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The Effect of Applying Preventive Intervention Based on Champion Health Believe Model on Breast Cancer Fatalism, Knowledge and Screening Behaviors among Female Employees

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Abstract Breast cancer (BC) is the most common cancer among women and leading cause of death worldwide, including Egypt. Many factors are identified to be linked with BC, fear and fatalism play a vital role in discouraging women from seeking BC screening. **Aim of the study:** Is to investigate the effect of applying preventive intervention based on Champion Health Believe Model on breast cancer fatalism, knowledge and screening behaviors among female employees. **Subjects & method:** Subjects: 200 female employees working in Alexandria & Damanhour universities. **Research design:** A quasi experimental design was adopted to carry out the study. **Tool I**: Female employees' breast cancer screening knowledge and practice scale, **Tool II:** Powe Cancer Fatalism Scale, & **Tool III:** Champion's Health Belief Model Scale. In addition to, female employees' Basic Data Structured Questionnaire. Data were analyzed using percentages & Pearson Chi-square. **Results:** the smallest percentages of the female employees had good breast cancer related knowledge and screening measures in the preprogram implementation phase. Statistically significant rise were noticed immediately after the program implementation. Women in both faculties had high cancer fatalism level in the initial assessment, which lessened immediately after the program application, with a statistically significant difference between them. The highest mean and standard deviation in Alexandria and Damanhour in perceived Susceptibility, perceived Seriousness and perceived benefits was immediate after the program. **Conclusions:** It was concluded that female employees' 'knowledge & practice of breast cancer was greatly affected by breast cancer fatalism, applying Breast Cancer related preventive program improve the knowledge and practice of female employees and decrease the level of breast cancer fatalism. **Recommendation:** Empowering women to take a proactive role in their own health & support health care professional role.

Keywords: *breast cancer, breast cancer fatalism, fear, champion's health believe model, education intervention program, screening behavior*

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1. Introduction

Breast Cancer (BC) is the most common cancer in women, and is accountable for thousands of deaths each year (ACS, 2015). BC ranks as the second leading cause of death in women, second to lung cancer (ACS, 2015) [1]. BC in low to middle income countries has late manifestation with poor treatment consequence due to many factors such as unequal arrival to rapid high quality treatment, lack of screening facilities, or lack of awareness and knowledge of the disease [2]. The consequence of BC survival after diagnosis and treatment rely on the stage of breast cancer at diagnosis. Thus, the earlier the BC is diagnosed the better the survival averages. As such there is potential to decrease mortality from BC by diagnosing BC early [3,4].

Moreover, Mohamed Emara, Director General of Baheya Foundation for Early Detection and Treatment of BC, mentioned that, 34% of Egyptian women suffer from cancer breast, the most common type of cancer in Egypt

for women. Emara emphasis on the need for all women over 40 to experience a periodic breast cancer test once every year. Women over 25 who have a genetic history of the disease should also experience yearly examinations. Emara assured that the rate of recovery from BC may reach up to 98% if the disease is diagnosed in its early stages. Indicated that 7,030 cases were diagnosed in its early stages in 2016 [5]. Among the existing group of Egyptian women, who had never sought a BC screening service, many personal, economic, and health care obstacles to the screening were determined. The Egyptian women suffered in silence, tolerated sever pain and discomfort before they would recognize to being ill, and would particularly only seek treatment when their symptoms became intense [6].

Furthermore, many factors are identified to be linked with BC. According to the ACS (American Cancer Society), some risk causes include: being female, getting older, family history, personal history of cancer in one breast, first child after the age of 30 or no children, getting a period early in life (menarche) before age 12, menopause after age 55, overweight, hormone replacement therapy and being a carrier of the breast cancer gene BRCA1 or BRCA2 (2015) [6]. Women can diminish their risk of developing BC by reducing the risk factors that can be changed. These factors include behaviors such as avoiding hormone replacement therapy, modifying lifestyle, having genetic testing (if indicated), and following recommended mammography and breast self-examination [7].

Several researchers have investigated the perceived barriers that prevent some women from seeking BC screening. In an exploratory study, Thomas, Saleem, and Abraham (2005) [8] found out many factors that represent as obstacles among African Americans and other minority group members. Factors such as lack of knowledge, underlying health and cultural beliefs, language barriers, and unhelpful attitudes of health professionals participated to lower utilization of mammography screenings in minority women [8]. Loerzel and Bushy (2005) [9] also identified barriers to cancer screening, including both systemic and human barriers, that affect the health care seeking behaviors of women of low socioeconomic status and minority women [9]. Furthermore barrier to cancer psychosocial factors i.e., fear and fatalism that play a major role in discouraging women from seeking BC screening. Cancer fatalism, which can be understood as the belief that cancer is a death sentence, has been found to be an obstacle to preventive cancer screening participation [10].

Breast cancer screening, which means examining a person's breast before any signs or symptoms have progressing, is still one of the best ways to decrease the incidence of mortality from BC in women and men today [11].

