Effect of The Health Belief Model-Based Education on Preventive Behaviors of Breast Cancer

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ABSTRACT

***Context*:** Breast cancer is the main type of cancer affecting women and the fourth most common cancer mortality cause. Approximately one out of eight women worldwide develop breast cancer. Screening prevention plays a vital role in the early detection of breast cancer and reducing mortality rates.
Aim: The study aimed to evaluate the effect of the health belief model-based education on breast cancer preventive behaviors.
Methods: Quasi-experimental (pre/post-test) design was used in this study. The study was conducted at the obstetrics outpatient clinic affiliated to Benha University Hospital, Egypt, on a purposive sample of 100 women. A self-administered questionnaire, Champion's Health Belief Model Constructs Scale (CHBMS), and an observation checklist for Breast Self-Examination (BSE) were used to collect the data.
Results: The study showed that 62% of the studied women's mean age was 35.90±6.45, 53 % of them had secondary education, 93% of them didn't do regular breast self-examination, and 96% of them did not have a mammogram ever. Besides, there were improvements in the studied women' knowledge scores regarding breast cancer post-model implementation ($P < 0.001$). There was a highly statistically significant difference in total practice scores of preventive behaviors pre and post model implementation (p-value <0.001). Also, there was a positive statistically significant correlation between the studied women's total knowledge (pre and post model implementation), practices (post model implementation), and their total health belief.
Conclusions: This study concluded the positive effects of the health belief model-based education on women's knowledge and preventive breast cancer behaviors regarding breast self-examination. The study recommended developing a regular periodic educational program for women to enhance their knowledge and practices toward the prevention of breast cancer. Regular periodic screening of the high-risk women for early detection of breast cancer.

Keywords: Breast Cancer, Health Belief Model, preventive behaviors

1. Introduction

Breast cancer is the most common form of cancer diagnosed among women both in developed and developing countries, and it is the second cause of death in the world. Its annual incidence is rising globally each year, more than one million new cases of breast cancer have been diagnosed in the world, and for this reason, more than six hundred thousand cases of death occur (*Ahmed et al., 2016*).

Approximately one out of eight women worldwide develop breast cancer, accounting for 12% of new cancer cases and 25% of all cancers in women as of 2012. Annually, about 1.7 million women worldwide are diagnosed with breast cancer. As such, breast cancer is responsible for the most frequent malignancy-causing deaths and cancer-related morbidity and mortality in women, and epidemiological profile mirrored in almost every country. However, in developing countries, where health literacy, access to care, and resources are all scarce, these rates become particularly alarming and contribute to significant health disparities between the developed and developing world, especially in that most women in developing nations who develop breast cancer seek health care only when the cancer is at an advanced stage *(Doumit et al., 2017*).

Breast cancer is a multifactorial disease in which genetic and environmental factors predispose to its occurrence. Established risk factors for breast cancer include reproductive factors as early menarche, null parity, age at first pregnancy over 30 years, late menopause, and use of high-dose hormonal contraceptives, hormone replacement therapy, high breast tissue density, increasing age, and family history of cancer, especially breast cancer. Other factors that modulate breast cancer risk include nutritional factors, physical activity, history and duration of breastfeeding, obesity in post menopause, smoking, alcohol consumption, exposure to ionizing radiation, and socioeconomic level *(Prolla et al., 2015).*

Screening prevention plays a vital role in the early detection of breast cancer and reducing mortality rates. The recommended screening approaches for early breast cancer diagnosis are mammography, clinical breast examination,

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and breast self-examination. Annual mammography screening is the best method to discover tumors before signs and symptoms appear and prompt effective treatment (*Rezaeian et al., 2014*).

Health beliefs play a considerable role in women` tendency toward participating in health promotion related behaviors. One of the well-studying educational models in health education is the health belief model, and it is widely used in the context of research studies involved in predicting health behaviors and spotting the preventive behaviors to detect breast cancer early. The health belief model has six domains concerned with behaviors. It includes perceived severity, perceived susceptibility, perceived benefits and barriers, cues to action, and self-efficacy (*Moballeghi et al., 2014*).

The Health Belief Model (HBM) has been used as a theoretical framework in many studies related to breast cancer screening and evaluations of breast-cancer screening behavior, such as breast self-examination or mammography screening. Perceived susceptibility should focus on the risk of developing breast cancer, whereas perceived seriousness should be concerned with women's perceptions of breast cancer complications if not treated. Perceived benefits from action develop positive outcomes or feedback after mammogram screening, whereas perceived barriers to action are obstacles that hinder mammogram screening (*Wang et al., 2014*).

Nurses play a prominent role in teaching women about breast self-examination, and they are in an appropriate position to raise awareness about breast cancer at no extra cost. A female who was advised about BSE demonstrated more excellent knowledge, confidence, and was likely to practice it routinely (*Abd El-Mohsen & Abd El-Maksoud, 2015*).

2. Significance of the study

In Egypt, breast cancer constitute18.9% of total cancer cases (32.04% in women and 2.2% in men) with an age-adjusted rate of 49.6 per 100 000 population. In the early treatment stage, breast cancer has a 97% probability of surviving five years. However, a woman's likelihood of surviving five years decreases to 20% once it spreads to other body parts. Cancer prevalence and mortality displayed strong geographic patterns worldwide and in Egypt *(Gewaifel et al., 2019).*

Breast cancer has been considered a significant health problem among females because of its high incidence in recent years. BSE wasthe most critical behaviors for early diagnosis of breast cancer. 95% of all breast cancers can be diagnosed in the primary stage by BSE. Unfortunately, despite the relative benefits of regular BSE, few women examine themselves. The majority do not even know how to do a BSE (*Mohamed et al., 2016).*

Challenges for Egyptian doctors treating breast cancer were late detection and the lack of awareness about the disease. According to the National Cancer Institute in Cairo, many women fail to seek medical treatment or preventive screening, making it more difficult to treat cancer, and by the time breast cancer is detected in advanced stage *(Abd El-Mohsen & Abd El-Maksoud, 2015).*

Many women are diagnosed with more advanced breast cancer stages due to a lack of awareness and information about breast cancer screening practices. So, raising awareness about breast cancer screening is a primary trend in our society. HBM is one of the models that can effectively enhance women's knowledge, change their unhealthy practices, and improve their preventive behaviors for early breast cancer detection. Hence, the researchers decided to perform the study to evaluate the effect of the health belief model on women's preventive practices regarding the detection of breast cancer.

3. Aim of the study

The study aimed to evaluate the effect of the health belief model-based education on breast cancer preventive behaviors.

3.1. Research hypothesis

To fulfill the aim of the study, the following research hypothesis was formulated:

- The health belief model-based education will improve women's knowledge and preventive behaviors regarding breast cancer compared to their pre model implementation.

4. Subjects and Methods

4.1. Research design

Quasi-experimental research (pre/post-test) design was utilized to conduct this study. Quasi-experimental research is to examine the cause and effect relationships among selected independent and dependent variables. Researchers conduct quasi-experimental research in nursing to determine the effect of nursing interventions (independent variables) on patient outcomes (dependent variables) (*Burns and Grove, 2011).*

4.2. Research Setting

The study was conducted at the obstetric outpatient clinic affiliated at Benha University Hospital. This clinic provides a free obstetric and gynecologic service for a high flow rate of women seeking medical services and nursing care.

4.3. Subjects

A purposive sample was used in this study. The total number of women who attended the Outpatient Clinic were 100 through the last six months from the beginning of the study. According to specific criteria, they were chosen not diagnosed with breast cancer, accepted to participate in the study.

4.4. Tools of data collection

4.4.1. A Structured Interviewing Questionnaire

The researchers designed it after reviewing relevant literature. It consisted of two parts:

Part 1 was concerned with the studied women's sociodemographic characteristics such as their age, educational level, marital status, residence, family income, family history of breast cancer, regularly do breast self-examination, and a mammogram. Besides a question about their source of information.

Part 2 was concerned with the studied women's knowledge regarding breast cancer adopted from *Korkut (2019).* These included 22 open-ended questions divided under three main topics. The first 12 questions were about breast cancer risk factors, six questions about breast cancer warning signs, and four questions about screening methods.

Scoring system

Each item scored two if answered correct and complete, scored one if correct and not complete, and zero if incorrect or do not know. The total knowledge scores were distributed as good if the score of the total knowledge ≥75% (≥33)degree considered average if it equals 50-<75% (22-32 degree), and considered poor if it is less than 50%) less than 22 degrees).

4.4.2. Champion Health Belief Model Scale (CHBMS)

It was adopted from *Parsa et al. (2008).* The pre/post model was used to assess the studied women's behaviors regarding breast cancer and breast self-examination. The Champion Health Belief Model Scale was utilized to measure health belief model components. It is a self-reported questionnaire adapted to evaluate perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, cues to action, and self-efficacy. It is a method used to evaluate and explain individual differences in preventative health behavior. It consists of 45-questions classified into six dimensions as follows. Assess perceived susceptibility included (4 questions), perceived seriousness of breast cancer (10 questions), perceived benefits (10 questions), perceived barriers (9 questions), cues to action (7 questions), and efficacy in performing BSE (5 questions).

Scoring system

The scale was measured on a five-point Likert type scale with the following scoring: strongly disagree (1); disagree (2); neutral (3); agree (4), and strongly agree (5). The total scores were 225, divided into two categories. The total scores were constituted positive behaviors if the score ≥ 60 % ≥135 and constituted negative behaviors if it is less than 60% <135.

4.4.3. Breast Self-Examination Observational Checklist

It was used as a pre/post educational model implementation, adopted from *Breast Cancer Organization (2019), and* included nine practical steps to assess and observe women's breast self-examination performance.

Scoring system

Each step was scored from (0-2). The correct and complete correct practical step was scored as two grades, the correct, but the incomplete step was scored as one grade while the incorrect or missed step was scored as zero. The total practical scores were 18, divided into two categories. Scores ≥ 60 % (≥11) referred to satisfactory practice, while scores less than 60% (<11) referred to unsatisfactory practice.

4.5. Procedures

The present study was submitted to five academic nursing staff in" the Community Health Nursing, Obstetrics, and Women Health Nursing field to test the tools' content validity. The recommended modifications were performed according to the academic nursing experts' judgment on the content's appropriateness and the clarity of sentences. Internal consistency of CHBMS was calculated using Cronbach alpha, and the degree of reliability alpha precision equaled 0.90 for susceptibility, 0.82 for severity, 0.85 for benefits of BSE, 0.82 for benefits of a mammogram, 0.97 for barriers of BSE, 0.93 for barriers of a mammogram, 0.94 for cues to action, and 0.82 for self-efficacy. Besides, 0.82 for knowledge assessment questionnaire and 0.80 for breast self-examination checklist which indicates accepted reliability of the tools.

Official permission was taken by submitting an official letter from the Faculty of Nursing to the responsible authorities of the study settings to get permission for data collection.

The pilot study was carried out on 10% (N=10) of the studied women at the settings mentioned above to test the study tools for applicability, clarity to fill out the questionnaires, and the research process's feasibility. The necessary modifications were done by removing repeated or unneeded questions, and improvements were made before data collection according to the pilot study results. The sample of the women recruited in the pilot study was excluded from the main study sample.

Ethical considerations: Personal communication was done with women to explain the purpose of the study, assure their best possible cooperation, and ensuring the confidentiality of the data. The researchers emphasized to women that participated in the study was voluntary, and the questionnaires were anonymous. The women had the full right to refuse to participate in the study or withdraw at any time without giving any reason.

Fieldwork: The current study was implemented in four phases, assessment and planning, implementation, and evaluation.

Assessment and planning phase: After obtaining official permissions to conduct the study, the researchers interviewed women, then explained the study's purpose and asked for participation. Then, the women were interviewed to assess their sociodemographic characteristics and knowledge regarding breast cancer. The information obtained during this phase constituted the baseline for the development of the educational program and was used for further comparisons to estimate the effect of health belief model implementation. The average time for the completion of the women's interview was around 10-15 minutes.

Implementation phase: The model was implemented in six months, from October 2018 to the end of March 2019.

Implementation of the model was carried out at Obstetric Outpatient Clinic at Benha University Hospital. The subject material has been used in sequence through the six sessions (four sessions for theory and two sessions for practices). Each session's duration ranged from 30 to 45 minutes, including times for discussion according to women's achievement, progress, and feedback.

Each group participated in six sessions separately for two weeks (2 days/week; Saturday and Tuesday) from 9:00 am to 12:00 mid-day, in addition to one week for pre and post-test. Sometimes the researchers worked with two groups on the same day. At the beginning of the first session, an orientation to the model and its purpose were made and then explained the general information about breast anatomy and physiology and the definition of breast cancer to increase women's motivation. In subsequent sessions, the researchers demonstrated warning signs of breast cancer (perceived severity), the risk factors of breast cancer (perceived susceptibility), and emphasizing screening methods of breast cancer (perceived benefits). The researchers allowed group discussions to overcome any barriers (perceived barriers) to healthy practices and self-efficacy. After each session, feedback about the previous session was done, and the objectives of the new topics were mentioned.

Evaluation phase: After implementing the model, the post-test was done on the women to assess knowledge, practices of preventive behaviors by the same format of the pre-test to evaluate the effectiveness of the implemented model. This evaluation was done immediately after the model implementation.

4.6. Data analysis

The collected data were revised, coded, entered into the computer, and statistical analysis was done using the Statistical Package for Social Science (SPSS) version 20. Data were represented in tables using mean, standard deviation, number, percentage distribution, and Chi-Square, t-test, and correlation coefficient to examine the comparison of women's knowledge and practices of preventive behaviors between pre and post-implementation of HBMS. Statistical significance was considered p-value ≤ 0.05, highly significant at a p-value of ≤ 0.001, and insignificant at p-value >0.05.

5. Results

Table 1 shows the sociodemographic characteristics of the studied women. It was clear that 62% of studied women aged from 30 to 39 years old with mean age were 35.90±6.45, 53% had secondary education, while 69% of them were married, and 79% lived in the rural area. This table also shows that 65% of them had enough monthly income, 80% did not have a family history of breast cancer, 93% did not do breast self-examination regularly, and 96% did not have a mammogram ever.

Figure 1 shows that 41% of the studied women acquired their information about breast cancer from social media, followed by 29% from relatives and friends, while only 17% through the health care provider.

Table 2 shows a statistically significant improvement in studied women's knowledge post model implementation. Regarding the risk factor of breast cancer, 32% of the studied women had complete, correct answer pre model implementation compared with 58% at post model implementation. Concerning warning signs of breast cancer, 26% of the studied women had complete, correct answer pre model implementation, which increased to 60% in the post model implementation, and 19% of the studied women had complete and correct answer regarding screening methods pre model implementation then this percentage increased to 59% post model implementation.

Figure 2 shows that 38% of the studied women had a good level of knowledge regarding breast cancer pre model implementation, and then this percentage increase to 64% post model implementation.

Table 3 shows the comparison of health belief model scores pre and post model. The scores of the susceptibility, severity, benefits, barriers, cues to action, and self-efficacy had a highly statistically significant increased post model implementation compared to the scores pre model implementation ($P< 0.000$).

Figure 3 shows the percentage distribution of the studied women's total health belief model regarding breast cancer pre-post implementation. In the pre-model implementation phase, 36% of the studied women had positive health beliefs, which improved to 64% post-model implementation.

Table 4 documents a highly statistically significant difference in total practices scores pre and post model implementation regarding the practice of preventive behaviors toward breast cancer (p-value <0.001).

Figure 4 shows the percentage distribution of women's total practice of preventive behaviors regarding breast cancer pre-post implementation. In the pre model implementation phase, 36% of the studied women had satisfactory practice, then this percentage improved to 74% post-model implementation.

Table (5) shows a positive statistically significant correlation between studied women's total knowledge (pre and post-model implementation), practices (post model implementation), and their total health belief model (p <0.001).

Table 6 shows a highly significant association between total women's knowledge score and their education level and marital status pre and post model implementation. A statistically significant association was revealed between the residence and total knowledge score pre and post model implementation, while a highly statistically significant difference between the family income and total knowledge score post-implementation of the HBM education (p <0.001).

Table 7 shows a statistically significant association between women's total practice scores and their age, educational level, and family history of breast cancer pre and post model implementation. Also, there is a statistically significant association between the women's total practice score and marital status (pre model implementation) and residence pre model implementation.

Table (1): Frequency and percentage distribution of the studied women regarding their sociodemographic data.

Sociodemographic characteristics	N0. 100	%
Age / years		
≥20	14	14.0
30-39	62	62.0
40+	24	24.0
X±SD	35.90±6.45	
Educational level		
Basic education	21	21.0
Secondary education	53	53.0
High education	26	26.0
Marital status		
Single	20	20.0
Married	69	69.0
Divorced	11	11.0
Residence		
Rural	79	79.0
Urban	21	21.0
Family Income		
Enough and saved	24	24.0
Enough	65	65.0
Not enough	11	11.0
Family history of breast cancer		
Yes	20	20.0
No	80	80.0
Regularly do breast self-examination		
Yes	7	7.0
No	93	93.0
Doing a mammogram		
Yes	4	4.0
No	96	96.0

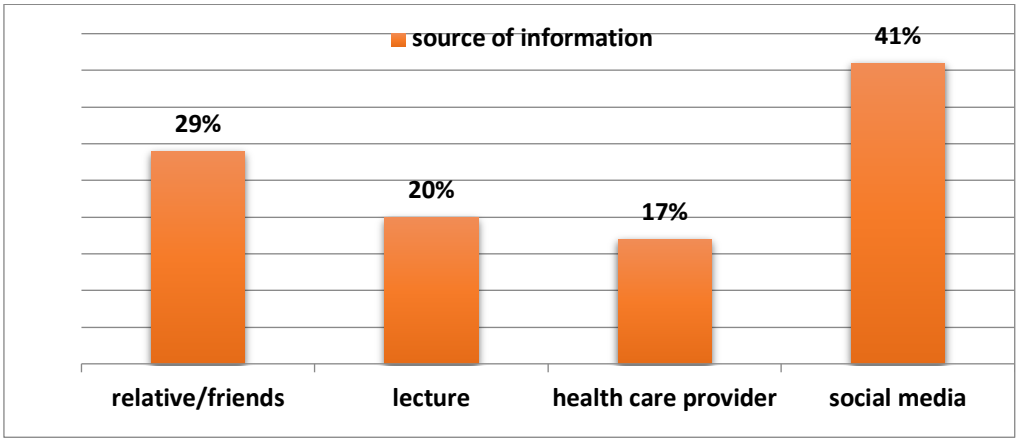

Figure (1) Percentage distribution of the studied women's source of information regarding breast cancer (n= 100).

Table (2): Comparison of women's knowledge between pre and post-implementation of HBM based education (n= 100).

Items	Pre-model implementation (%)			Post-model implementation (%)			X2	P-value
	Complete	Incomplete	Don't know	Complete	Incomplete	Don't know		
Risk factors	32.0	13.0	55.0	58.0	8.0	34.0	47.36	<0.001
Warning signs	26.0	34.0	40.0	60.0	19.0	21.0	64.06	<0.001
Screening methods	19.0	32.0	49.0	59.0	22.0	19.0	46.24	<0.001

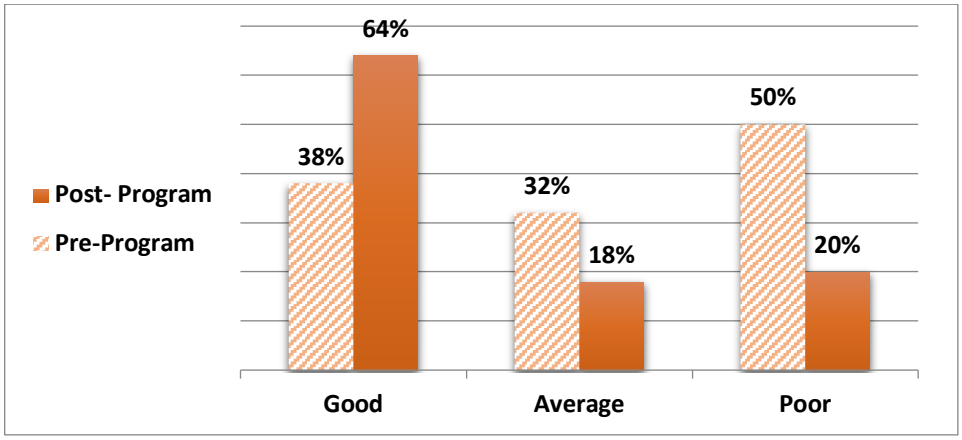

Figure (2): Percentage distribution of the studied women according to their total knowledge scores about breast cancer (n=100).

Table (3): Comparison of the studied women's HBM dimensions between pre and post-implementation (n= 100).

Health belief model dimensions	Pre-model implementation (%)		Post- model implementation (%)		X^2	P-value
	Positive	Negative	Positive	Negative		
Susceptibility	34.0	66.0	69.0	31.0	43.57	<0.001
Severity/seriousness	30.0	70.0	78.0	22.0	17.64	<0.001
Benefits	19.0	81.0	61.0	39.0	67.24	<0.001
Barriers	60.0	40.0	89.0	11.0	33.64	<0.001
Cues to action	35.0	65.0	75.0	25.0	37.82	<0.001
Self-efficacy	30.0	70.0	58.0	42.0	36.00	<0.001
Total	36.0	64.0	77.0	33.0	40.35	<0.001

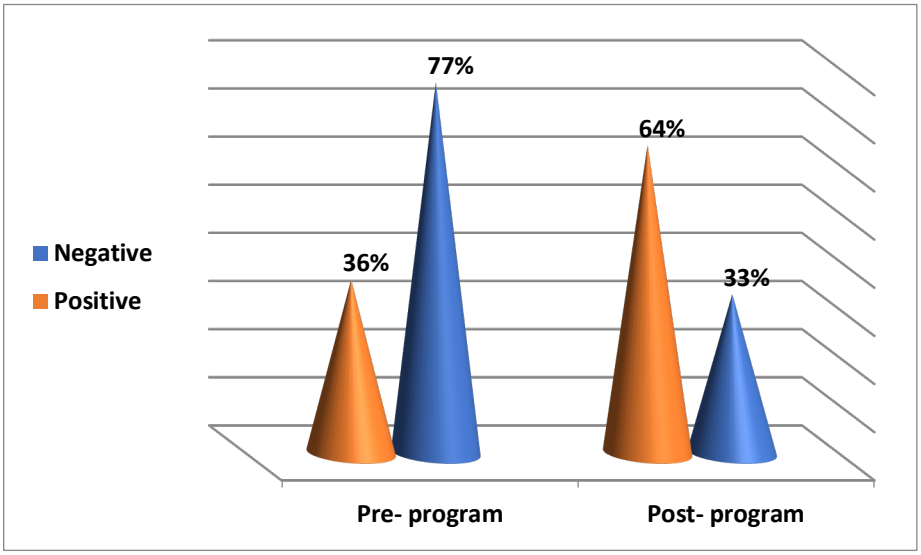

Figure (3): Percentage distribution of total health belief model regarding breast cancer of the studied women (n=100).

Table (4): Comparison of the studied women's total practices mean scores regarding breast cancer preventive behaviors pre and post-implementation of the model (n= 100).

Variable	Pre-implementation (%)	Post -implementation (%)	t -test	p-value
	Mean ±SD	Mean ±SD		
Total practices	11.36±0.48	41.73±0.44	38.77	0. 000

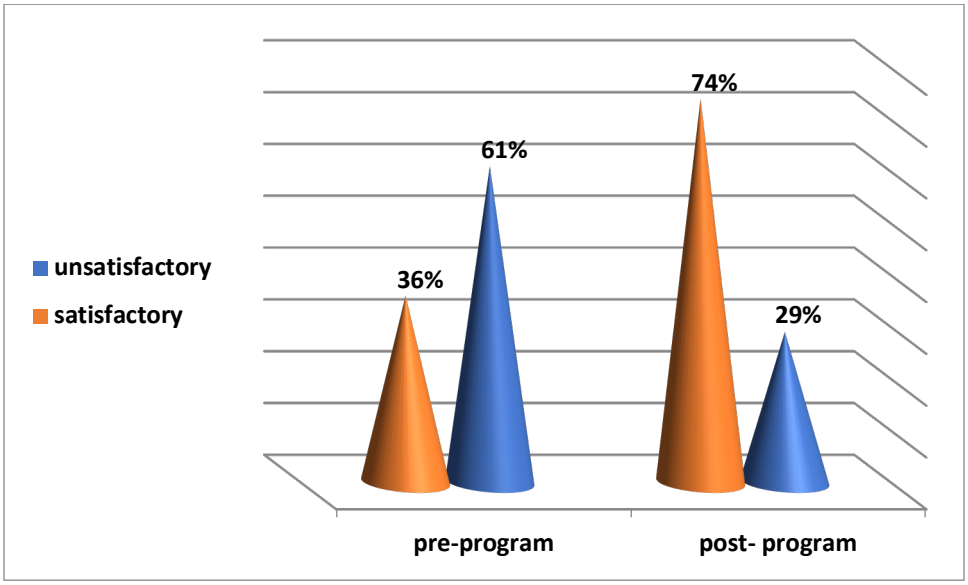

Figure (4): Percentage distribution of the studied women's total practice scores pre and post-implementation of the model regarding breast cancer preventive behaviors (n= 100).

Table (5): Correlation between studied women's total knowledge, practices, and total health beliefs (n=100).

Variables	Total Knowledge				Total Practices			
	Pre- model		Post- model		Pre - model		Post- model	
	r	p-value	r	p-value	r	p-value	r	p-value
Total health belief	0.67	0.000	0.76	<0.001	0.17	0.12	0.42	<0.001

Table (6): Relation between the studied women's sociodemographic characteristics and their total knowledge score pre and post-HBM implementation.

Sociodemographic characteristics	Total Knowledge- pre model implementation			X_1^{2*}	P_1	Total Knowledge- post model implementation			X_2^{2**}	P_2
	Good	Average	Poor			Good	Average	Poor		
	%	%	%			%	%	%		
Age / years										
≥20	0.0	4.0	10.0	3.22	0.19	6.0	2.0.0	6.0	9.52	0.04
30-39	7.0	15.0	30.0			26.0	14.0	22.0		
40+	4.0	8.0	12.0			10.0	5.0	9.0		
Educational level										
Basic education	3.0	8.0	10.0	21.05	0.000	11.0	5.0	5.0	30.92	<0.001
Secondary education	11.0	14.0	28.0			30.0	10.0	13.0		
High education	9.0	11.0	6.0			17.0	7.0	2.0		
Marital status										
Single	6.0	4.0	10.0	19.26	<0.001	12.0	2.0	6.0	22.13	<0.001
Married	13.0	16.0	40.0			46.0	12.0	11.0		
Divorced	3.0	4.0	4.0			6.0	2.0	3.0		
Residence										
Rural	11.0	18.0	50.0	7.49	0.05	34.0	15.0	30.0	8.13	0.01
Urban	6.0	7.0	8.0			10.0	6.0	5.0		
Family history of breast cancer										
Yes	3.0	7.0	10.0	1.31	0.31	11.0	5.0	4.0	1.86	0.39
No	15.0	10.0	60.0			43.0	6.0	31.0		
Family Income										
Enough and saved	11.0	3.0	10.0	79	0.67	21.0	1.0	2.0	25.09	<0.001
Enough	10.0	14.0	41.0			47.0	7.0	11.0		
Not enough	4.0	1.0	6.0			8.0	0.0	3.0		

**X_1^2 is the association between sociodemographic variables and total knowledge pre model implementation, ** X_2^2 is the association between sociodemographic variables and total knowledge post model implementation*

Table (7): Relation between the studied women's sociodemographic characteristics and their total practice score pre and post-HBM implementation.

Sociodemographic characteristics	Total Practices- Pre model implementation		X_1^{2*}	P_1	Total Practices –Post model implementation		X_2^{2**}	P_2
	Satisfactory %	Unsatisfactory %			Satisfactory %	Unsatisfactory %		
Age / years								
≥20	3.0	10.0	6.14	0.01	8.0	6.0	11.50	<0.001
30-39	12.0	50.0			47.0	15.0		
40+	4.0	20.0			19.0	5.0		
Educational level								
Basic education	3.0	18.0	92.16	0.000	15.0	6.0	47.36	<0.001
Secondary education	14.0	39.0			35.0	18.0		
High education	9.0	17.0			18.0	8.0		
Marital status								
Single	9.0	11.0	0.30	0.85	15.0	5.0	8.12	0.01
Married	19.0	50.0			53.0	16.0		
Divorced	3.0	8.0			9.0	2.0		
Residence								
Rural	19.0	60.0	2.62	0.02	58.0	21.0	1.09	0.57
Urban	3.0	18.0			16.0	5.0		
Family history of breast cancer			92.16	0.000			31.36	<0.001
Yes	9.0	11.0			16.0	4.0		
No	18.0	62.0			41.0	39.0		
Family Income								
Enough and saved	8.0	16.0	1.28	0.52	19.0	5.0	0.49	0.62
Enough	15.0	50.0			55.0	21.0		
Not enough	3.0	8.0			10.0	2.0		

**X_1^2 is the association between sociodemographic variables and total practice pre model implementation, ** X_2^2 is the association between sociodemographic variables and total practice post model implementation*

6. Discussion

One of the influential models in predicting cancer-protective behaviors is the Health Belief Model (HBM). According to HBM, women should believe that even in the case of no disease symptoms, they might have it *(Masoudiyekta et al., 2015).* The current study aimed to evaluate the effect of the health belief model-based education on breast cancer preventive behaviors.

Regarding the studied women's sociodemographic characteristics, this study showed that slightly less than two-thirds of the studied women aged from 30 to 39 years old with a mean age of 35.90±6.45. This finding might be due to women at this age being told about breast cancer to prevent and detect the disease early. This finding was in the same line with the study done by *Hajian and Auladi (2015*). They studied the awareness, attitude, and practice of breast cancer screening in women, and the associated sociodemographic characteristics, in Northern Iran, and they reported that the mean age of the studied sample was 31.5±9.3 years. Also, this finding was congruent with *Shakweer and Hamza (2016).* They studied practicing breast self-examination and early detection of breast cancer at Helwan University. They reported that the mean age of the women was 33.3±1.9 years. On the other hand, this finding disagrees with *Kamberi et al. (2017),* who studied the breast cancer health beliefs and the use of mammography among women randomly selected in Albania and reported that half of the women belonged to the age group >50 years.

As regards the educational level, more than half of the studied women had secondary education. This finding agrees with *Marmarà et al. (2017)*, who studied the health beliefs, determinants of breast screening uptake, and illness perceptions in Malta. Their study presented that; three-quarters of the women had a secondary education level. Also, this finding is consistent with *Masoudiyekta et al. (2015*). They implemented the health belief model in predicting breast cancer screening behavior of women in Dezfu health centers. They found that less than half of the sample participating in the study had a diploma. However, this finding is incongruent with *Shakweer and Hamza (2016),* who reported that two-thirds of the samples had primary education.

Concerning the marital status, the present study revealed that; more than two-thirds of the studied women were married, and more than three-fourths come from the rural area. This finding was in agreement with *Kamberi et al. (2017),* who found that most women were married. This finding is also congruent with *Marmarà et al. (2017); Masoudiyekta et al. (2015).* They found that the majority of women were married. More than three-quarters of studied women lived in rural areas. This finding disagrees with *Aker et al. (2015),* who studied the practice of breast cancer early diagnosis among women living in Samsun, Turkey, and factors associated with this practice, and they denoted that two-thirds of the women lived in the city.

Concerning family history, the present study shows that most studied women didn't have a family history of breast cancer. This finding is in the same line with the study done

by *Khalili et al. (2014),* they studied the status of breast self-examination performance among women referring to Health Centers of Tabriz, Iran, and they found that the minority of women had a history of cancer in their first and second-grade family.

Concerning monthly income, slightly less than two-thirds of studied women had enough income per month. This finding agrees with *Marmarà et al. (2017),* who found that; more than half of women from average income families. Also, this finding was consistent with *Khalili et al. (2014),* they found that the majority of subjects their family income was sufficient and relatively sufficient in their view.

Most of the studied women didn't have regular breast self-examination and did not have a mammogram ever. This finding might reflect the underestimation and poor knowledge of the women to breast cancer risks before program implementation. This finding agrees with *Kamberi et al. (2017),* who found that more than half of the women didn't have a mammogram and the frequency of breast self-examination is very low. On the other hand, this finding disagrees with *Wang et al. (2014),* who made a survey on mammography as breast cancer screening behaviors in Eastern Taiwan based on a health belief model and found a high proportion of women had received regular mammography examinations.

The present study showed that; less than half of the studied women acquired their information about breast cancer from social media and the minority of them from the health care provider. This finding might be due to a lack of breast cancer mass programs, and the majority of studied women did not have a family history of breast cancer. This finding disagrees with *Hajian and Auladi (2015),* they reported that the source of information was health care workers, and magazines, books, and brochures were the most common sources.

The women's knowledge about the detection of breast cancer reveals a statistically significant improvement in studied women's knowledge after model implementation. This finding demonstrates that the HBM model was effective in increasing women's knowledge about breast cancer. This result in the same line with *Özerdoğan et al. (2017)* conducted an educational study to improve breast cancer knowledge level and scanning participant women working at a University in Eskişehir Osmangazi University, Turkey. They reported a highly significant relationship was found in the study group's scores between the women's knowledge levels before the training on breast cancer (pre-test) and their knowledge after the training (post-test) (p=0.001). This finding agrees with *Ylmaz et al. (2017),* they studied the effects of training on knowledge and beliefs of breast cancer and early diagnosis methods among females in the Central Anatolia of Turkey. They found that the knowledge of breast cancer among women was low in the pre-test, and it was significantly increased in the post-test.

Regarding total knowledge scores of women about breast cancer, the present study revealed that more than one-third of the studied women had good knowledge regarding breast cancer detection before model implementation, and then this percentage increased to slightly less than two-thirds of them post model implementation. It might be due to the HBM model helping women acquire knowledge about the disease, and their level of education helped them acquire knowledge about the disease.

This finding is in the same line as *Masoudiyekta et al. (2015).* Their study's results have proved the efficiency of educational intervention based on HBM on increasing knowledge and health beliefs about breast cancer. This finding is also congruent with *Yılmaz et al. (2017),* they reported that women did not have complete knowledge and practice about screening behaviors related to BC before the training. After the training scores in breast cancer, screening knowledge scores were increased while the knowledge of breast cancer among women was at a low level in the pre-test, it was significantly increased in the post-test.

Regarding the use of the health belief model, the present study showed that the susceptibility, severity, barriers, benefits, cues to action and self-efficacy were highly significantly increased post model compared to the scores before model implementation. This finding might be due to awareness and education on breast health issues from the HBM model changed women's behavior toward breast cancer detection. This finding is consistent with *Rezaeian et al. (2014).* They studied the effects of breast cancer educational intervention on women's knowledge and health beliefs of 40 years and older, Iran, and reported that women's beliefs regarding breast cancer and mammography screening behavior increased after educational intervention in all of the HBM components.

Regarding the total practice score of studied women regarding breast cancer preventive behaviors, the present study documents a highly statistically significant difference oftotal practices of preventive behaviors' scores between pre andpost model implementation (p-value <0.001). These findings are supporting the research hypothesis. The finding is supported by *Khalili et al. (2014);* they showed that BSE's performance toward breast cancer prevention was very poor between women ,while after applying the health belief model, they found highly significant improvements in performances toward breast cancer prevention. Also, *Yılmaz et al. (2017)* reported that women did not have sufficient knowledge and practice about screening activities related to breast cancer before the training. After the training, breast cancer screening scores have been increased with a high statistical significance (p-value 0.000).

Concerning the total practice score of studied women, the present study reveals that more than one-third of the women had satisfactory practice pre-implementation of the health belief model. The findings were supported by *Khalili et al. (2014);* they showed that the status of BSE performance was very poor between women. It might be due to inadequate and irregular education about breast cancer. Simultaneously, slightly less than three-quarters of women had satisfactory practices after implementing the model in the present study. According to *Yılmaz et al. (2017),* they reported that women did not have sufficient knowledge and practice about screening activities related to breast cancer before the training. After the training, scores in breast cancer screening has been increased.

This study illustrates a positive statistically significant correlation between studied women's total knowledge, practices, and total health belief post model ($p < 0.001$). It might be due to the improved level of knowledge and practices that can affect behaviors about breast cancer.

There was a highly significant association between total women` knowledge score and their level of education pre and after model implementation in the current study. The findings were supported by Yılmaz et al. (2017), they reported that breast cancer screening knowledge of women in the pre- and post-tests, had a significant relationship with the level of education among women. It might be due to women's level of education that could help them acquire knowledge about breast cancer.

The current study shows a highly statistically significant difference between women's total practice scores and their age pre and post-model implementation. This finding was supported by *Aker et al. (2015),* they reported that age is a significant variable on the performance of BSE. It might be due to the identification of age as an influential factor in the study. It might also be related to an increase in breast cancer risk with advanced age, higher perception of risk of breast cancer, and thus more compliance with early diagnostic methods.

The current study shows a high statistically significant difference between women's total practice scores and their family history of breast cancer pre and post-model implementation. According to *Khalili et al. (2014),* they reported that BSE's quality has a significant correlation with a family history of breast cancer. This finding might be due to family history helping women be aware of the disease and its practices.

7. Conclusion

Based on the results of the current study. It concluded that; the health belief model had significantly increased the knowledge, improved health practice, and enhancing health beliefs regarding the detection of breast cancer among the studied women. More than one-third of women had good knowledge regarding breast cancer detection before model implementation, then this percentage increase to less than two-thirds post model implementations. More than one-third of the studied women had positive health beliefs, and then this percentage improved and became less than two-thirds after implementing the model. There was a highly statistically significant improvement of total practice scores pre and post model implementation (p-value <0.001). A positive, statistically significant correlation was found between studied women's total knowledge, practices, and total health belief after model implementation.

8.Recommendation:

The present study recommends that:

- Develop a regular periodic educational program for women to enhance their knowledge and practices toward breast cancer prevention.
- Regular periodic screening for women for early detection of breast cancer is also recommended.
- Further studies are implemented on a larger probability sample of women with different age groups.

9. References

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