

Effect of an Educational Program on Enhancing Female Workers' Health Belief Model of Breast Cancer Preventive Measures

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Abstract Background: Breast cancer is a prevalent global disease, causing over one million new cases and over 60,000 deaths annually. We developed the health belief model (HBM) to explain health behaviors, such as the use of health services and views on avoiding illness. The model was expanded to include self-efficacy, a person's belief in their ability to act successfully. **Aim:** to evaluate effect of an educational program on enhancing female workers' health belief model of breast cancer preventive measures. **Subjects and Methods: Design:** A quasi-experimental design. **Sample and Settings:** 323 working women at Beni-Suef University were selected. **Tools:** The study utilizes a structured interviewing questionnaire, a Health Belief Model Questionnaire, and an Arabic booklet to assess pregnant women's psychological readiness for breast cancer prevention. **Results:** there was a highly statistically significant improvement in female workers' health belief regarding to perceived susceptibility, benefits, and self-efficacy during post-test HBM as $p \leq 0.01$ in comparison to the pretest. Moreover, there was a statistically significant improvement in female workers' health belief regarding to perceived seriousness, barriers, and cues to action during post-test HBM as $p \leq 0.01$. **Conclusion:** Based on the findings of the present study, it can be concluded that there was a statistically significant improvement in female workers' health belief toward all items of HBM including perceived susceptibility, seriousness, benefits, barriers, cues to action, self-efficacy during post implementation program compared to pre-implementation. The implemented educational program about health belief model had a positive effect of female workers' breast cancer preventive measures. **Recommendations:** Apply health belief model for preventive measures for other types of gynecological cancer.

Keywords: Breast Cancer, Educational Program, Enhancing, Female Workers', Health Belief Model

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1. Introduction

Each year, more than one million new cases of breast cancer have been diagnosed in the world, and for this reason. In more than six hundred thousand cases, death occurs [1,2,3,4,5,6,7,8]. Worldwide, breast cancer is a prevalent tumor in women. Breast cancer causes a burden in terms of prevention, diagnosis, and treatment, regardless of a nation's economic situation [9,10,11,12] [13,14,15,16].

A social psychology model for health behavior modification, the health belief model (HBM) was created to explain and forecast behaviors connected to health, especially the use of health services. It also describes a person's views on avoiding illness, preserving good health, and aiming for well-being [17,18,19].

The four elements of the HBM perceived susceptibility, severity, benefits, and barriers were expanded in 1988 to

include self-efficacy. A person's belief in their ability to act successfully is known as self-efficacy. An attempt was made to enhance the HBM by including self-efficacy to better explain individual variations in health behaviors [20,21,22].

The updated Champion's HBM Scale (CHBMS) consists of six elements: perceived susceptibility to illness, risk perception, perceived severity of illness, perceived benefits of behavior modification, and perceived barriers to action. It suggests women with serious breast cancer risk are more likely to participate in screenings [23].

Perceived susceptibility refers to the subjective estimation of one's vulnerability to a health issue, which can lead individuals to take actions to reduce their likelihood of experiencing it [24]. Perceived severity refers to the subjective assessment of the severity and potential outcomes of a health issue, influencing individuals to take action to prevent or reduce its impact, including opinions on the illness's terminality and effects

[25]. Perceived benefits refer to an individual's evaluation of the worth or effectiveness of adopting a health-promoting action to reduce disease risk [26].

Perceived barriers to action significantly influence health-related behaviors, as individuals evaluate impediments to altering their actions, even if they believe it will reduce the threat of their health condition [27]. Cues to action are situations that prompt decision-making about health, including media messages, social interactions, and influence. Interior cues, such as disease signs and symptoms, can influence individuals to seek treatment for advanced-stage breast cancer [28]. Self-efficacy, a person's belief in their ability to act successfully, was incorporated into the Health Behavior Model (HBM) to better explain individual health behaviors [20].

2. Aim of the Study

The current study was conducted to evaluate effect of an educational program on enhancing female workers' health belief model of breast cancer preventive measures.

3. Subject and Method

Research design:

The research utilized an interventional, quasi-experimental design, which included a pre-test and a post-test.

Subjects and Settings:

A sample of 323 working women aged 18 to 60 at Beni-Suef University was chosen due to their absence of cancer, chemotherapy, radiation, and psychological illnesses.

Tools of data collection:

Tool I: A Structured Interviewing Questionnaire Sheet

Age, education, marital status, place of residence, and family income are just a few of the socio-demographic and personal characteristics of women that the researcher collected through a review of the literature.

Tool II: Health Belief Model Questionnaire:

Subscale (1): Perceived susceptibility to breast cancer is influenced by health status, anxiety, self-examination, family history, and exercise, with health status, family history, and exercise all contributing factors.

Subscale (2) Breast cancer is a hopeless disease that significantly impacts self-perception, financial stability, and long-term health issues, making it a more dangerous and difficult condition than any other.

