and early detection.

Regarding knowledge of breast self-examination, the present study revealed that, majority of the studied women had unsatisfactory knowledge before implementation of the preventive guideline. This may be attributed to lack of health educational programs directed to increase the women awareness of BSE. The present study finding was in agreement with a descriptive study conducted in a rural area of India by *Kumarasamy et al. (2017)* they found that majority of their participants were not aware of BSE.

Conversely, another Indian study conducted by *Kalliguddi et al. (2019)* who assess Knowledge, attitude, and practice regarding breast self-examination. They found that majority of their participants had satisfactory knowledge regarding BSE. This disagreement may be attributed to their source of knowledge gained through the internet or print, and film media.

In addition, the present study revealed that there were highly statistically significant differences regarding BSE pre and post implementation of the preventive guideline. This study finding was supported by the study conducted in a district of Istanbul by *Gur et al. (2014)* to study breast cancer risks and effectiveness of BSE training among women in this district. They founded the training program is an effective on BSE performance. Moreover, the present study finding in the same line with the study conducted in Egypt by *Seif and Aziz (2000)* to assess effect of breast self-examination training program on knowledge, attitude and practice of a group of working women. They founded the majority of the sample had satisfactory information about BC & BSE after the program.

Concerning women's total knowledge for breast cancer, the present study revealed that more than two-thirds of the studied women had poor knowledge regarding BC before implementing of the BC guideline. This study finding can be attributed to nearly half of the studied women had secondary education, majority of them were housewives and majority of them their source of information was the family not by the health care provided. The present study finding was in agreement with a descriptive study conducted in Kampala, Uganda by *Godfrey et al. (2016)* to assess breast cancer knowledge among female university students. They founded that less than one-quarter of the participants had good knowledge about breast cancer total knowledge pre-intervention.

The present study demonstrated that, there was highly statistically significant improvement in the total knowledge regarding breast cancer after implementation of the preventive breast cancer guideline. This study finding may be attributed to the simple attractive way of illustrating the element of the preventive guideline and the well-prepared booklet with a colored illustrated photo. This study finding was in the same line with an experimental study conducted by *Yilmaz et al. (2017)* to investigate the effects of training on women's knowledge and beliefs about breast cancer. The researchers reported that the majority of the women had better knowledge regarding BC post the training program than before.

Also, the present study finding was in agreement with *Kaushalendra (2018)* to assess of the Knowledge of breast cancer and breast self- Examination. They founded that there was highly significant improvement after intervention.

Thus, the aim of the present study was achieved through the present study findings which revealed that majority of high risk breast cancer women who included in preventive intervention sessions had better knowledge of BC after the breast cancer guideline than before.

5. CONCLUSION

The study hypothesis was accepted which indicated that the preventive cancer guideline was an effective tool to improve the healthy women's knowledge regarding breast cancer.

6. RECOMMENDATION

Raising women's awareness regarding prevention of breast cancer by the health care providers.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest statement.

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