However, the Health Belief Model (HBM) has been used and is believed as one of the most beneficial models in healthcare prevention and promotion. It exhibits the ability to understand various behaviors or attitudes people may progress under the same condition. The model discusses the relationship between individual's belief and health behaviors, also used as a planning instrument for promoting compliance with preventive health behaviors and healthcare recommendations [12]. The Champion's Health Belief Model Scale (CHBMS) is a valid and reliable tool to examine beliefs about BC and screening methods [13]. The components of this model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy [14]. The first component of the HBM, is perceived susceptibility. It is known as a subjective perception of the risk of an illness. The greater the perceived risk, the greater the involving in behaviors to reduce the risk. In the context of BC, perceived susceptibility may involve the risk of a BC diagnosis in the long term or rapid future [15]. Perceived severity is the second construct of the HBM. Perceived severity is one's belief about the severity of a medical condition, the progression of events after detecting and feelings resulting from the outcome of a specific medical condition [16]. Possible medical outcome may include death, disability, and pain. Potential social outcome may include effects on work, family life, and social relations. The third component of HBM is perceived benefits which is one's belief in the efficacy of the recommended action to diminish health risks [14]. Perceived benefits of BC screening behaviors include BSE for early diagnosis of breast diseases. People tend to take on healthier behaviors when they think the new behavior will diminish their opportunities of progressing a disease. Perceived benefits play a vital role in the applying of secondary prevention behaviors such as screening. Perceived barriers are the fourth component of HBM. It points out to the potential negative aspects or obstacles to take an advised health action. This is the belief about physical and psychological costs of taking health action. Perceived barriers presenting breast cancer screening behaviors can be emotional, social and physical. Possible barriers may involve financial expenses, intensity of the procedure, pain, feeling confused, upset, and time-consumption [17]. Cues to action are the strategies taken to stimulate one's readiness to take health action. Cues to action, previously considered as motivation, refer to internal incentives to live a healthy lifestyle. Cues to action for presenting BC screening behaviors foster people to tolerate BSE and mammography. Cues to action include health education or recommendations by a physician [18,19]. The health Belief Model (HBM) was developed to display that a persons' reaction to their own health problems is directly related to their perceptions about the current threat to their health and about whether or not any action they take regarding such problems worth it and whether it will benefit them [20].

Community health nurse, obstetric nurse & nurse educator has a great role in promoting breast cancer early diagnosis behaviour, it is recommended to evaluate fatalism perceptions and health beliefs of the women and arrange training programs.

1.1. Significant of the Study

This study proposes that, along with so many other barriers, fear and fatalism are among the major barriers that prohibit screening. These factors, connected with lower levels of education regarding the causes of BC and preventive guidelines, contribute to the inadequate levels of screening among Egyptian women. So, this research investigates how these barriers disturb preventive screening.

2. Materials and Method

2.1. Material

2.1.1. Research Design

The quasi experimental design was adopted to carry out this study.

2.1.2. Aim

Is to investigate the effect of applying preventive intervention based on Champion Health Believe Model on breast cancer fatalism, knowledge and screening behaviors among female employees.

2.1.3. Research Hypothesis

- Applying Breast cancer related preventive program will improve the knowledge and practice of female employees
- Applying Breast cancer related preventive program will decrease breast cancer fatalism.

2.1.4. Setting

The study was carried out at faculty of nursing of both Alexandrina and Damanhur universities.

2.1.5. Subjects

The sample size was estimated using Epi info 7 statistical program using the following parameters; expected frequency 50%, 97% confidence level with 5% maximum error. The minimum sample size estimated to be 80 female employees from each setting. The final sample size was 100 female employees from each faculty to compensate possible non response.

A convenient sample of 100 female employee were selected from each faculty. Female employee aged 25 years and above and were willing to participate in the study.

2.1.6. Tools for Data Collection

Three tools were used for data collection:

Tool (I): Female employees' breast cancer screening knowledge scale: It was developed by the researchers to assess the female employees' breast cancer related knowledge and screening behavior like breast self-examination and mammogram. It consisted of **Part (1):** consists of 23 statements with two responses [yes= (1), and no= (0)]. The total score of knowledge scale distinguished between poor knowledge (score 0-7), fair knowledge (score 8-15) and good knowledge (score 16-23) to assess breast cancer related knowledge

Part (2): consists of 5 questions to assess the female employees' breast cancer related screening behavior beside, **Tool (II): Powe Cancer Fatalism Scale (Powe, 1995, 2001)** [21-23]. This scale was developed by Powe 1995 to measure the cancer fatalism and its associated cultural beliefs and values. It contained 15 items with a Yes or No response. Each "Yes" response was scored as one point and a "No" response as zero, giving the possible range of scores from 0 to 15. A score of zero to five indicates a low degree of fatalism, scores from six to ten indicate a moderate degree of fatalism, and scores from eleven to fifteen reflect a high degree of fatalism.

Tool (III): Champion's Health Belief Model Scale [24,25,26]:

It was originally developed in 1984 (Champion, 1984) and a revised model was crafted in 1999 (Champion, 1999) and Champion et al., 2004. The Champion Breast Cancer Fear Scale (CBCFS; Champion et al., 2004) was designed specifically to measure the perceived fear of breast cancer. The measure is unique in the sense that it analyzes the general emotion or the physiological arousal relating to human behavior regarding mammography testing. To measure perceived susceptibility and serious of breast cancer as well benefits and barriers of screening measures. The CHBMS scale comprised 42 questions divided into 6 domains; susceptibility (5 items), seriousness (7 items), benefits of screening measures (6 items), barriers of screening measures (6 items), self-Efficacy (11 items), and clues to action (7 items). The scoring for all statements is on 5 points Likert formats range from strongly agree equals (5), to strongly disagree equals (1). The total score for each domain result by summing up the scores of its statements and higher scores indicate high perception and lower scores indicate low perception.

In addition to female employees' basic data sheet. It included Female employees' personal and socio-demographic data such as age, sex, level of education, income, living condition and marital status and health status data such as previous health history and current health problems. Furthermore, female employees' practice level was assessed through three questions with yes /no answer format regarding previous experience of BSE and mammogram for breast cancer.

2.2. Method

The study was executed according to the following steps:

2.2.1. Administrative Process

- Approval of responsible authorities was obtained through official letters from the Faculties of Nursing.
- Meetings were held with the directors of the selected settings to clarify the purpose of the study and to gain their cooperation and support during data collection.

2.2.2 Study Tool

- Tool (I) was developed by the researchers after reviewing the recent relevant literature. It was validated by juries of (5) experts in the field. Their suggestions and recommendations were taken into consideration.
- Cronbach Alpha Coefficient was used to ascertain the reliability of the study tools especially tools (II) and (III) after translation into Arabic language, (r= 0.83 for tool I, r = 0.78 for tool II and 0.86 for tool III).

2.2.3. Pilot Study

- Was carried out on 10 (10%) female employees who were randomly chosen from each of both faculties and were not included in the sample in

order to ascertain the relevance, clarity and applicability of the tools, test wording of the questions and estimate the time required for the interview. Based on the obtained results, the necessary modifications were done.

2.2.4. Nursing Intervention (Breast Cancer Screening Educational Program):

I-Preparation phase:

- Initial assessment of each study subject in the previously mentioned settings using Breast Cancer knowledge and practice scale was carried out before applying the educational program, the researchers conducting posters, brochures and videos.

II- Developmental phase:

- The program objectives and methodology were prepared based on reviewing of all relevant and recent literature [21,22,23,24].

III- Implementation phase:

- Each female employee included in the study was interviewed individually to collect the necessary data using tool I, II, III. Privacy was maintained.
- The female employees were divided into 5 groups at every faculty. Each group composed of 20 females.

For each group, the program was conducted on 4 sessions along 2 weeks, 2 sessions per week. Each session duration took about 2 hours.

Components of Educational program	Number of sessions
- Program expectations	2
- Over view about breast cancer	2
- Prevention and control of breast cancer	2
- Breast Self-Examination (demonstration)	2

IV-Evaluation phase:

- The female employees in the present program were evaluated to determine the extent to which they have acquired the desired knowledge and skills and practiced it.
- Evaluation of the females' prior the program was done in the form of pretest administered to them using tool (I), (II) and (III). At the end of the program, a post test was carried out using the same tools as in pre-test. Post tests were conducted twice, immediately after the end of the programme and 3 months later to evaluate the immediate and retained changes in the female employees.

2.2.5. Data Collection

Data was collected by the researchers during the period from January 2019 to May 2019 (18 weeks).

2.2.6. Ethical Considerations

- Informed oral consents were obtained from the female employees after brief explanation of the purpose and nature of the research.
- The anonymity and confidentiality of responses, voluntary participation and right to refuse to participate in the study were emphasized to patients. The researcher explained the objectives of the study to the participants.

2.2.7. Statistical Analysis

After data were collected, they were coded and transferred into specially designed formats so as to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid any errors during data entry, frequency analysis, cross tabulation and manual revision were all used to detect any errors. The statistical package for social sciences (SPSS version 20) was utilized for both data presentation and statistical analysis of the results. The level of significance selected for this study was P equal to or less than 0.05.

3. Results

Table 1: Shows the distribution of the studied female employees according to their basic characteristics.

Concerning the female employees' age, it was found that the mean age of Alexandria employees was 38.90 ± 5.25 compared to 31.62 ± 8.46 in Damanhur. Furthermore, 40.0% of women in Alexandria were forty years and more compared to 19.0% in Damanhur. Moreover, the majority of them were married in Alexandria and Damanhur (86%, 91% respectively). The same table reveals that more than half (52%) female employees in Alexandria compared to 41.0% in Damanhur had associate degree of education. Additionally, it was noticed that the vast majority (95.0%) of employees in Alexandria were from urban area, while more than three quarters (77.0%) of the employees in Damanhur were from rural areas. The highest percentage of employees in both faculties reported income insufficiency (65.0% and 78.0% respectively). Lastly, 21.0% of female employees in Alexandria and 14% in Damanhur declared positive family history of breast cancer.

Table 1. Distribution of nurses according to their basic characteristics (n=200)

Women's Characteristics	Alexandria (N= 100)		Damanhour (N= 100)	
	No	%	No	%
Age (years)				
25-	15	15.0	24	24.0
30-	20	20.0	30	30.0
35-	25	25.0	27	27.0
≥40	40	40.0	19	19.0
	X ± SD 38.90 ± 5.25		X ± SD 31.62 ± 8.46	
Marital status				
- Married	86	86.0	91	91.0
- Not married (single- widowed- divorced)	14	14.0	9	9.0
Educational qualifications				
- Diploma degree	29	29.0	33	33.0
- Associate degree	52	52.0	41	41.0
- Bachelor degree	19	19.0	26	26.0
Place of residence				
Urban	95	95.0	16	16.0
Rural	0	0.0	77	77.0
Suburban	5	5..0	7	7.0
Income sufficiency				
Yes	65	65.0	78	78.0
No	35	35.0	22	22.0
Family history of breast cancer				
Yes	21	21.0	14	14.0
No	79	79.0	86	86.0

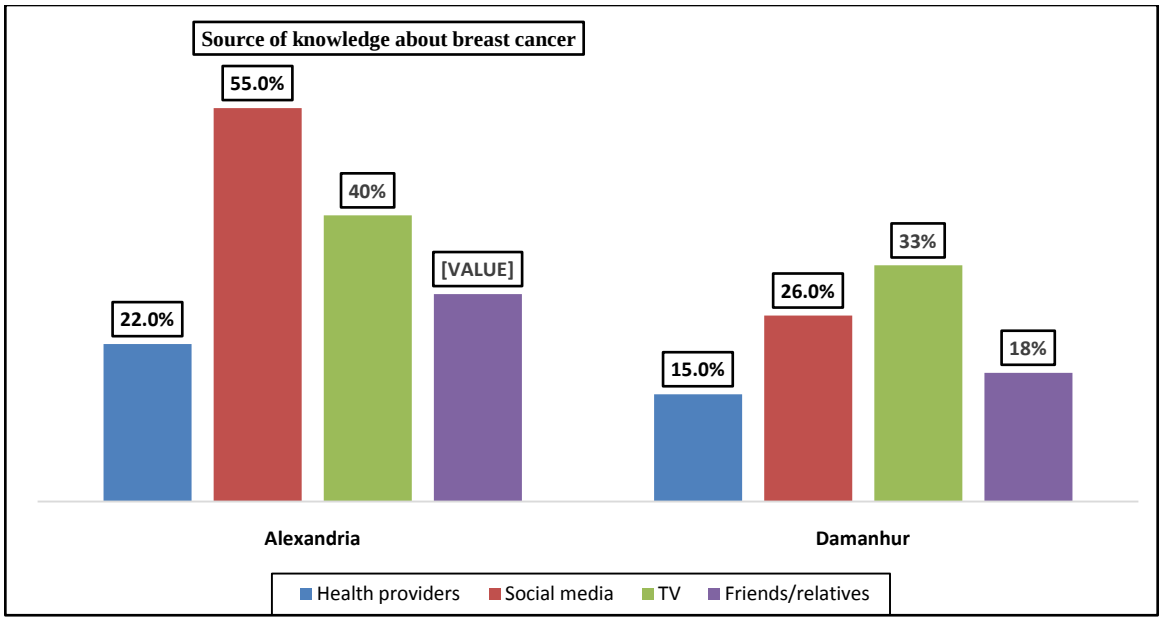

Figure 1. Distribution of the studied women according to the source of their breast cancer related knowledge (*More than one answer.)

Figure 1: Illustrate that the main source of knowledge about breast cancer among the studied female employees in Alexandria was social media (55.0%), while TV was the main source in Damanhur (33.0%). Unfortunately, health care providers were the least source of information among employees in Alexandria and Damanhur (22.0 % and 18.0% respectively).

Table 2: Demonstrate the distribution of the studied female employees according to their knowledge level and mean scores.

It was noticed that less than one quarter (24.0%) of Alexandria female employees had good knowledge in the initial assessment, which raised to 48.0% immediately after the educational program with a statistically significant difference between them (X^2= 17.39, P=0.000). Then, it lessened to 31.0% in the follow up phase after three months with a statistically significant difference between the two phases (X^2= 6.406, P=0.041).

On the other hand, in Damanhur, less than one quarter (21.0%) of the female employees had good knowledge level before the program, and raised to 32.0% immediately after it with a statistically significant difference between them (X^2= 21.95, P=0.000). But it dropped to 28.0% after three months of the program with a statistically significant difference between them (X^2= 13.85, P=0.001).

Additionally, statistically significant differences were noticed between female employees in Alexandria and Damanhur in their knowledge levels before and immediately after the program (X^2= 10.13, P=0.006, and X^2= 6.342, P=0.042 respectively).

Lastly, statistically significant differences were found between female employees in Alexandria and Damanhur in their knowledge mean scores before, immediately after and in the follow up phase after three months of the program applications (t= 6.059, P=0.000, t= 8.948, P=0.000, and t= 9.891 , P= 0.000 respectively).

Table 2. Distribution of female employees according to their knowledge level and mean scores (n=200)

Item	Alexandria N= 100						Damanhur N=100					
	Pre		**Post 1**		**Post 2**		**Pre**		**Post1**		**Post 2**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Knowledge level												
Poor	27	27.0	9	9.0	15	15.0	48	48.0	17	17.0	23	23.0
Fair	49	49.0	43	43.0	54	54.0	31	31.0	51	51.0	49	49.0
Good	24	24.0	48	48.0	31	31.0	21	21.0	32	32.0	28	28.0
Mean ± SD	11.63±5.65		20.37±7.83		14.05±8.18		8.24±3.76		13.42±7.81		11.48±5.22	

χ^{2a}	The association b/w Alexandria group pre and post 1 intervention X^2= 17.39 P= 0.000*
χ^{2b}	The association b/w Alexandria group pre and post 2 intervention X^2= 4.562 P= 0.102
χ^{2c}	The association b/w Alexandria group post 1 and post 2 intervention X^2= 6.406 P= 0.041*
χ^{2d}	The association b/w Damanhur group pre and post 1 intervention X^2= 21.95 P= 0.000*
χ^{2e}	The association b/w Damanhur group pre and post 2 intervention X^2= 13.85 P= 0.001*
χ^{2f}	The association b/w Damanhur group post 1 and post 2 intervention X^2= 1.207 P= 0.547
χ^{2g}	The association b/w Alexandria- Damanhur pre intervention X^2= 10.13 P= 0.006*
χ^{2h}	The association b/w Alexandria- Damanhur post 1 intervention X^2= 6.342 P= 0.042*
χ^{2i}	The association b/w Alexandria- Damanhur post 2 intervention X^2= 2.079 P= 0.354
χ^2	**Chi square test** — *** Statistically significant at 0.05**

t^a	The association b/w Alexandria group pre and post 1 intervention t= 9.519 P= 0.000*
t^b	The association b/w Alexandria group pre and post 2 intervention t= 14.41 P= 0.000*
t^c	The association b/w Alexandria group post 1 and post 2 intervention t= 3.662 P= 0.000*
t^d	The association b/w Damanhur group pre and post 1 intervention t= 9.835 P= 0.000*
t^e	The association b/w Damanhur group pre and post 2 intervention t= 10.36 P= 0.000*
t^f	The association b/w Damanhur group post 1 and post 2 intervention t= 2.256 P= 0.025*
t^g	The association b/w Alexandria- Damanhur pre intervention t= 6.059 P= 0.000*
t^h	The association b/w Alexandria- Damanhur post 1 intervention t= 8.948 P= 0.000*
t^i	The association b/w Alexandria- Damanhur post 2 intervention t= 9.891 P= 0.000*
t	**Paired t test** — *** Statistically significant at 0.05**

Table 3: Presents the distribution of the studied female employees according to their breast cancer screening practices.

The table reveals that less than three quarters (73.0%) of the female employees in Alexandria did not perform breast self-examination or mammogram in the initial assessment, which decreased to 15.0% immediately after the educational program with a statistically significant difference between them (X^2= 68.26, P=0.000). While, in the follow up phase after three months, it raised to 36.0% with a statistically significant difference between the two phases (X^2= 11.61, P=0.001).

On the other hand, in Damanhur, the vast majority (92.0%) of the female employees did not perform such practices before the program, and reduced to 29.0% immediately after it with a statistically significant difference between them (X^2= 83.04, P=0.000). But it elevated to 51.0% after three months of the program with a statistically significant difference between them (X^2= 10.08, P=0.002).

Furthermore, statistically significant differences were found between female employees in Alexandria and Damanhur in their screening practices before, immediately after the program and three months later (X^2= 12.50, P=0.000, X^2= 5.711, P=0.017 and X^2= 4.577, P=0.032 respectively).

Table 4: presents the distribution of the studied female employees according to their cancer fatalism levels and mean scores.

The table illustrates that more than half (51.0%) of female employees in Alexandria had high cancer fatalism level in the initial assessment, which lessened to 38.0% immediately after the program application, with a statistically significant difference between them (X^2= 6.123, P=0.047). While, in the follow up phase, it reached 34.0%.

Moreover, in Damanhur, the majority (88.0%) of the female employees had high cancer fatalism level, then it decreased to 60.0% immediately after the program, with a statistically significant difference between them (X^2= 20.83, P=0.000). This figure decreased to 53.0% after three months of the program.

Table 3. Distribution of female employees according to their breast cancer screening practice (n=200)

Item	Alexandria N= 100						Damanhur N=100					
	Pre		Post 1		Post 2		Pre		Post1		Post 2	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Performing BSE / Mammogram												
Yes	27	27.0	85	85.0	64	64.0	8	8.0	71	71.0	49	49.0
No	73	73.0	15	15.0	36	36.0	92	92.0	29	29.0	51	51.0

χ^{2a}	The association b/w Alexandria group pre and post 1 intervention X^2= 68.26 P= 0.000*
χ^{2b}	The association b/w Alexandria group pre and post 2 intervention X^2= 27.60 P= 0.000*
χ^{2c}	The association b/w Alexandria group post 1 and post 2 intervention X^2= 11.61 P= 0.001*
χ^{2d}	The association b/w Damanhur group pre and post 1 intervention X^2= 83.04 P= 0.000*
χ^{2e}	The association b/w Damanhur group pre and post 2 intervention X^2= 41.25 P= 0.000*
χ^{2f}	The association b/w Damanhur group post 1 and post 2 intervention X^2= 10.08 P= 0.002*
χ^{2g}	The association b/w Alexandria- Damanhur pre intervention X^2= 12.50 P= 0.000*
χ^{2h}	The association b/w Alexandria- Damanhur post 1 intervention X^2= 5.711 P= 0.017*
χ^{2i}	The association b/w Alexandria- Damanhur post 2 intervention X^2= 4.577 P= 0.032*
χ^2	**Chi square test** — *** Statistically significant at 0.05**

Table 4. Distribution of female employees according to their cancer fatalism level and mean scores (n=200)

Item	Alexandria N= 100						Damanhur N=100					
	Pre		Post 1		Post 2		Pre		Post1		Post 2	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cancer fatalism level												
Low	30	30.0	47	47.0	45	45.0	3	3.0	15	15.0	17	17.0
Moderate	19	19.0	15	15.0	21	21.0	9	9.0	25	25.0	30	30.0
High	51	51.0	38	38.0	34	34.0	88	88.0	60	60.0	53	53.0
Mean ± SD	11.42±3.47		7.06±2.99		5.78±1.81		14.26±3.15		10.43±2.29		9.52±3.32	

χ^{2a}	The association b/w Alexandria group pre and post 1 intervention X^2= 6.123 P= 0.047*
χ^{2b}	The association b/w Alexandria group pre and post 2 intervention X^2= 6.50 P= 0.038*
χ^{2c}	The association b/w Alexandria group post 1 and post 2 intervention X^2= 1.266 P= 0.531
χ^{2d}	The association b/w Damanhur group pre and post 1 intervention X^2= 20.83 P= 0.000*
χ^{2e}	The association b/w Damanhur group pre and post 2 intervention X^2= 29.79 P= 0.000*
χ^{2f}	The association b/w Damanhur group post 1 and post 2 intervention X^2= 1.013 P= 0.601
χ^{2g}	The association b/w Alexandria- Damanhur pre intervention X^2= 35.51 P= 0.000*
χ^{2h}	The association b/w Alexandria- Damanhur post 1 intervention X^2= 23.96 P= 0.000*
χ^{2i}	The association b/w Alexandria- Damanhur post 2 intervention X^2= 18.38 P= 0.000*
χ^2	**Chi square test** *** Statistically significant at 0.05**

t^a	The association b/w Alexandria group pre and post 1 intervention t= 9.519 P= 0.000*
t^b	The association b/w Alexandria group pre and post 2 intervention t= 14.41 P= 0.000*
t^c	The association b/w Alexandria group post 1 and post 2 intervention t= 3.662 P= 0.000*
t^d	The association b/w Damanhur group pre and post 1 intervention t= 9.835 P= 0.000*
t^e	The association b/w Damanhur group pre and post 2 intervention t= 10.36 P= 0.000*
t^f	The association b/w Damanhur group post 1 and post 2 intervention t= 2.256 P= 0.025*
t^g	The association b/w Alexandria- Damanhur pre intervention t= 6.059 P= 0.000*
t^h	The association b/w Alexandria- Damanhur post 1 intervention t= 8.948 P= 0.000*
t^i	The association b/w Alexandria- Damanhur post 2 intervention t= 9.891 P= 0.000*
t	**Paired t test** *** Statistically significant at 0.05**

The same table shows statistically significant differences in the levels of cancer fatalism between female employees in Alexandria and Damanhur whether before the program or immediately after or three months later (X^2= 35.51, P=0.000, X^2= 23.96, P=0.000, X^2= 35.5118.38, P=0.000).

Table 5: Portrays the distribution of the studied female employees according to their CHBM mean scores.

Starting with female employees in Alexandria, the table reveals that their susceptibility mean score was 6.17±2.70 prior the program implementation and raised to 13.11±3.89 immediately after the program with a statistically significant difference between them (t^a=14.66, P=0.000). While in the follow up assessment after three months, it dropped to 9.87±3.66 with a statistically significant difference between them (t^c=6.066, P=0.000). While, the female employees in Damanhur got a mean score of 7.12±4.03 in the initial assessment, then it elevated to 15.60 ±4.32 in the immediate post evaluation with a statistically significant difference between them (t^d=14.35, P=0.000). In the second evaluation after 3 months, it dropped to 11.15 ±3.64 with a statistically significant difference between them (t^f=7.877, P=0.000). Moreover, statistically significant differences were found between female employees in Alexandria and Damanhur across the study (t^i=1.958, P=0.052, t^h=4.283, P=0.000, and t^g=2.479, P=0.014).

With respect to the seriousness, the female employees in Alexandria had a mean score of 24.13± 4.65 before the program compared to 32.93±4.53 after the program with a statistically significant difference between them (t^a=13.55, P=0.000) and lessened to 27.66±3.81 after three months with a statistically significant difference between the two phases (t^c=8.903, P=0.000). The same picture was portrayed in Damanhur, where the seriousness mean score was 29.72±6.25 pre the program implementation, and raised to 33.46±5.44 after it with a statistically significant difference between them (t^d=4.514, P=0.000). In the follow up evaluation, it dropped to 30.23±6.51 with a statistically significant difference between them (t^f=3.807, P=0.000). Moreover, statistically significant differences were noticed between Alexandria and Damanhur female employees' seriousness mean score before the program and in the second evaluation (t^i=7.176, P=0.000 and t^g=3.407, P=0.001).

Concerning the barriers, the table shows that the mean score of female employees in Alexandria before the program was 22.90±4.11 compared to 32.93±4.53 immediately after the program and 27.66±3.81 after three months with statistically significant differences between them (t^a=11.64, P=0.000 and t^c=2.306, P=0.022). Furthermore, in Damanhur, their barriers' mean score was 27.16 ± 5.84 in the initial assessment, which changed to 19.30 ±4.65 immediately after the program with a statistically significant difference between them (t^d=10.53, P=0.000). While, in the second evaluation the barriers' mean score decreased to 16.45±5.36 with a statistically significant difference between the two phases (t^f=4.016, P=0.000). The same table shows statistically significant difference between Alexandria and Damanhur female employees' barriers mean scores (t^i=5.965, P=0.000) preprogram application, as well immediately after it and three months later (t^h=4.767, P=0.000, and t^g=3.561, P=0.000 respectively).

Moreover, the benefits mean score among female employees in Alexandria was 27.66±3.81 before the program and raised to 24.30±4.38 immediately after the program with a statistically significant difference between them (t^a=21.18, P=0.000), but it dropped to 21.54±7.19 in the second evaluation after three months with a statistically significant difference between them (t^c=3.278, P=0.000). While, in Damanhur, the benefits' mean score before the program was 8.21±3.62 and elevated to 21.46±8.44 with statistically significant difference between the two phases (t^d=14.35, P=0.000). On the other hand, it decreased to 18.15±6.24 three months later with a statistically significant difference between them (t^f=3.154, P=0.000). Additionally, significant differences were found between female employees' benefits' mean scores in both Alexandria and Damanhur across the study (t^g=3.278, P=0.000, t^h=3.278, P=0.000, t^i=3.278, P=0.000).

Concerning, self-efficacy, its mean score was 25.30±6.75 among female employees in Alexandria before the program and increased to 39.49±5.13 immediately after the program with a statistically significant difference between them (t^a=16.74, P=0.000). Then, it decreased to 32.81±7.45 in the second evaluation after three months with a statistically significant difference between them (t^c=7.385, P=0.000). The same picture noticed in Damanhur, where self-efficacy mean score was 18.10±5.48 preprogram and elevated to 35.42±4.68 after the program and 29.86±4.73 after three months with statistically significant differences between them (t^d=24.03, P=0.000 and (t^f=8.356, P=0.000 respectively). Furthermore, statistically significant differences were observed among female employees' self-efficacy mean scores in Alexandria and Damanhur in the study three phases (t^g=8.281, P=0.000, t^h=5.861, P=0.000, t^i=3.343, P=0.001).

With respect to motivation, the table portrays statistically significant increase in the female employees in Alexandria mean score from 18.20±7.98 before the program to 31.52±8.43 (t^a=9.434, P=0.000), and reached significantly 27.13±4.63 three months later (t^c=4.565, P=0.000). On the other hand, in Damanhur, motivation mean score significantly raised from 17.834±3.11 to 22.73±6.35 immediately after the program (t^d=17.834, P=0.000), then significantly dropped to 17.72±2.85 in the second evaluation after three months (t^f=7.198, P=0.000). Lastly, statistically significant differences were noted among Alexandria and Damanhur group motivation mean scores across the study (t^g=9.434, P=0.000, t^h=8.329, P=0.000, t^i=17.31, P=0.000).

Table 5. Distribution of female employees according to their CHBM mean scores (n=200)

Item	Alexandria N= 100			Damanhur N=100		
	Pre	**Post 1**	**Post 2**	**Pre**	**Post1**	**Post 2**
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**
Susceptibility	6.17±2.70	13.11±3.89	9.87±3.66	7.12±4.03	15.60±4.32	11.15±3.64
Test of significance	t^a = 14.66 P=0.000*			t^d = 14.35 P= 0.000*		
	t^b= 8.135 P= 0.000*			t^e = 7.421 P= 0.000*		
	t^c = 6.066 P= 0.000*			t^f = 7.877 P= 0.000*		
	ti= 1.958 P=0.052*		t^h =4.283 P= 0.000*		t^g =2.479 P= 0.014*	
Seriousness	24.13±4.65	32.93±4.53	27.66±3.81	29.72±6.25	33.46±5.44	30.23±6.51
Test of significance	t^a = 13.55 P=0.000*			t^d = 4.514 P= 0.000*		
	t^b= 5.872 P= 0.000*			t^e = 0.565 P= 0.573		
	t^c = 8.903 P= 0.000*			t^f = 3.807 P= 0.000*		
	ti= 7.176 P=0.000*		t^h =0.748 P= 0.455		t^g =3.407 P= 0.001*	
Barriers	22.90±4.11	16.47±3.69	14.82±6.13	27.16±5.84	19.30±4.65	16.45±5.36
Test of significance	t^a = 11.64 P=0.000*			t^d = 10.53 P= 0.000*		
	t^b= 10.95 P= 0.000*			t^e = 13.51 P= 0.000*		
	t^c = 2.306 P= 0.022*			t^f = 4.016 P= 0.000*		
	ti= 5.965 P=0.000*		t^h =4.767 P= 0.000*		t^g =2.002 P= 0.047*	
Benefits	12.62±3.35	24.30±4.38	21.54±7.19	8.21±3.62	21.46±8.44	18.15±6.24
Test of significance	t^a = 21.18 P=0.000*			t^d = 14.35 P= 0.000*		
	t^b= 11.24 P= 0.000*			t^e = 14.43 P= 0.000*		
	t^c = 3.278 P= 0.001*			t^f = 3.154 P= 0.002*		
	ti= 8.941 P=0.000*		t^h =2.987 P= 0.003*		t^g =3.561 P= 0.001*	
Self-efficacy	25.30±6.75	39.49±5.13	32.81±7.45	18.10±5.48	35.42±4.68	29.86±4.73
Test of significance	t^a = 16.74 P=0.000*			t^d = 24.03 P= 0.000*		
	t^b= 7.470 P= 0.000*			t^e = 16.25 P= 0.000*		
	t^c = 7.385 P= 0.000*			t^f = 8.356 P= 0.000*		
	ti= 8.281 P=0.000*		t^h =5.861 P= 0.000*		t^g =3.343 P= 0.001*	
Motivation	18.20±7.98	31.52±8.43	27.13±4.63	10.12±3.11	22.73±6.35	17.72±2.85
Test of significance	t^a = 11.475 P=0.000*			t^d = 17.834 P= 0.000*		
	t^b= 9.679 P= 0.000*			t^e = 18.016 P= 0.000*		
	t^c = 4.565 P= 0.000*			t^f = 7.198 P= 0.000*		
	ti= 9.434 P=0.000*		t^h =8.329 P= 0.000*		t^g =17.31 P= 0.000*	

t^a	The association b/w Alexandria group pre and post 1 intervention
t^b	The association b/w Alexandria group pre and post 2 intervention
t^c	The association b/w Alexandria group post 1 and post 2 intervention
t^d	The association b/w Damanhur group pre and post 1 intervention
t^e	The association b/w Damanhur group pre and post 2 intervention
t^f	The association b/w Damanhur group post 1 and post 2 intervention
t^g	The association b/w Alexandria- Damanhur pre intervention
t^h	The association b/w Alexandria- Damanhur post 1 intervention
t^i	The association b/w Alexandria- Damanhur post 2 intervention
t	**Paired t test** — *** Statistically significant at 0.05**

Table 6. Predictors of breast cancer screening among the study subjects using binary logistic regression analysis (Enter method):

Characteristics	B	S.E.	Wald	P
Age (less than 30 years/ more than 30 years)	0.132	0.338	0.153	0.734
Marital status (married / not married)	0.075	0.283	0.069	0.792
Level of education (higher education / less education)	0.76	0.223	4.011	**0.045***
Place of residence (rural/ urban)	0.400	0.320	1.561	**0.021***
Susceptibility (yes/ no)	0.765	0.342	4.726	**0.045***
Seriousness (yes/ no)	-0.314	0.209	2.253	**0.013***
Barriers (yes/ no)	-0.436	0.324	1.817	**0.019***
Benefits (yes/ no)	0.409	0.685	2.357	**0.053***
Efficacy (yes/ no)	0.594	0.649	4.531	**0.028***
Motivation (yes/ no)	-0.219	0.235	1.005	0.259
Knowledge level (low/ high)	0.676	0.353	3.672	**0.051***
Constant	1.015	0.690	2.162	0.141
Model X2 = 408.78, P < 0.0001	Cox & Snell R2=.033	Significant at P = 0.05		

Table 6: Reveals the predictors of breast cancer screening among the studied female employees.

The table shows that eight variables were found to predictors of better breast cancer screening namely level of education (P = 0.045), residence place (P = 0.021), perceived susceptibility (P=0.045), perceived seriousness (P = 0.013), perceived barriers (P = 0.019), perceived benefits (P = 0.053), self-efficacy (P = 0.028), motivation (P= 0.049) and knowledge about breast cancer and screening measures (P = 0.051).

4. Discussion

It is widely known and accepted that early diagnosis of **breast cancer** can reduce mortality significantly and will promote women's overall health. Breast cancer mortality rates have dramatically decreased in all over the world chiefly as a result of primary preventive measures in the form of timely screenings [27,28]. Ensuring that accurate, up-to date cancer screening information and services are easily accessible to women is critical in reducing rates of cancer incidence and mortality. Breast self-examination (BSE), clinical breast exam (CBE), and mammography are widely known to be the main methods of breast cancer screening [27,28].

Even though early detection of breast cancer is clearly associated with breast cancer survival, many women still do not follow recommended screening guidelines. Previous researchers have identified several barriers that influence women's choices regarding breast cancer screening. These factors include accessibility, cost, trust of healthcare providers, lack of transportation, lack of knowledge of cancer screening guidelines (Ozaras G et al 2010, Ozmen V 2011, Tavafian S et al 2009) [29,30,31].

This was portrayed in the current study findings where the largest percentage of the female employees in both faculties did not perform regular breast self-examination or mammography especially among those women from rural areas. These findings were worsened by the results of the current study where the smallest percentages of the female employees had good knowledge regarding breast cancer and its screening measures as well their main sources of information regarding breast cancer were social media, TV and friends or family members, which shed the light on the wider use of social media even in health related matters and the health care providers' delinquency in offering health education in different health care facilities especially those in rural areas. Therefore, an important effort should be intensified in using these media to create breast cancer awareness and prioritizing the breast health behaviors within the Egyptian community. These findings come in line with those of Bassey R et al 2011 [32], Beydag K and Yurugen B 2010 [33], Ayed A et al 2015 [34] who found a low level of knowledge among the subjects, and it was attributed to many causes such as accessibility, acceptability, and affordability to health care services and its quality, and trust of the health care providers. In addition to level of education and socioeconomic status of the subjects. These findings could explain the findings of the current study where rural female employees had lower knowledge level than those from urban areas, which reflect the quality of health services in the rural areas and shed the light on the importance of improving the quality of services provided at rural areas and enhancing the qualifications and skills of health care providers.

Review of the available literature indicated that, breast cancer screening behaviors are affected by various demographic and socio-cultural factors. Higher level of education, adequate income, health insurance, and marital status, and also women's access to services increases the likelihood of breast cancer screening (Baysal and Gozum, 2011) [35]. The results of the current study reveal that age, marital status, level of education and income are among the determinants of breast cancer screening. Women who had more education were more aware of the importance of screening and were reading more about breast cancer. They also had more positive beliefs about post-diagnostic cancer care, and most of them knew that, early detection of cancer would increase the chance of survival, treatment and recovery.

Also Having income and financial affordability can affect breast health behaviors. Women, who are independent and earning a living, are more likely to go to doctor for breast examinations, and could afford the screening cost easier. Additionally, ease of access and satisfaction about the quality of the health care services can affect the utilization of the services. Moreover, fear of losing sexual appeal, fear of losing husband, fear of losing breasts, fear of hair loss and chemotherapy, and fear of breast deficiency, radiotherapy and its complications such

as weight loss and nausea could explain why age and marital status could affect the screening behaviors of breast cancer. Similar findings were reported by Ahmadian M et al 2012, Baysal H et al 2011, Keshavarz Z et al 2011, Marmara D et al 2017,Karimi S et al 2018 [36,37,38,39].

Cancer is considered as a disabling and incurable disease in the society and after diagnosis, people usually experience anxiety, depression and unrealistic fear of instant death, which itself causes many physical, psychological, economic and family problems. Among the barriers that influence women's choices regarding breast cancer screening is the underlying belief that cancer, itself, is incurable. Fatalism is deeply rooted beliefs about diseases and its management. It is the belief that all events are fated to happen and that human beings have no control over their futures and are unable to change their outcomes. Cancer fatalism represents a surrender of the human spirit to perceptions of hopelessness, powerlessness, worthlessness, and social despair. Fatalism is among the major impediments that deter screening practices. Fatalism couples with lower levels of information regarding the etiology of breast cancer and preventive guidelines, contribute to the inadequate levels of screening among the studied women (Avci I 2007, Anbulat N & Uzun O 2008, Temiz M et al 2008) [40,41,42].

This could explain the results of the current study where the largest percentages of the female employees had high cancer fatalism in the initial assessment especially from rural areas, as well the significant association between cancer fatalism, knowledge and practices of the studied women regarding breast cancer and screening measures as fatalism endorse the belief that death is inevitable from cancer and no need to participate in screening, detection and treatment measures. Similar findings were reported by Avci I 2008, and Anbulat N & Uzun O 2008, Cam O & Gumus A 2009, and Al-Sharbatti S et al 2013 [40-44] who found that fear and fatalism act against breast self-examination practices among the studied females.

Additionally, studies have revealed that fatalism may be a deterrent to participation in health promoting behaviors. Fatalism is the belief that all things in the world are under the control of some invisible force, and individuals are powerless to do anything about it and may view a diagnosis of cancer as a struggle against insurmountable odds. Cancer fatalism represents a surrender of the human spirit to perceptions of hopelessness, powerlessness, worthlessness, and social despair. (Che C et al 2014, Dettenborn L et al 2005, Kulakci H et al 2015, Charkazi A et al 2013 [45,46,47,48]. These could explain the results of the current study where perception of barriers was high among female employees in the initial assessment as well their perception of benefits of screening, susceptibility to cancer, self-efficacy and motivation to take actions towards preventive measures were low.

Similar findings were reported by Tavafian S et al 2009 [31] and Mag X et al 2012 [49] who found that fear, lack of knowledge, lack of access to health services, poor socioeconomic status as well culture were the key players among their study subjects regarding performance of breast self-examination and health seeking behaviors.

In essence, although the factors related to screening behaviors are multi-faceted, the overarching argument is that knowledge is a crucial component in the war on breast cancer. Knowledge certainly is a basic requirement for any individual to maintain proper health. Knowledge is a vital element of all health promotion activities. In the greater attempt to disseminate knowledge and increase awareness about breast cancer, researchers in the current study develop and deliver nursing interventions tailored to increased relevant overall knowledge and understanding about breast cancer, in order to limit faulty beliefs and in turn enhance breast cancer screening practices of the studied women.

Several studies had approved that educational programs provide opportunity for the participants to generate a better understanding of the topic involved and make informed decision making which can help to change their behaviors (Gucuk S et al 2013, Donmez Y et al 2012, Gupta K 2009, Yoo B et al 2012) [50,51,52,53].

The same picture was portrayed in the current study findings as the women's knowledge level was increased after the program application, which reflected on their screening practices positively. It could be explained that group education improves women's knowledge of the importance of routine breast cancer screening and motivates them to seek out screening services. These results are consistent with those of similar previous studies (Burgess C et al 2008, Ceber E et al 2010, Secginli S 2011 [54,55,56].

Additionally, the current study found significant improvement in the studied women's perception regarding the susceptibility, seriousness, as well benefits and barriers of screening practices. Furthermore, their motivation and cues to act against breast cancer were improved after the educational program. These findings could be attributed to the improvement in their knowledge about breast cancer, its magnitude, causes and risk factors, management, prevention measures. This knowledge could shape their perspectives, beliefs and practices regarding breast cancer screening. In the same line Tavafian S et al 2009, Gozum S et al 2010, Kim J et al 2009, Hajian S et al 2011, and Ebril N et al 2014 [31,57,58,59,60] who reported significant change perceived benefits and barriers and self-efficacy regarding breast self-examination and mammography as a result of having knowledge about breast cancer screening practices.

5. Conclusion

The current study findings concluded that female employees' 'knowledge & practice of breast cancer was greatly affected by breast cancer fatalism. Applying Breast cancer related preventive program had improved the knowledge and practice of female employees and decrease the level of breast cancer fatalism

6. Recommendations

Based on findings, the study recommended:

1. Empowering women to take a proactive role in their own health
2. Support and train health care professional to enrich their role in prevention.

3. Develop training a greater health interventions programs that are culturally specific, with the purpose of improving the psychological, and social aspects of health to address fear and fatalism.

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