Subscale (3) Breast self-examination offers numerous benefits, including early detection of tumors, preventing future issues, promoting a healthy diet, and reducing the risk of breast cancer, while also reducing complications.

Subscale (4): Perceived barriers to breast cancer include financial costs, time consumption, interference with activities, and pain associated with medical examinations.

Subscale (5): The individual prioritizes health through healthy eating habits, following doctor's instructions, taking vitamins, seeking health-related information, regular check-ups, and regular examinations.

Subscale (6): The individual believes they can handle breast cancer screenings, even if others object, and is

confident in their ability to cope with the resulting emergency, despite the potential risks associated with a healthy diet.

Scoring system: A study rated responses on a five-point Likert scale, resulting in 300 degrees of total attitude. Three categories were created: positive belief ($\geq 75\%$), neutral belief (50-74%), and negative belief ($< 50\%$). The questions related to susceptibility, seriousness, and barriers had a reversed scoring system, with higher scores indicating more negative health beliefs.

Tool III: Supportive material (Arabic booklet):

The text provides a comprehensive overview of breast cancer, outlining its definition, signs, symptoms, risk factors, types, stages, diagnosis, treatment, and preventive measures.

Tools Validity and Reliability

Five experts from Beni-Suef University evaluated the study tools' content validity and reliability, with total knowledge, Health Belief Model, and breast cancer preventive measures having high reliability coefficients.

Ethical Consideration and Administrative Design:

The study received ethical approval from Beni-Suef University's Faculty of Medicine's Research Ethics Committee, nursing faculty dean, and hospital director, and an official letter was sent.

Pilot study:

A pilot study on 10% of 32 women evaluated tool applicability, efficiency, and clarity, identifying obstacles and making necessary modifications, excluding the pilot sample from the main study.

Fieldwork

The study, which began in December 2023 and concluded in May 2024, involved phases of assessment, planning, implementation, and evaluation.

Preparatory phase:

The researcher created and evaluated data collection tools through a review, and a panel of experts assessed their validity, substance, knowledge, correctness, and relevance.

Phase (I): Assessment phase:

The researcher conducted interviews with women to understand their socio-demographic traits and knowledge about breast cancer, which served as the baseline for an educational program and influenced the health belief model's impact.

Phase (II): Planning phase:

The researcher used pre-test results and a health belief model to inform the development of an educational program aimed at improving the knowledge and behaviors of women on the prevention of breast cancer.

Phase (III): Implementation phase:

Through theoretical sessions, the program sought to inform women about breast cancer's causes, risk factors, symptoms, diagnosis, treatment, and preventive measures.

Program sessions:

Health education sessions were scheduled for 45 minutes each, starting with an orientation about the program and objectives. Each session summarized previous sessions and objectives, followed by questions and answers, and a plan for the next session. Feedback was used for termination. Educational media included an artificial breast module, laptop, and guidance booklet, along with Arabic and audiovisual materials.

Phase (IV): Evaluation phase:

Post-tests were conducted on female participants to assess their knowledge and practices of preventive behaviors, and abnormal signs were referred to maternal healthcare centers for further investigation.

Statistical Design:

The study analyzed data on women's knowledge and preventive behaviors before and after HBMS implementation using SPSS version 20 and compared results using various statistical tests, p-value of ≤ 0.001 , and insignificant at a p-value > 0.05 .

4. Results

Table 1 shows that there was a statistically significant improvement in female workers' health belief toward all items of perceived susceptibility during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that less than one tenth (5.0%, 5.3% & 5.9%) of females were strongly agreeing regarding the perceived susceptibility of breast cancer in the pretest, which improved to more than one third and nearly one half (49.5%, 39.3% & 44.6%) post HBM implementation, respectively.

Figure 1 shows that there was a highly statistically significant improvement in female workers' health belief regarding to perceived susceptibility during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 68.1%, which improved to 3.7% post HBM implementation, while positive belief in the pretest was reported by 85.8%, which improved to 0.9% post HBM implementation.

Table 2 reveals that there was a statistically significant improvement in female workers' health belief toward all items of perceived seriousness (severity) during post-test HBM as $p \leq 0.05$ in comparison to the pretest, as noticed that less than one tenth (7.4%, 7.7%, & 8.4%) of females were strongly disagreeing regarding the perceived seriousness of breast cancer in the pretest, which improved to more than one third and nearly less than half (40.2%, 39.3%, & 39.6%) post HBM implementation, respectively.

Figure 2 shows that there was a highly statistically significant improvement in female workers' health belief regarding to perceived seriousness (severity) during post-test HBM as $p \leq 0.05$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 37.2%, which improved to 11.8% post HBM implementation, while positive belief in the pretest was reported by 7.1%, which improved to 59.8% post HBM implementation.

Table 3 illustrates that there was a highly statistically significant improvement in female workers' health belief toward all items of perceived benefits during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that the minority (12.1% & 14.2%) of females were strongly agreeing regarding perceived benefits of breast cancer in the pretest, which improved to less than half

(48.6% & 48.9%) post-HBM implementation, respectively.

Figure 3 shows that there was a statistically significant improvement in female workers' health belief regarding to perceived benefits during post-test HBM as $p \leq 0.05$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 51.4%, which improved to 9.9% post HBM implementation, while positive belief in the pretest was reported by 5.6%, which improved to 62.2% post HBM implementation.

Table 4 shows that there was a statistically significant improvement in female workers' health belief toward all items of perceived barrier during post-test HBM as $p \leq 0.05$ in comparison to pretest, as noticed that nearly one quarter and more (21.4%, 27.6%, & 31.9%) of females were strongly disagreeing regarding the perceived barrier of breast cancer in the pretest, which improved to nearly one half and more (54.2%, 48.0%, & 46.1%) post HBM implementation, respectively.

Figure 4 shows that there was a statistically significant improvement in female workers' health belief regarding to perceived barrier during post-test HBM as $p \leq 0.05$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 55.3%, which improved to 10.3% post HBM implementation, while positive belief in the pretest was reported by 7.4%, which improved to 63.5% post HBM implementation.

Table 5 reveals that there was a highly statistically significant improvement in female workers' health belief toward all items of cues to action during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that more than one tenth (10.5% & 18%) of females were strongly agreeing regarding cues to action of breast cancer in the pretest, which improved to less than half (43.3% & 42.7%) post HBM implementation, respectively.

Figure 5 shows that there was a highly statistically significant improvement in female workers' health belief regarding to perceived cues to action during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 66.3%, which improved to 11.8% post HBM implementation, while positive belief in the pretest was reported by 6.5%, which improved to 73.4% post HBM implementation.

Table 6 presents that there was a highly statistically significant improvement in female workers' health belief toward all items of self-efficacy during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that the minority (16.1% & 13.9%) of females were strongly agreeing regarding self-efficacy of breast cancer in the pretest, which improved to less than half (43.0% & 41.8%) post-HBM implementation, respectively.

Figure 6 shows that there was a highly statistically significant improvement in female workers' health belief regarding to perceived self-efficacy during post-test HBM as $p \leq 0.01$ in comparison to the pretest, as noticed that negative belief in the pretest was reported by 62.2%, which improved to 7.4% post HBM implementation, while positive belief in the pretest was reported by 85.8%, which improved to 72.4% post HBM implementation.

Table 1. Percentage distribution of the studied female workers' health belief regarding susceptibility (n=323)

First: about the susceptibility	Pretest					Posttest					X ² (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
Health status has a role in the development of BC	36.8	13.0	22.3	22.9	5.0	7.1	1.9	6.5	35.0	49.5	49.321 (0.000**)
The possibility of me getting BC increases my anxiety	7.4	16.4	16.7	21.7	37.8	48.6	20.4	14.6	6.8	9.6	26.436 (0.048*)
Doing BSE reduces the risk of BC	43.7	21.4	10.8	13.9	10.2	6.5	4.3	10.2	31.6	47.4	38.872 (0.001**)
Having a family member with BC increases chance of getting BC in future	45.5	25.1	13.0	8.4	8.0	5.9	4.0	9.6	36.8	43.7	27.659 (0.043*)
Exercise reduces the incidence of BC	31.3	33.7	11.1	14.6	9.3	6.8	1.5	10.8	38.3	41.5	26.179 (0.05*)
Aging is one of the factors that increases the chance of developing BC	51.4	21.7	11.5	8.4	7.1	6.2	3.7	12.1	36.8	41.2	41.833 (0.000**)
Eating healthy diets reduces the incidence of BC	26.6	40.6	13.9	13.0	5.9	7.1	2.2	11.1	35.0	44.6	49.453 (0.000**)
You think you are susceptible to BC because of wearing tight bras	24.8	36.2	16.7	15.8	6.5	5.6	5.0	11.1	39.0	39.3	38.470 (0.001**)
Doing one breast exam replace doing other breast exams	9.0	13.6	10.5	30.3	36.5	42.1	27.9	16.7	8.0	5.3	80.566 (0.000**)
You can do all the breast exams easily	38.7	35.0	9.0	12.1	5.3	5.9	3.4	10.5	40.9	39.3	42.612 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

* Statistically significant at $p \leq 0.05$ ** Highly statistical significant at $p \leq 0.01$

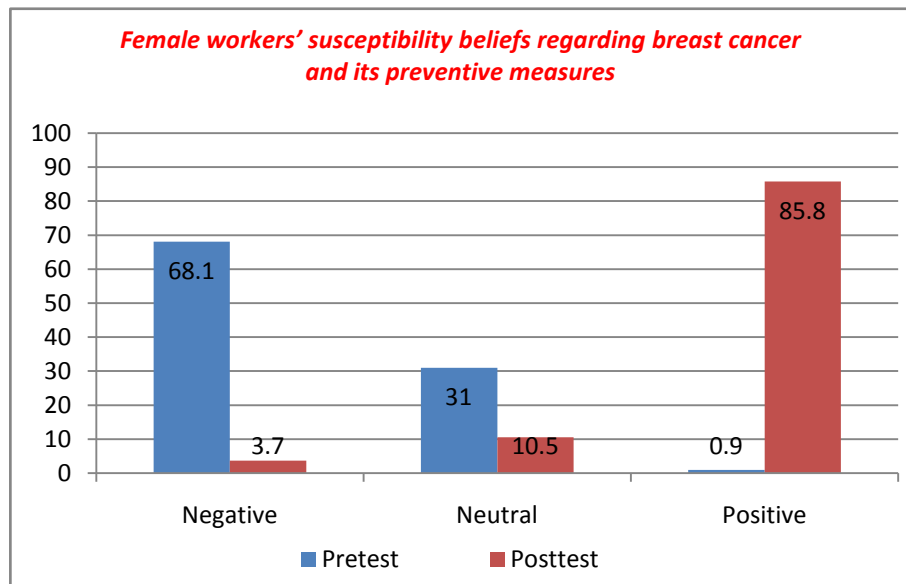


Figure 1. Female workers' susceptibility beliefs regarding breast cancer and its preventive measures as measured by the health belief model (n= 323, X² = 19.292, p value = 0.001**)

Table 2. Percentage distribution of the studied female workers' health belief regarding seriousness (n=323)

Second: about the seriousness	Pretest					Posttest					X ² (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
Thinking about breast cancer scares me and I feel nauseous	9.6	7.1	8.4	34.4	40.6	26.3	26.9	21.7	12.4	12.7	68.386 (0.000**)
My career is at risk if I get BC	9.6	23.2	19.8	18.6	28.8	35.6	27.6	11.5	13.0	12.4	31.887 (0.010**)
Will breast cancer be a factor	5.9	13.6	44.9	30.3	5.3	38.7	29.1	10.2	9.3	12.7	35.620 (0.003**)
BC is a hopeless disease	17.6	21.1	14.6	20.7	26.0	37.8	27.2	10.8	10.2	13.9	30.539 (0.015*)
How I feel about myself will change if I get BC	7.7	30.3	19.5	33.4	9.0	39.3	27.9	9.0	11.5	12.4	30.200 (0.017*)
Financial condition will be affected if I get BC	7.1	16.7	31.6	34.7	9.9	34.0	30.9	9.0	12.1	13.9	39.569 (0.001**)
Having BC results in problems that take a long time	7.4	12.4	38.7	35.9	5.6	40.2	27.6	10.2	10.8	11.1	32.744 (0.008**)
If I get breast cancer, my situation will be much more dangerous than having	6.2	14.2	38.4	28.8	12.4	34.4	31.0	10.8	12.1	11.8	31.806 (0.011*)

any other disease											
If I get BC, my whole life will change for the worse	8.4	16.7	18.3	29.1	27.6	39.6	28.8	10.2	8.7	12.7	33.892 (0.006**)
Are you afraid of the harm of radiation exposure during Mammography	12.7	17.6	31.3	26.3	12.1	37.8	29.4	9.6	9.6	13.6	43.651 (0.000**)
Are you afraid to do self-examination because it may lead to possibility of BC	11.8	15.2	22.0	33.7	17.3	36.5	30.3	8.4	12.7	12.1	38.568 (0.000**)
Does not knowing enough about breast exams make you afraid of a doing it	13.0	19.8	20.7	38.4	8.0	33.1	25.0	18.9	10.2	12.7	73.997 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

* Statistically significant at $p \leq 0.05$ ** Highly statistical significant at $p \leq 0.01$

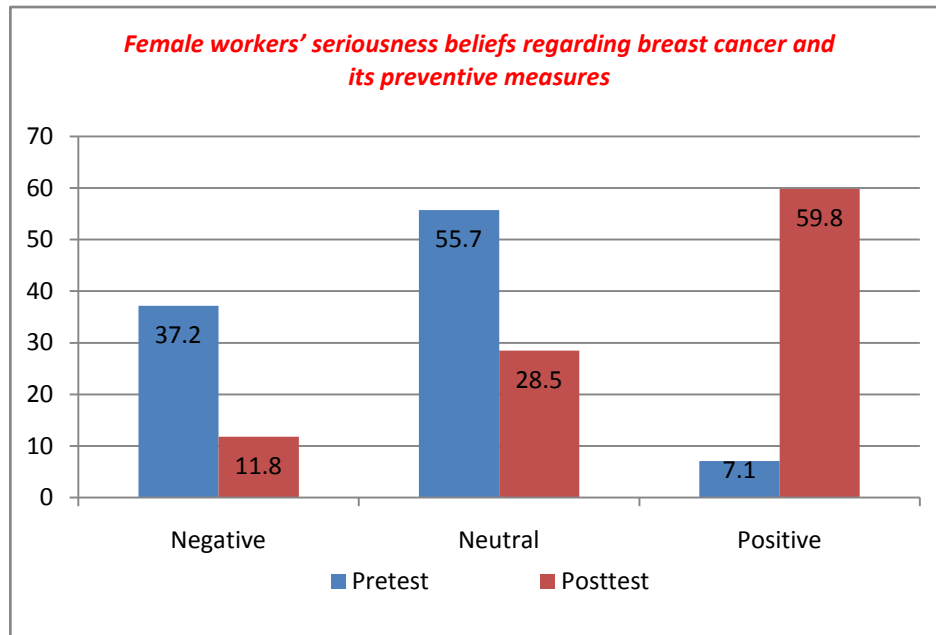


Figure 2. Female workers' seriousness beliefs regarding breast cancer and its preventive measures as measured by the health belief model ($n=323$, $X^2 = 15.539$, p value = 0.016*)

Table 3. Percentage distribution of the studied female workers' health belief regarding benefits ($n=323$)

Third: about the benefits	Pre test					Posttest					X^2 (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
Doing a BSE will not make me feel disturbed by breast cancer & make me feel healthy	32.2	17.3	24.5	13.9	12.1	10.5	2.5	12.7	25.7	48.6	56.101 (0.000**)
BSE helps me find a tumor early & prevent future problem	27.9	19.2	20.1	21.4	11.5	12.7	7.1	9.3	25.7	45.2	37.163 (0.002**)
I have a lot to gain by doing a BSE	33.7	15.5	18.9	17.6	14.2	15.5	4.6	9.9	21.1	48.9	92.143 (0.000**)
Eating a healthy diet reduces my chance of getting BC	24.8	33.4	13.9	17.0	10.8	16.7	4.3	14.2	17.0	47.7	37.324 (0.002**)
Doing a medical examination will help me find any tumor in the breast and reduce complications	30.3	31.3	13.6	14.6	10.2	15.8	9.0	12.4	23.5	39.3	70.949 (0.000**)
Doing physical activity will reduce my chance of getting BC	25.1	28.5	18.0	15.5	13.0	18.0	7.4	11.5	22.9	40.2	72.268 (0.000**)
Do you think having a comprehensive breast health scan will reduce the chance of dying from BC	34.7	23.5	11.5	21.4	9.0	14.9	7.7	9.6	28.8	39.0	47.108 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

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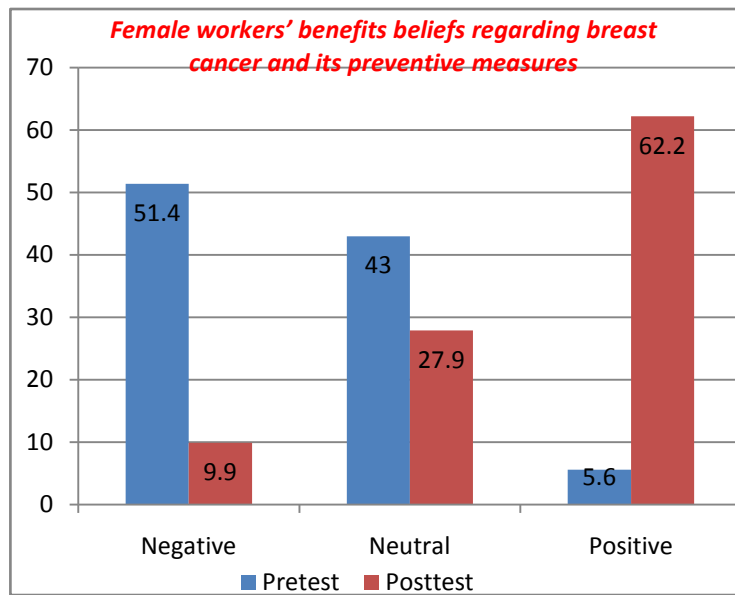


Figure 3. Female workers' benefits beliefs regarding breast cancer and its preventive measures as measured by the health belief model (n=323, $X^2=10.683$, p value = 0.030*)

Table 4. Percentage distribution of the studied female workers' health belief regarding barriers (n=323)

Fourth: about the barriers	Pre test					Posttest					X^2 (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
Performing BE by a doctor is an undesirable practice	22.9	33.1	14.9	15.8	13.3	44.9	23.5	8.7	9.0	13.9	27.863 (0.033*)
Doing a medical BE or mammography is financially expensive	11.5	40.6	26.9	11.1	9.9	38.7	24.8	8.0	10.2	18.3	43.390 (0.000**)
Doing BE by a doctor consumes time	15.8	40.6	14.6	14.9	14.2	39.3	26.0	9.3	9.6	15.8	30.635 (0.015*)
A medical BE interferes with my activities	25.4	30.0	15.5	15.8	13.3	45.5	25.1	8.0	7.7	13.6	28.554 (0.027*)
A medical examination of the breast by doctor painful	31.9	27.2	9.6	13.6	17.6	46.1	20.4	9.6	8.7	15.2	27.902 (0.032*)
Doing a monthly BE is one of the desirable behaviors	26.6	24.1	19.2	17.0	13.0	40.2	28.8	8.0	7.4	15.5	45.096 (0.000**)
Adherence to a healthy diet is financially expensive	23.5	30.0	17.3	13.9	15.2	39.9	24.8	9.9	8.0	17.3	35.054 (0.000**)
My family and friends make fun of me when doing a breast examination by a doctor or practicing BSE	32.2	23.5	17.3	9.6	17.3	41.5	25.4	11.1	6.5	15.5	44.524 (0.000**)
I don't have enough time for physical activity	32.5	27.6	13.3	15.8	10.8	45.2	27.6	8.7	6.2	12.4	28.699 (0.000**)
I lack knowledge of BC symptoms, risk factors and screening methods	22.6	35.9	15.8	10.8	14.9	44.9	27.6	8.4	7.1	12.1	48.502 (0.000**)
You don't have enough privacy to do BSE	27.6	32.2	13.6	15.5	11.1	48.0	21.7	6.8	7.1	16.4	35.103(0.000**)
Mammography a source of embarrassment for you	23.8	30.0	16.1	16.7	13.3	41.8	29.7	6.8	8.4	13.3	236.282 (0.000**)
There are any places available for a comprehensive breast scan in your city	21.4	42.1	17.3	9.0	10.2	54.2	20.4	6.5	6.8	12.1	70.9829 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

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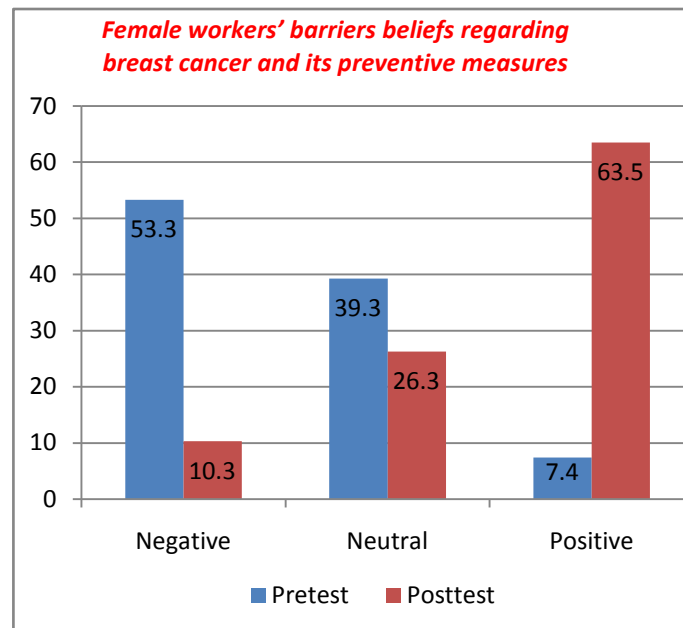


Figure 4. Female workers' barriers beliefs regarding breast cancer and its preventive measures as measured by the health belief model (n=323, $X^2=9.724$, p value = 0.045*)

Table 5. Percentage distribution of the studied female workers' health belief regarding cues to action (n=323)

Fifth: about the cues to action	Pre test					Posttest					X^2 (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
Adopt healthy eating habits	35.9	27.9	15.5	10.8	9.9	14.9	5.6	7.4	29.7	42.4	40.799 (0.000**)
Always follow the doctor's instructions, because I think it benefits my health	35.3	25.7	11.5	13.3	14.2	16.7	7.7	10.5	23.2	41.8	36.013 (0.000**)
Taking vitamins if I'm not properly fed	36.2	22.6	13.0	12.1	16.1	14.2	9.6	8.0	32.8	35.3	40.799 (0.000**)
Always look for information that benefits my health	32.2	30.0	12.7	10.8	14.2	17.3	7.1	6.2	30.3	39.0	96.877 (0.000**)
Doing regular check-ups & also going for an examination for any problem	34.4	29.7	8.7	9.3	18.0	11.8	2.8	11.1	31.6	42.7	53.249 (0.000**)
I exercise regularly at least 3 times a week	44.3	15.2	12.7	14.2	13.6	13.3	4.0	7.4	37.2	38.1	81.524 (0.000**)
Do you regularly do a monthly BSE to detect BC	49.5	14.2	12.7	12.7	10.8	14.2	5.9	5.9	34.1	39.0	84.852 (0.000**)
Do you know how to do BSE for early detection of BC	35.6	26.9	14.6	9.9	13.0	10.8	3.4	10.5	31.9	43.3	71.055 (0.000**)
Are you breastfeeding to reduce the incidence of BC	31.3	27.6	14.6	13.0	13.6	12.4	9.9	7.1	31.3	39.3	86.239 (0.000**)
Are you reducing the intake of hormonal contraceptives	43.3	21.4	10.8	13.9	10.5	13.3	11.5	9.0	22.9	43.3	63.008 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

* Statistically significant at $p \leq 0.05$ ** Highly statistical significant at $p \leq 0.01$

