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Self-efficacy of the First-degree Relatives of Patients with Breast Cancer in the Prevention of Cancer: Using the Health Belief Model

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Abstract
Breast cancer is the most common type of cancer in women. The best method to fight this disease is early diagnosis. The aim of this study was to investigate the effect of education based on the health belief model on self-efficacy of the first-degree relatives of patients with breast cancer. This randomized clinical trial was conducted in Tehran in 2016 on 80 first-degree relatives of patients with breast cancer. After purposive sampling, the subjects were assigned to interventions and control groups using the randomized block design. The data collection tool was a questionnaire including questions about demographic data, health belief model, and self-efficacy. The educational intervention was held during four 90-min sessions. The questionnaires were completed before and 8 weeks after the intervention in both groups. The data were analyzed using the SPSS16 software. The educational intervention led to a significant increase in susceptibility ($d = 1.17$, 95%CI 0.69, 1.66), seriousness ($d = 1.11$, 95%CI 0.62, 1.59), benefits ($d = 1.58$, 95%CI 1.06, 2.09), and significant decrease in perceived barriers ($d = -0.73$, 95%CI 0.27, 1.19) scores in the intervention group. The self-efficacy score in the intervention group was increased from 7.58 to 9.20, which was statistically significant ($d = 1.72$, 95%CI 1.19, 2.25). However, in the control group, there was no significant difference in self-efficacy score before and after the intervention ($p = 0.45$). The present study confirmed the effectiveness of the health belief model in promoting self-efficacy of the first-degree relatives of patients with breast cancer. Therefore, it is recommended that this education program is implemented for women, especially the first-degree relatives of patients with breast cancer.

Keywords Education · Health belief model · Self-efficacy · Breast cancer · First-degree relative

Introduction

Breast cancer is the most common type of cancer in women worldwide, accounting for 23% of all cases of cancer among women [1]. Despite progressive diagnosis and treatment of cancer, it is still the most common malignancy and the second leading cause of death from cancer among women [2, 3]. The number of deaths from breast cancer in 2010 was estimated to be 40,230 (390 men and 39,840 women) [1]. In addition, there is an increasing incidence of breast cancer in the world, especially in developing countries [4]. In Iran, as in other countries in the world, breast cancer is the most common cancer in women [5]. Amirkhah et al. [6] indicated that 24.5% of the whole cancers and 14.2% of the whole cancer deaths is related to breast cancer. Cancer usually occurs at an older age. In Iran, the mean age of women with breast cancer is reported to be less than Western countries [7]. So far, the role of various risk factors in the incidence of breast cancer has been shown including family history, high age, menarche age below 12 years, menopause after age 54 years, nulliparity, stress and unhealthy lifestyle in terms of nutrition, physical activity, smoking, and alcohol use [8]. A non-behavioral risk factor for breast cancer is family history [1]. Family history increases 2–3 times the chance of getting this disease [8]. However, women with a positive family history may avoid thinking about the disease, which does not lead to preventive behaviors [9]. Contrary to the expectations of healthcare providers, perceived beliefs in

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women with a positive family history of breast cancer regarding the risk of this disease are low [10]. On the other hand, early detection of this disease is a method for fighting it [10], which depends on the self-care behavior of the patient. Barriers to the prevention of the disease are a lack of awareness and attention to screening methods, unhealthy lifestyle (low activity, high fat diet, no consumption of fruits and vegetables, smoking, and alcohol consumption), stress, and inability to adequately respond to stressful situations [8], which can be modified through appropriate self-care behaviors. Although some factors such as gender, age, and genetics cannot be modified, cognitive behavioral factors such as self-efficacy can promote healthy behaviors [11]. Based on Bandura's theory, self-efficacy involves a person's confidence in being able to perform self-care tasks that lead to desired results. Self-efficacy can affect all aspects of life [11]. Understanding self-efficacy helps maintain and improves health promotion behaviors [11]. Different studies indicate a direct and linear relationship between self-efficacy and self-care behaviors [12, 13]. Also, individuals with higher self-efficacy have higher problem-solving abilities and higher self-care behaviors [14]. Therefore, self-efficacy seems to be a prerequisite for self-care and preventive behaviors [13].

On the other hand, according to the results of studies, educational programs have a positive effect on the quality of life and the use of preventive behaviors [15, 16]. For this purpose, educational models can be used to increase the efficiency of the curriculum [17]. One of the educational models in health education is the health belief model (HBM) [17]. The basis of the HBM is the belief that individuals react well to health messages and disease prevention when they feel that they are at risk (perceived susceptibility), and their risk is very serious (perceived seriousness), behavioral change has many benefits to them (perceived benefits), and obstacles to health behaviors can be addressed (perceived barriers) [17]. Therefore, the present study aimed to investigate the effect of education based on the HBM on self-efficacy of the first-degree relatives of patients with breast cancer in the prevention of breast cancer.

Method

This controlled clinical trial was performed on 80 women with a family history of breast cancer referred to the Cancer Institute of Imam Khomeini Hospital in Tehran in 2016. Given the effect size of 0.5, the alpha of 0.05, the power of 80% (Jedgal et al.), and the probability of dropouts by 10%, the sample size was estimated to be 80 people. Inclusion criteria included no known cancer, no known mental illness, family history of breast cancer in the first-degree family members (mother, sister, and daughter), and willingness to collaborate in the study. Exclusion criteria included women with suspected lesions in ultrasound or mammography, absence in more than one education session, receiving education over the past 2 years, and lack of willingness to continue with the study.

Instruments used in the study included three researcher-made questionnaires. The first questionnaire consisted of 28 questions related to individual, demographic, and risk factors of breast cancer. The second questionnaire consisted of 41 items in relation to the HBM including 8 perceived susceptibility questions, 7 perceived seriousness questions, 9 perceived benefits questions, and 17 perceived barriers questions. The third questionnaire had 11 questions for measuring self-efficacy. The validity of the questionnaires was confirmed by content validity, and the internal consistency of them was confirmed by Cronbach's alpha of 0.8.

The purposive sampling method was used. The researcher referred to surgical, chemotherapy, radiotherapy, and surgical clinics of Cancer Institute at Imam Khomeini Hospital on consecutive days. