American Journal of Nursing Research, 2025, Vol. 13, No. 1, 1-10
Available online at http://pubs.sciepub.com/ajnr/13/1/1
Published by Science and Education Publishing
DOI:10.12691/ajnr-13-1-1

Effect of an Educational Program on Female Workers' Knowledge about Breast Cancer Preventive Measures at Beni-Suef University

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Received December 07, 2024; Revised January 08, 2025; Accepted January 15, 2025

Abstract **Background**: Breast cancer affects women in a multifaceted way, affecting every part of their lives both before and after treatment. Patients with breast cancer communicate significant, unfulfilled requirements for information, education, and assistance to enhance their quality of life and lessen their pain impairment. Preventive screening measures greatly aid in the early detection of breast cancer and the reduction of mortality rates. **Aim:** The current study was conducted to evaluate the effect of an educational program on female workers' knowledge about breast cancer preventive measures at Beni-Suef University. **Subjects and Methods:** ***Design***: An interventional quasi-experimental design. ***Sample &Settings***: A purposive sample of 323 working women at Beni-Suef University was selected. ***Tools*:** (1) A structured Interviewing Questionnaire Sheet to assess women's knowledge about breast cancer, breast self-examination, and breast cancer preventive measures. (2) Health Belief Model Questionnaire. (3) Breast Cancer Preventive Measures Checklist. (4) Supportive material (Arabic booklet). **Results**: It clarifies that there is a statistically significant improvement in the female worker's all sub-items and total beliefs regarding breast cancer and its preventive measures as measured by the health belief model after the health education program, as the total score increases from 150.19±21.68 pre-HBM application to 226.51±32.83after the educational program, $p \leq 0.01$. Marked improvement in female workers' total preventive measures level after program implementation, 18.6% of the female workers who had adequate practice with pretest compared to 91.6% who had adequate practice with posttest. A marked improvement in female workers' total practice level regarding breast self-examination after program implementation, as (9.9%) of the female workers have adequate practice pretest and improved to (87.9%) posttest. **Conclusion:** the results showed the effect of health education programs on the improvement in practice of all sub-items for breast self-examination. **Recommendations**: Design and disseminate brochures work on the breast self-examination, preventive measures of breast cancer.

Keywords: *Educational program, Knowledge, Breast Cancer, Preventive Measures*

Cite This Article: Hanan Elzeblawy Hassan**,** Sahar Gamal Zaki, and Fatma Saber Nady, "Effect of an Educational program on Female Workers' Knowledge about Breast Cancer Preventive Measures at Beni-Suef University." *American Journal of Nursing Research*, vol. 13, no. 1 (2025): 1-10. doi: 10.12691/ajnr-13-1-1.

1. Introduction

Breast cancer's high incidence and mortality make it a significant global public health issue. Breast cancer affects women in a multifaceted way, affecting every part of their lives both before and after treatment [1,2,3,4,5]. Women may also feel disabled because of their inability to do everyday tasks and take care of their families and themselves. Patients with breast cancer communicate significant, unfulfilled requirements for information, education, and assistance to enhance their quality of life and lessen their pain impairment [6,7,8,9,10].

Preventive screening measures greatly aid in the early detection of breast cancer and the reduction of mortality rates. Mammography, clinical breast examination, magnetic resonance imaging and biopsy, and breast self-examination are the suggested screening methods for early breast cancer diagnosis. The greatest way to find cancer before symptoms and indications arise and to trigger effective treatment is through annual mammography screening [11,12,13,14,15].

The Health Belief Model is a cognitive paradigm that views people as rational beings who use a variety of techniques to decide whether or not to participate in an activity connected to their health. Created to help explain the poor participation rates in disease prevention initiatives, the Health Belief Model looked into factors that can promote or hinder participation. The two main factors that have influenced the development of the Health Belief Model are the belief that a specific behavior will

either prevent or improve health and the desire to avoid illness [16,17,18,19,20].

Early detection of breast cancer is essential for disease control. Early diagnosis and systematic or opportunistic screening using mammography (MMG), clinical examination (CEM), and breast self-examination (BSE) are the components of early detection. Of these techniques, MMG is thought to be the gold standard for screening the target group because it helps identify breast cancer early on [21].

Nurses possess the knowledge and skills necessary to instruct patients. In the practical context, the illness-related form is the most prevalent. Educating BSE in a variety of contexts and circumstances would seem to be a professional obligation for nurses, who are engaged in promoting and preserving health as well as preventing sickness [22,23,24,25,26].

2. Aim of the Study

The current study was conducted to evaluate the effect of an educational program on female workers' knowledge about breast cancer preventive measures at Beni-Suef University

3. Subject and Method

Research design:

An interventional, quasi-experimental research design (pre-test and post-test) was used to achieve the aim of the current study.

Subjects and Settings:

A purposive sample of 323 working women at Beni-Suef University was selected with the following criteria:

- Females aged 18-60
- Free from any type of cancer
- Did not receive any chemotherapy or radiotherapy.
- Free from any diagnosed psychological disorders

Tools of data collection:

Tool I: women's knowledge about breast cancer, breast self-examination, and breast cancer preventive measures.

Concerned about the women's knowledge about breast cancer, breast self-examination, and breast cancer preventive measures, there were closed-ended questions grouped into categories focused on three domains: The first domain is general information about breast cancer. The second domain is knowledge about breast self-examination screening for early detection of breast cancer. The third domain is knowledge about breast cancer preventive measures (total 55 questions).

Scoring system: Each question received a score of one point if it was answered correctly and zero points if it was answered incorrectly, with a total score of 55 degrees. The distribution of the overall knowledge scores is classified as follows:

- Good: for scores of ≥75%..... ≥ 40 degrees
- Average: for scores of 50% to 74%.....27-40 degrees
- Poor: for scores of <50% …… <27 degrees.

Tool II: Health Belief Model Questionnaire:

It was from Foad, 2015 and designed to measure pregnant women's psychological readiness to take positive action regarding the prevention of breast cancer. It includes six subscales for health belief [25].

Subscale (1): perceived susceptibility to breast cancer; 10 questions. Subscale (2) perceived severity; 12 questions. Subscale (3) perceived benefits; 7 questions. Subscale (4): perceived barriers of breast cancer; 13 questions. Subscale (5): Cues to action; 10 questions. Subscale (6): self-efficacy of breast cancer; 8 questions.

Scoring system: On a five-point Likert scale, the responses were scored as follows: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5), with a total score of 300 degrees. The total attitude score was calculated and divided into three categories:

- Positive belief: for scores of ≥75%..... ≥ 225 degrees
- Neutral belief: for scores of 50% to 74%..... 150-225 degrees
- Negative belief: for scores of <50%. ……< 150 degrees

Tool III: Breast Cancer Preventive Measures Checklist:

It was adopted by Golubnitschaja et al. (2016) and consisted of effective preventive measures against breast cancer, and it was utilized as a pre- and post-educational model implementation [26]. It consisted of two parts:

Part 1: Concerned with lifestyle modifications for the prevention of breast cancer.

Scoring system

Each step received a zero point (if the step was incorrectly done) and one point (if the step was correctly done) with a total score of 13 degrees. The total practical scores were calculated and scored into two groups:

- A score of ≥60% denoted adequate or satisfactory practice. …… ≥7.8 degrees.
- A score <60% denoted inadequate or unsatisfactory practice. ……..<7.8 degrees.

Part 2: Breast Self-Examination observational checklist It was comprised of practical steps to evaluate and track women's breast self-examination performance, and it was utilized as a pre and post-educational model implementation.

Scoring system

Each step was scored a zero grade (if the step was not done) and a one grade (if the step was done) with a total score of 35 degrees. The total practical scores were calculated into two groups:

- A score of ≥60% denoted adequate or satisfactory practice. ……..≥ 21 degrees.
- A score <60% denoted inadequate or unsatisfactory practice. ……...<21 degrees.

Tool IV: Supportive material (Arabic booklet):

It was designed by the researcher based on a literature review. It was designed in the form of a handout (booklet) using simple Arabic language and different illustrative pictures in order to facilitate understanding of its content. It contained information about breast cancer, Preventive measures of breast cancer, and take steps for breast self-examination.

Tools Validity:

Content validity of the study tools was assessed by a jury group consisting of five experts in the obstetrics and gynecological nursing department of the faculty of nursing, Beni-Suef University, for comprehensiveness, accuracy, clarity in language, and necessary modifications were done accordingly.

Tools Reliability:

The tool reliability was measured to ensure that an assessment tool produces stable and consistent results over time. The reliability coefficient for the study tools was calculated and tested for its internal consistency using the correlation coefficient Cronbach's Alpha test. The reliability of the study tools is mentioned in the following: Total knowledge = 0.897, Health Belief Model= 0.910, Breast Cancer Preventive Measures= 0.886 and Breast Self-Examination observational checklist= 0.976.

Ethical Consideration:

Ethical approval for the study was obtained from the Research Ethics Committee at the Faculty of Medicine, Beni-Suef University.

Pilot study:

A pilot study was carried out on 10% of the total study sample (32 women) to evaluate the applicability, efficiency, and clarity of tools.

Fieldwork

Data collection of the study was started at the beginning of December 2023 and completed by the end of May 2024. The fieldwork of this study was carried out through assessment, planning, implementation, and evaluation phases.

Preparatory phase:

This phase started with a review of current and past national and international literature related to the subjects of the study, using textbooks, articles, journals, and websites.

Phase (I): Assessment phase:

The researcher interviewed women after getting formal approval to carry out the study, followed by an explanation of its goal and an invitation to participate. Assessment of the females' knowledge and performance through an interview schedule for each one (pretest assessment): The pretest will be done to assess the knowledge and practices of the females regarding breast cancer preventive measures.

Phase (II): Planning phase:

The researcher developed the educational program after a comprehensive review of the relevant literature based on the baseline data obtained from the assessment phase (pre-test).

Phase (III): Implementation phase:

Two sessions were performed (one for theory and the other for practice), covering the topic content sequentially. Each session lasted between 30 and 45 minutes for all women and included discussion periods focused on the accomplishments, advancements, and feedback of women.

Phase (IV): Evaluation phase:

The post-test was administered to the participant females immediately following the model's implementation to gauge their knowledge and practices of preventive behaviors as well as assess the model's efficacy.

Statistical Design:

The Statistical Package for Social Science (SPSS) version 20 was used to do statistical analysis on the updated, coded, and computer-entered data. To compare the knowledge and use of preventive behaviors among women before and after the implementation of HBMS, data were presented in tables using mean, standard deviation, number, percentage distribution, square, t-test, and correlation coefficient. P-value ≤ 0.05 is statistically significant, highly significant at a p-value of ≤ 0.001, and insignificant at a p-value >0.05.

4. Results

Table 1 illustrates that there was a statistically significant improvement in studied female workers' means and standard deviation regarding sub-items of knowledge about breast cancer, breast self-examination and breast cancer preventive measure after program implementation; as $p \leq 0.05$ in the female workers' regarding their knowledge about all sub-items of breast cancer, breast self-examination and breast cancer preventive measures.

Figure 1 presents the percentage distribution of the studied female workers' regarding sub-items of knowledge about breast cancer, breast self-examination, and breast cancer preventive measures and illustrates that there is a statistically significant effect of the health education program on improvement in the female workers' total knowledge level about breast cancer compared to prior to the health education program (72.1% & 10.2%) of them having poor and good levels of knowledge, respectively. Whereas, after one month, improved to (13.0% & 72.4%, respectively), $p \leq 0.05$

Figure 2 presents the percentage distribution of the studied female workers' total knowledge about breast cancer and illustrates that there is a significant effect of the health education program on improvement in the female workers' total knowledge level, as prior to the health education program, 71.8% & 4% of them had poor and good levels of knowledge, respectively, and improved to 8% & 65.7% after one month, respectively.

Table 2 reveals means and standard deviation of the studied female workers' beliefs regarding breast cancer and its preventive measures as measured by the sub-items of health belief model. It clarifies that there is a statistically significant improvement in the female worker's all sub-items and total beliefs regarding breast cancer and its preventive measures as measured by the health belief model after the health education program, as the total score increases from 150.19±21.68 pre-HBM application to 226.51±32.83after the educational program, $p \leq 0.01$.

Figure 3 reveals improvement in the female worker's beliefs regarding breast cancer and its preventive measures in all items as measured by the health belief model after the health education program(susceptibility, seriousness, benefits, barriers, cues to action, and self-efficacy).

Figure 4 illustrates a significant improvement in the female worker's beliefs regarding breast cancer and its preventive measures after the HBM-based health education program, as pre-implementation (52.3%) of them had negative beliefs while decreased to (2.5%) after

the HBM-based health education program; also, (0.6%) of them had positive beliefs regarding breast cancer, breast self-examination, and breast cancer preventive measures pre-implementation and increased to (63.2%) post-HBM-based health education implementation, p≤ 0.05.

Figure 5 illustrates that there was marked improvement in female workers' total preventive measures level after program implementation, from the minority (18.6%) of the female workers who had adequate practice with pretest to the majority (91.6%) who had adequate practice with posttest.

Table 3 shows a highly statistically significant effect of the health education program on the practice of breast self-examination, as the mean scores of examination preparation, examination by consideration, asymmetry in the nipple, areola, or breast, and tactile examination (palpation) changed from (1.34±1.42, 3.36±3.09, 0.981±1.39, & 4.46±3.08, respectively) pretest compared to (3.37±1.31, 9.61±3.67, 4.05±1.64, & 11.13±4.12, respectively) posttest p≤0.01.

Figure 6 summarizes the percentage distribution of the studied female workers' practices regarding sub-items of breast self-examination. It shows that there is an effect of health education programs on the improvement in practice of all sub-items for breast self-examination (Examination preparations, Examination by consideration, Make sure a symmetry in the nipple, areola, breast, and Tactile examination).

Figure 7 presents a marked improvement in female workers' total practice level regarding breast self-examination after program implementation, as (9.9%) of the female workers have adequate practice pretest and improved to (87.9%) posttest.

Table 4 illustrates that there was a strong positive correlation with a statistically significant difference between total knowledge (pretest & posttest) with the Health Belief Model, Breast Cancer Preventive Measures, and Breast Self-Examination Observational Checklist, with P-values of 0.000, 0.002, & 0.000, respectively. There was a strongly positive correlation and statistically significant difference between the total Health Belief Model (pretest & posttest) with breast cancer preventive measures and the breast self-examination observational checklist, with P-values of 0.004 & 0.001, respectively. Also, there was a strongly positive correlation with a statistically significant difference between total breast cancer preventive measures (pretest and posttest) with the breast self-examination observational checklist as P-value = 0.000.

Table 1. Distribution of the studied female workers regarding mean sub-items of knowledge about breast cancer, breast self-examination and breast cancer preventive measures (n=323)

Sub-items	pretest	Posttest	X^2 (p value)
	Mean ± SD	Mean ± SD	
General information about breast cancer	5.13±2.191	10.44±4.273	6.905 (0.05*)
Breast self-examination	9.54±2.784	17.92±6.855	7.465 (0.006**)
Preventive measures of breast cancer	7.09±3.95	13.72±4.719	7.988 (0.018*)
Total	22.63±8.805	42.08±9.08	6.837 (0.009**)

* Statistically significant at p≤0.05
** highly statistical significant at p≤0.01

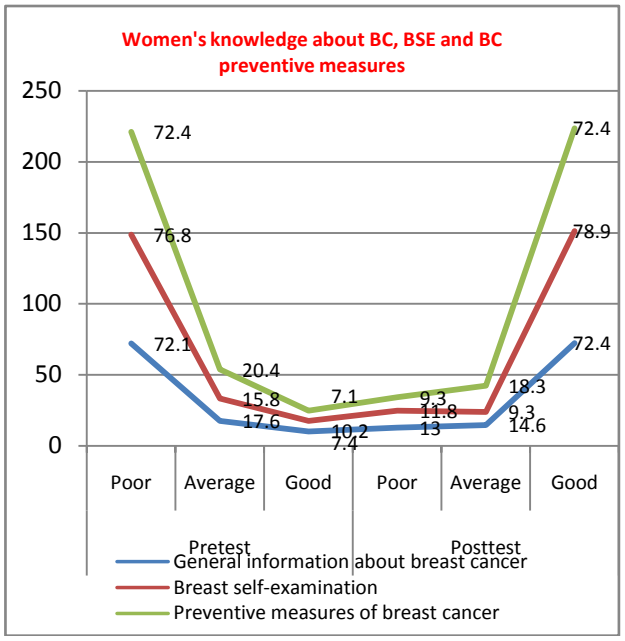

Figure 1. Women's knowledge about breast cancer, breast self – examination and breast cancer preventive measures

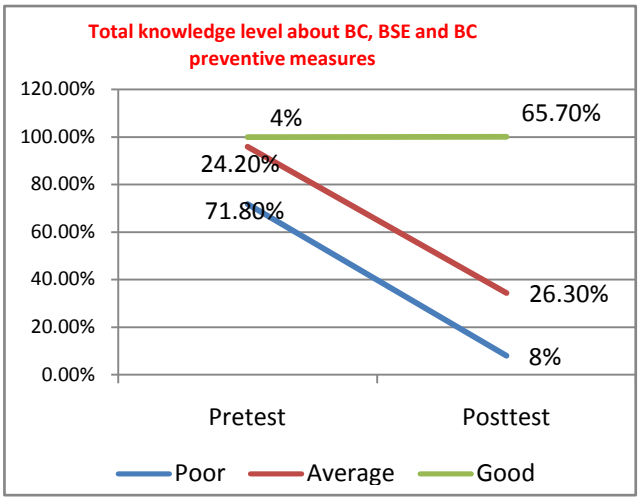

Figure 2. Percentage distribution of the studied female workers' regarding to their total knowledge level about breast cancer, breast self-examination and breast cancer preventive measures (n=323, X^2 = 6.837, p value = 0.009**)

Table 2. Distribution of the studied female workers' means sub-items of health belief model (n=323)

Sub-items of health belief model	Pretest	Posttest	X^2 (p value)
	Mean ± SD	Mean ± SD	
Susceptibility	22.61±4.73	40.42±6.87	19.292 (0.001**)
Seriousness	32.73±8.36	43.71±11.61	15.539 (0.016*)
The benefits	17.97±5.19	26.32±7.34	10.683 (0.030*)
The barriers	33.76±10.26	48.82±13.51	9.724 (0.045*)
Cues to action	23.91±8.09	37.68±10.56	10.620 (0.031*)
Self-efficacy	19.21±6.48	29.57±8.58	11.893 (0.018*)
Total	150.19±21.68	226.51±32.83	19.127 (0.001**)

* Statistically significant at p≤0.05
** highly statistical significant at p≤0.01

Table 3. Distribution of the studied female workers regarding means sub-items of breast self-examination (n=323)

Sub-items of breast self-examination	Pretest	Posttest	X^2 (p value)
	Mean ± SD	Mean ± SD	
Examination preparations	1.34±1.42	3.37±1.31	5.629 (0.018*)
Examination by consideration	3.36±3.09	9.61±3.67	6.712 (0.010**)
Make sure a symmetry in the nipple, areola, breast	0.981±1.39	4.05±1.64	9.541 (0.002**)
Tactile examination (palpation)	4.46±3.08	11.13±4.12	8.326 (0.004**)
Total	10.14±7.40	28.16±10.28	9.406(0.002**)

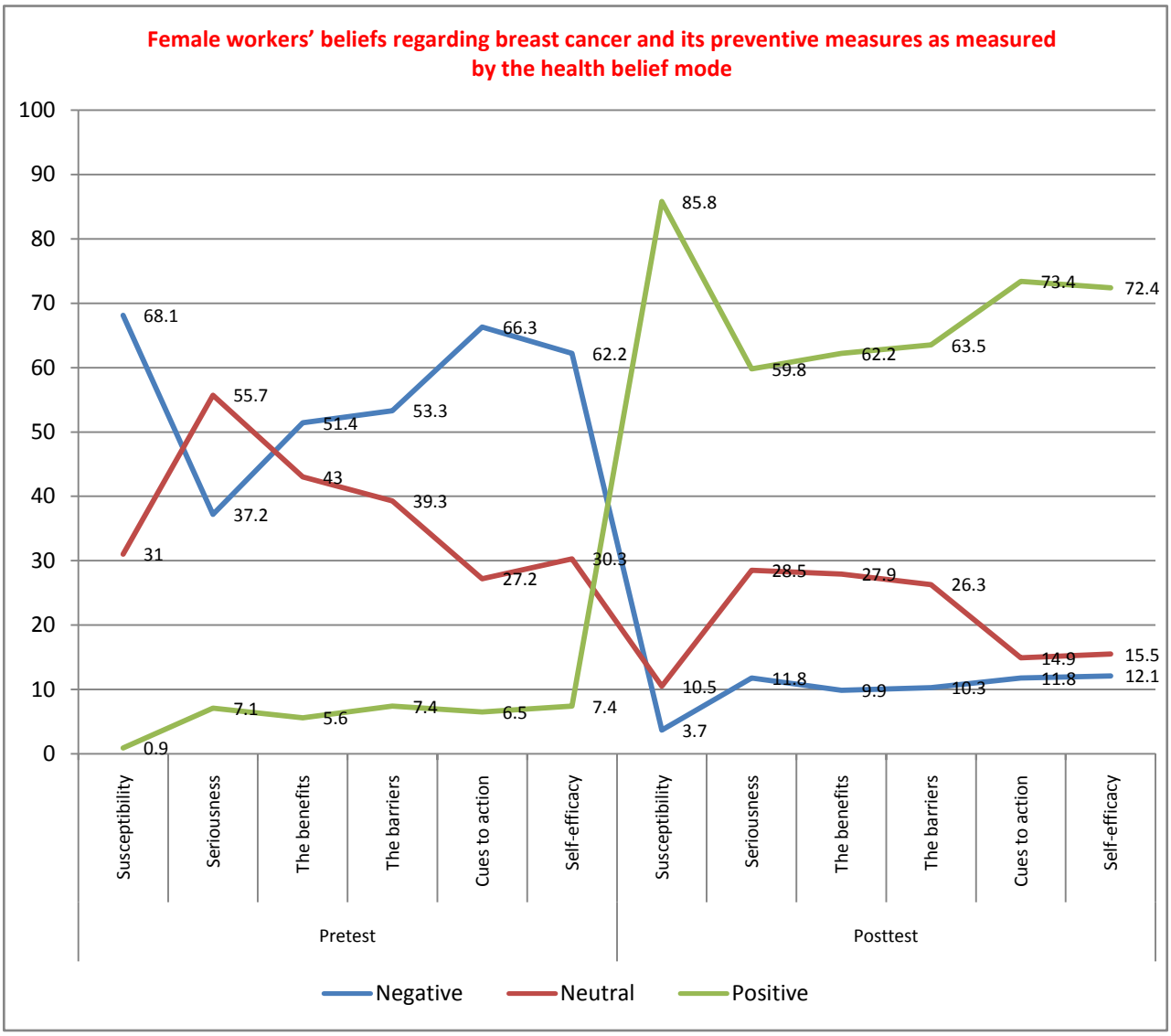

Figure 3. Female workers' beliefs regarding breast cancer and its preventive measures as measured by the health belief model

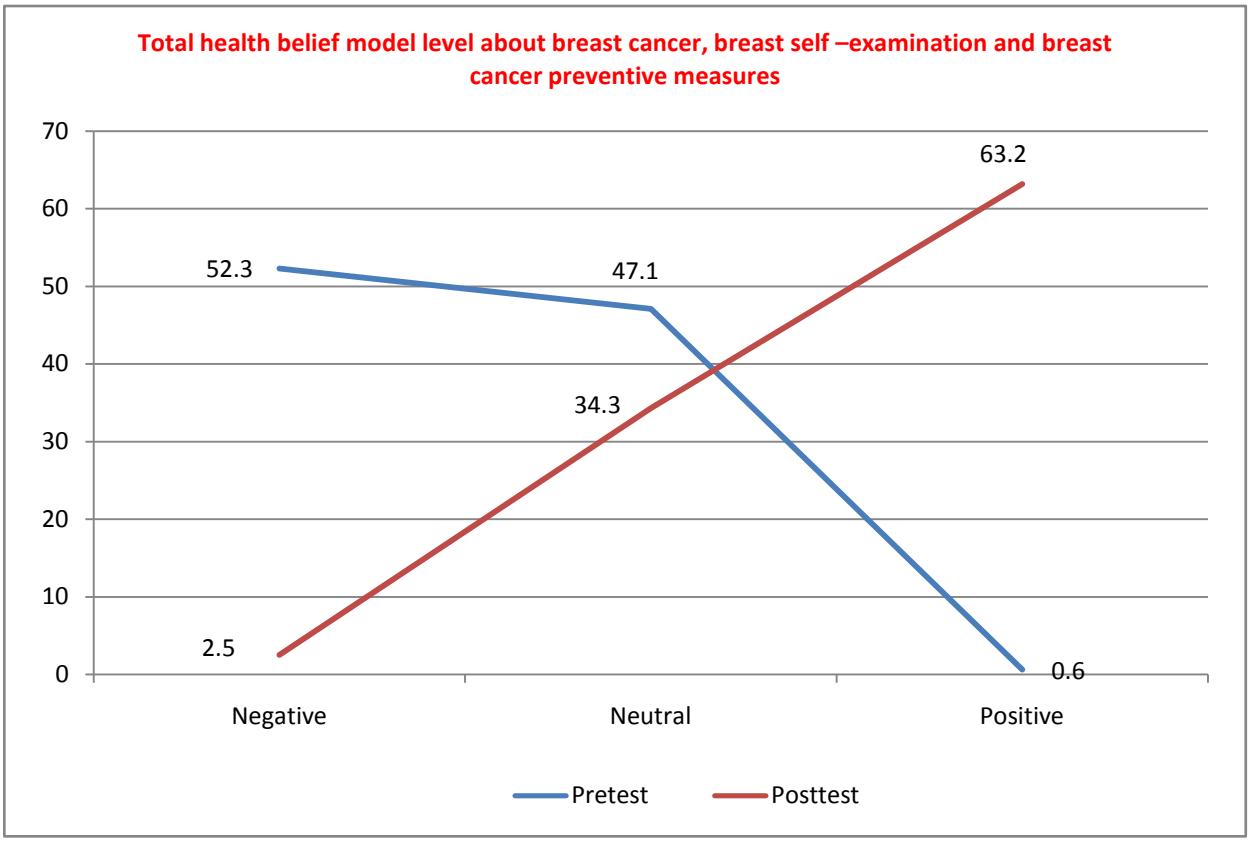

Figure 4. Percentage distribution of the studied female workers' regarding to their total health belief model level about breast cancer, breast self – examination and breast cancer preventive measures (n=323, X^2 = 19.127, p value = 0.001**)

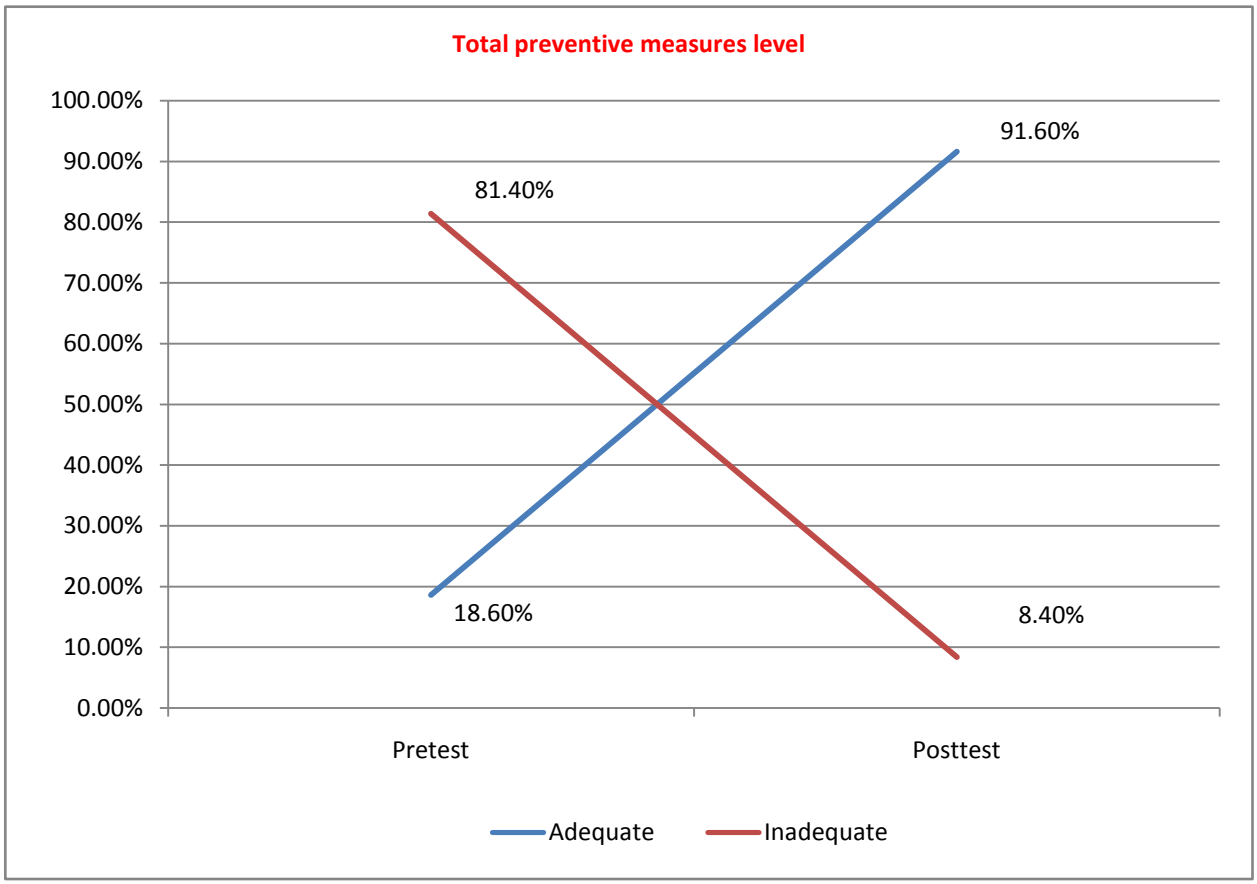

Figure 5. Percentage distribution of the studied female workers' total preventive measures level (n=323, X^2 = 10.559, p value = 0.032*)

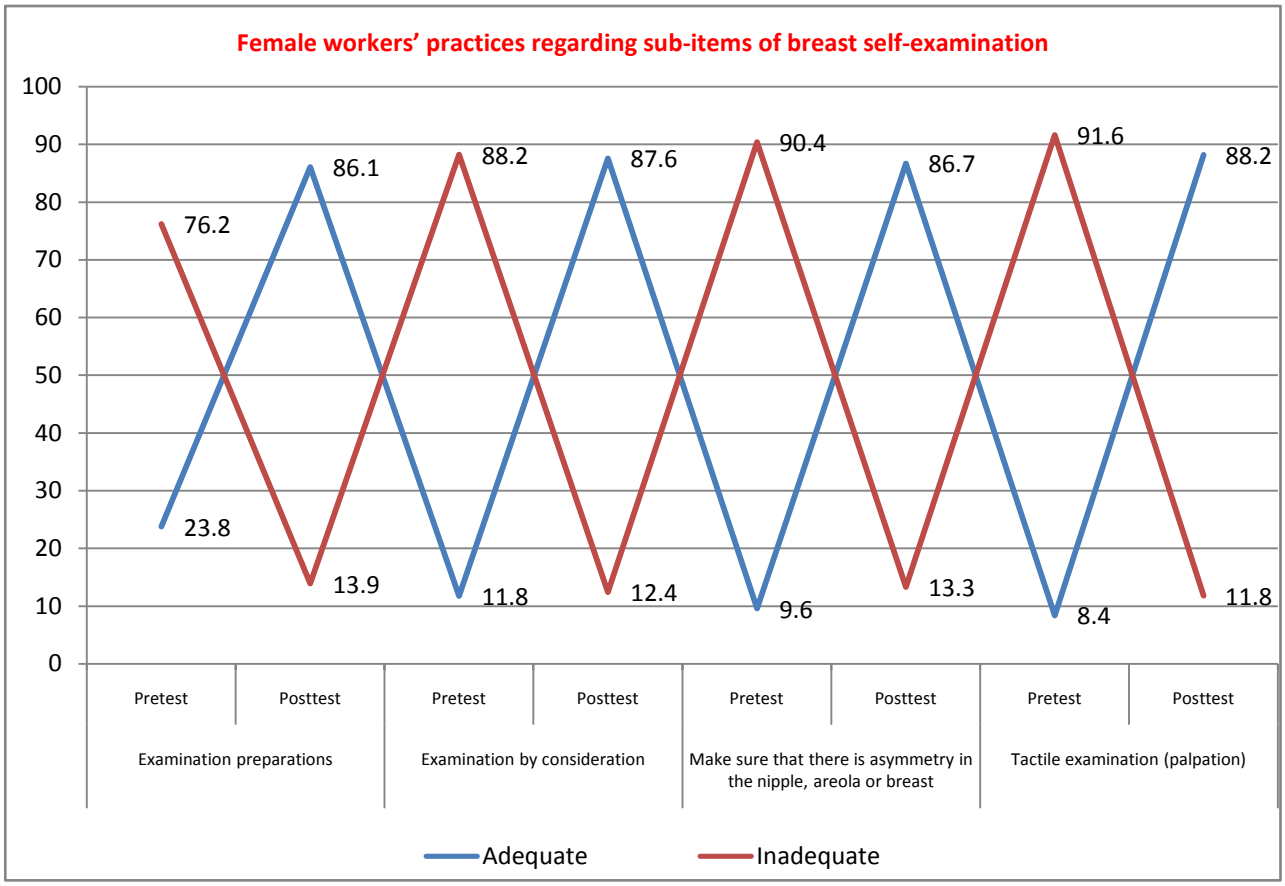

Figure 6. Female workers' practices regarding sub-items of breast self-examination

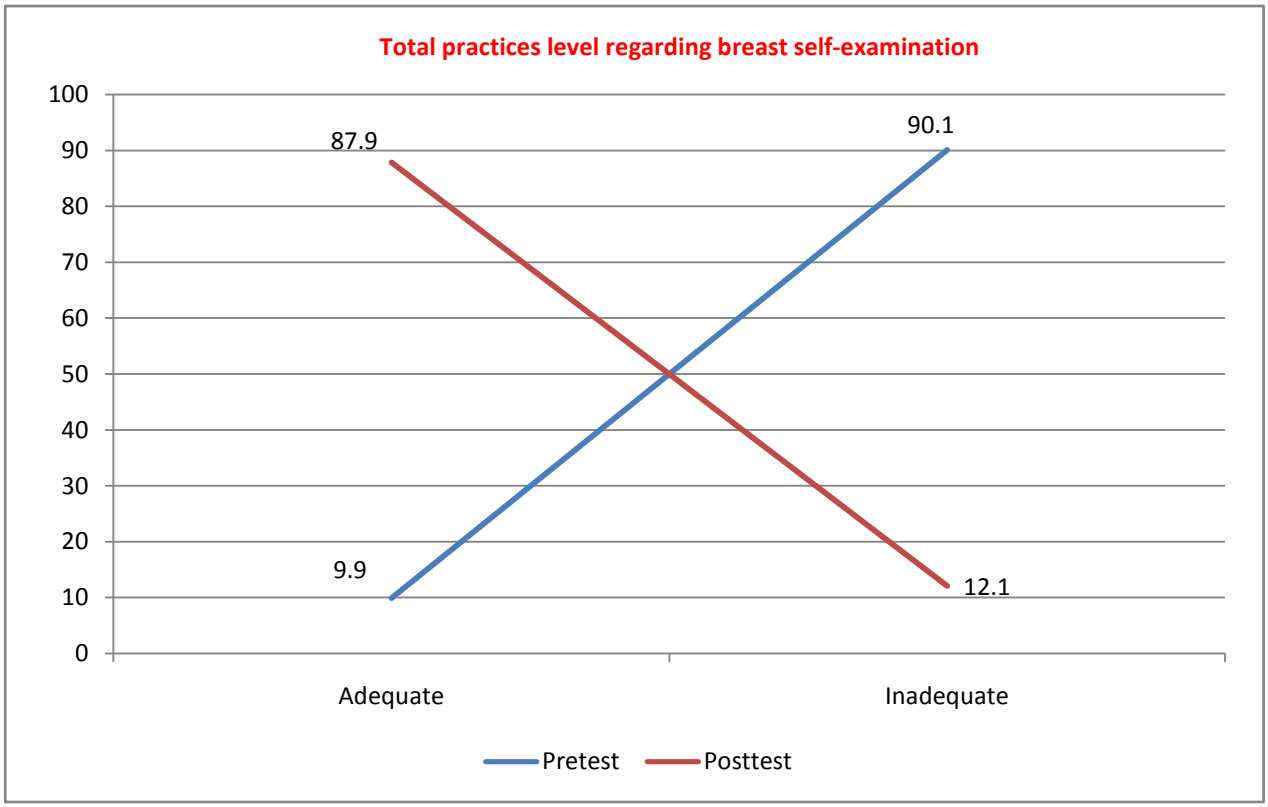

Figure 7. Distribution of the studied female workers' total practices level regarding breast self-examination (n=323, X^2 = 9.406, p value = 0.002**)

Table 4. Correlation between all studies of breast cancer, total beliefs as measured by health belief model and breast cancer preventive measures pre and posttest

		Total knowledge of breast cancer		Total beliefs as measured by HBM		Breast cancer preventive measures	
		Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Total knowledge of breast cancer	R						
	P						
Total beliefs as measured by HBM	R	0.020	0.214				
	P	0.724	0.000**				
Breast cancer preventive measures	R	0.112	0.168	0.001	0.158		
	p	0.045*	0.002**	0.990	0.004**		
BSE Observational checklist	r	0.036	0.398	0.094	0.186	0.069	0.259
	p	0.523	0.000**	0.091	0.001**	0.219	0.000**

* Positive correlation at p≤0.05

** Strongly Positive correlation at p≤0.01

5. Discussion

Breast cancer is the most common cancer among women, with an estimated 19.3 million new cases in 2025. The rising incidence leads to increased health spending and high death rates. Effective cancer screening is crucial for early diagnosis and prevention, with mammography, clinical breast examination, and BSE being essential tools [29]. So, the current study was conducted to evaluate the effect of an educational program on female workers' knowledge about breast cancer preventive measures at Beni-Suef University.

Concerning general knowledge of breast cancer, the study found that a health education program significantly improved the knowledge of female workers about breast cancer, from less than 10% to nearly three-quarters after a month. Moreover, the study found that a health education program significantly improved female workers' knowledge about breast self-examination, from over three-quarters to almost one-tenth after a month, indicating a significant improvement. Also, the study found that posttest female workers' practice of breast cancer preventive measures improved significantly, with almost one-third of them showing adequate practice compared to pretest levels.

Regarding of the studied female workers mean knowledge of sub-items about breast cancer, breast self-examination and breast cancer preventive measures, results revealed a statically significant improvement of mean of knowledge after program implementation. The finding was in the same line with **Eittah et al. (2014),** who investigated the "effect of health education on raising female students' awareness' regarding breast cancer in Saudi Arabia" and clarified that there was a statistically significant difference regarding posttest knowledge about breast cancer [30].

The following headlines address the beliefs of female employees regarding breast cancer and its prevention strategies as determined by the health belief model: The study shows a decrease in the perception of negative beliefs and an increase in the perception of positive ones, with mean±SD, for the studied female employees' perceived susceptibility, seriousness, benefits, barriers, cues to action, and self-efficacy of BC before and after the introduction of the HBM-based educational program. A highly statistically significant improvement in the posttest HBM regarding BC susceptibility when compared to the pretest.

The study found a significant improvement in female workers' beliefs about breast cancer and preventive measures after implementing a health education program based on Health Belief Modeling. Previously, over half of the workers had negative beliefs, but these decreased post-program. This result is similar to that of **Khorsandi et al. (2020)**, who discovered that post-HBM implementation significantly improved over pre-HBM [31].

Regarding the studied female workers' total preventive measures level, the current study revealed that there was a marked improvement in female workers' total preventive measures after program implementation, as less than one-fifth of the female workers had adequate practice pretest compared to the majority of them having adequate practice in posttest.

This finding is similar to **Pereira et al. (2020)**, who studied "effects of a WhatsApp-delivered education intervention to enhance breast cancer knowledge in women" and found that there was marked improvement in participants' total preventive measures level after intervention from more than half of participants having adequate practice with pretest to the majority having adequate practice with posttest. This finding may be attributed to improving women's knowledge, which affects their beliefs and habits regarding breast cancer prevention, as good knowledge can lead to a positive attitude, leading to good behaviors and the simple, attractive way of illustrating the element of the preventive guideline and the well-prepared booklet with a colored illustrated photo [32].

Regarding the practice of BSE, the current study announced that there was a highly statistically significant effect of the health education program on the practice of breast self-examination in the post-program implementation compared with the pretest with all items of reported practice regarding BSE.

The finding was in the same line with **Akarsu & Andsoy (2022),** who investigated the "evaluation of breast self-examination training in Turkish women living in northwestern Turkey" and clarified that there were significant improvements noted in the post-test (after training, after one month, and three months of training) scores for steps of BSE after the intervention [29]. This might be connected to the influence of knowledge on practice, as increasing knowledge is associated with better self-confidence, which in turn leads to the woman being able to practice with greater accuracy.

Concerning the correlation between the studied female's total knowledge, health belief model, breast

cancer preventive measures, and breast self-examination pre and posttest, the current study illustrates that there was a strong positive statistically significant correlation between total knowledge (pre & posttest), total beliefs as measured by the health belief model, breast cancer preventive measures, and breast self-examination. There was a strongly positive statistically significant correlation between total beliefs as measured by the health belief model (pre & posttest), breast cancer preventive measures, and breast self-examination. Also, there was a strongly positive statistically significant correlation between total breast cancer preventive measures (pre & posttest) and breast self-examination.

This finding is congruent with **El-kest et al. (2021),** who found that there was a positive correlation between the total knowledge of studied women and the total belief score of women. This indicates that improving awareness is positively related to an improved attitude [33].

Also, this finding agreed with **Ishtiak et al. (2022),** who proved that practice of BSE was positively associated with level of knowledge regarding BSE [34]. This finding is also in the same line with **Elbasuony et al. (2020),** who found that there were highly statistically significant differences regarding BSE and total knowledge pre and post-implementation of the preventive guideline [35].

Additionally, this finding is in accordance with **Godfrey et al. (2016),** proved that the poor BSE practices observed among the students may be related to inadequate knowledge of breast cancer symptoms, risk factors, as well as inadequate skills in performing BSE [36]. Also, this result agreed with **Kalliguddi et al. (2019),** indicated that there was a positive correlation between HBM and practice of BSE and a positive correlation between knowledge and BSE practice. But disagreed with this finding and proved that knowledge and attitude are not correlated [37].

Conversely, this finding disagreed with **Meilina et al. (2024),** who investigated "the relationship of knowledge, attitudes, and family history of breast cancer to breast self-examination (BSE) behavior in women" and revealed that there was no significant relationship between beliefs and BSE practice [38].

Based on the results of the current study, it was observed that the health belief model had significantly increased the knowledge, improved health practice, and enhanced health beliefs regarding the detection of breast cancer among the studied female workers, and the fact that the knowledge is the baseline of practices that positively affect beliefs and behavior.

6. Conclusion

Based on the results of the current study, it was observed that the health belief model had significantly increased the knowledge, improved health practice, and enhanced health beliefs regarding the detection of breast cancer among the studied female workers, and the fact that the knowledge is the baseline of practices that positively affect beliefs and behavior. Moreover, based on the findings of the present study, it can be concluded that there was marked improvement in female worker's beliefs regarding breast cancer and its preventive measures in all items as measured by the health belief model after the health education program after program implementation. Moreover, the results showed the effect of health education programs on the improvement in practice of all sub-items for breast self-examination.

Recommendations

- Increase awareness about effect and important of breast self-examination among working women.
- Design and disseminate brochures work on the breast self-examination, preventive measures of breast cancer

Additional research on large samples of high risk women to assess their perception for the prevention and early detection of BC.

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