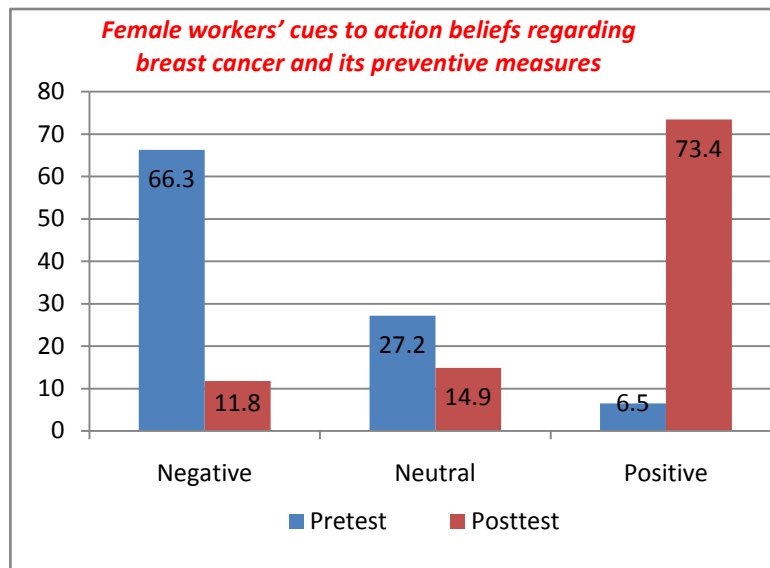


Figure 5. Female workers' cues to action beliefs regarding breast cancer and its preventive measures as measured by the health belief model (n=323, $X^2=10.620$, p value = 0.031*)

Table 6. Percentage distribution of the studied female workers' health belief regarding self-efficacy (n=323)

Sixth: about the self-efficacy	Pre test					Posttest					X^2 (p value)
	SD	D	N	A	SA	SD	D	N	A	SA	
	%	%	%	%	%	%	%	%	%	%	
If I want to do BC screening, I think I can solve the difficulties of screening	39.0	25.7	12.7	13.6	9.0	12.7	5.9	11.1	32.5	37.8	59.557 (0.000**)
If I knew that screening had many benefits, even if others refused, I would still do it	35.0	28.2	9.6	11.1	16.1	14.6	3.7	9.9	28.8	43.0	73.983 (0.000**)
It's easy for me to insist on regular BC screening	33.7	31.0	11.8	9.9	13.6	18.0	9.3	11.5	24.8	36.5	34.841 (0.004**)
If I have BC, I think I can effectively deal with the resulting emergency	39.9	22.3	13.0	11.1	13.6	14.2	8.4	12.1	29.4	35.9	46.385 (0.000**)
You follow a healthy diet to reduce the risk of BC	37.5	27.6	10.2	9.9	14.9	16.1	6.2	13.6	30.7	33.4	35.416 (0.003**)
Having a BE feels confident in being able to detect an abnormal change in the breast	26.6	32.5	15.5	11.5	13.9	13.9	7.4	9.3	27.6	41.8	146.880 (0.000**)
I did BSE	36.2	26.9	10.8	12.4	13.6	15.5	5.0	10.8	31.9	36.8	114.801 (0.000**)
Performing a regular breast examination is important	35.3	24.1	16.1	12.7	11.8	12.1	6.5	13.9	27.9	39.6	84.337 (0.000**)

SD.....Strongly disagree, D... Disagree, N....Neutral, A....Agree, SA..... Strongly agree

* Statistically significant at $p \leq 0.05$ ** Highly statistical significant at $p \leq 0.01$

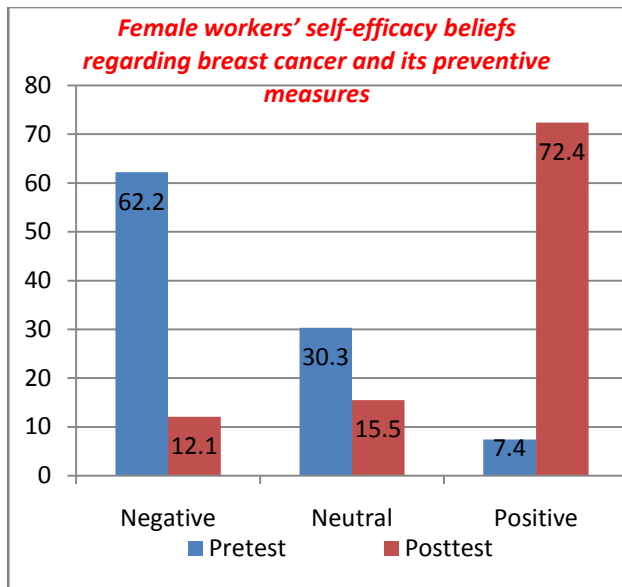


Figure 6. Female workers' self-efficacy beliefs regarding breast cancer and its preventive measures as measured by the health belief model ($n=323$, $X^2=11.893$, p value = 0.018*)

Discussion

Originally, the model was created to explain health-related one-time activities like getting a vaccine or going through a cancer screening. In due course, the HBM was extended to include more significant, long-term behavioral changes, including quitting smoking, exercising, and altering one's diet. The model's creators understood that a crucial element of changing health-related behavior was self-efficacy, or the belief in one's capacity to influence changes in outcomes [29,30]. The aim of the study was evaluate effect of an educational program on enhancing female workers' health belief model of breast cancer preventive measures.

Concerning female workers' beliefs regarding breast cancer and its preventive measures as measured by the health belief model, it is discussed under the following headlines. Firstly, regarding the studied female worker's perceived susceptibility of BC pre and post-implementation of the HBM-based educational program, the current study indicates regression in perceiving negative susceptibility and progression in positive ones with an improvement. A highly statistically significant improvement in the posttest HBM compared with the pretest toward susceptibility of BC. This finding is in the same line with **Wondmu et al. (2022)**, who investigated the "effect of breast cancer education based on the health belief model on knowledge, health belief, and breast self-examination among female students" and found that there was a highly statistically significant difference observed between the intervention group and the control group in perceived susceptibility regarding breast cancer and breast self-exam using HBM within pre- and one month post-intervention [31]. From the researcher's point of view, encouraging group discussions or support groups can create a supportive environment where participants motivate each other to act on their health.

Secondly, concerning perceived severity (seriousness) of BC pre and post-implementation of the HBM-based educational program, the current study revealed that there was a marked improvement in the posttest HBM compared with the pretest toward susceptibility of perceived severity of BC with a highly statistically significant difference. This finding is in accordance with **Ștefănuț et al. (2023)**, who studied "psychotherapeutic intervention on breast self-examination based on the health belief model" and demonstrated that there were statistically significant differences between perceived severity regarding BC & BSE beliefs [32]. From the researcher's point of view, enhanced perceived severity by sharing information about the consequences of breast cancer, participants may better understand the seriousness of the disease and increase their motivation to take preventive action.

Thirdly, regarding the studied female worker's perceived benefits, the current study presented that there was a marked improvement in the posttest HBM compared with the pretest toward perceived benefits of BC. Regression in perceiving negative benefits and progression in positive ones with an improvement with a highly statistically significant difference was observed. This finding was supported by **Elsawy et al. (2023)**, who investigated the "effect of utilizing the health belief model on knowledge, beliefs, and behavior of visually impaired women toward breast self-examination" and showed that there were highly statistically significant differences between perceived benefits regarding BC & BSE behavior [27]. From the researcher's point of view, this finding may be due to the program highlighting the advantages of early detection and preventive behaviors, helping individuals recognize the positive outcomes of screening and lifestyle changes.

Fourthly, in relation to the studied female worker's perceived barrier of BC pre and post-implementation of the HBM-based educational program, the current study revealed that there was a marked improvement in the posttest HBM compared with the pretest toward perceiving the barrier of BC with a highly statistically significant difference. This finding agreed with **El-kest et al. (2021)**, who discussed "the effect of a health education program on the prevention of breast and cervical cancer based on the health belief model among female employees at the medical campus" and found that there were highly statistically significant differences between perceived barriers regarding BC beliefs [33]. From the researcher's point of view, this finding may be due to addressing common misconceptions and fears about screening or lifestyle changes that can help reduce perceived barriers, making participants more likely to engage in preventive actions.

Fifty; regarding the studied female worker's cues to action, the current study revealed that there was a marked improvement in the posttest HBM-based educational program compared with the pretest toward cues to action of BC with a highly statistically significant difference. This finding agreed with **Wondmu et al. (2022)**, who addressed the "effect of breast cancer education based on the health belief model on knowledge, health belief, and

breast self-examination among female students” and found that there was a highly statistically significant difference noted between the intervention group and the control group in cues to action regarding breast cancer and breast self-exam using HBM within pre- and post-intervention [31]. From the researcher's point of view, this finding might be due to educational materials providing brochures, videos, and workshops that can serve as tangible reminders to encourage participants to engage in screening, seeking necessary health services, and preventive behaviors.

Sixthly, concerning self-efficacy, the present study illustrated that there was a marked improvement in the posttest HBM compared with the pretest toward self-efficacy regarding BC with a highly statistically significant difference. This finding was congruent with **Elsawy et al. (2023)**, who discussed the “effect of utilizing the health belief model on knowledge, beliefs, and behavior of visually impaired women toward breast self-examination” and proved that there were highly statistically significant differences between perceived benefits regarding BC & BSE behavior [27].

Conclusion

Based on the findings of the present study, it can be concluded that there was a statistically significant improvement in female workers' health belief toward all items of HBM including perceived susceptibility, seriousness, benefits, barriers, cues to action, self-efficacy during post implementation program compared to pre-implementation. The implemented educational program about health belief model had a positive effect of female workers' breast cancer preventive measures

Recommendation

Apply health belief model for preventive measures for other types of gynecological cancer

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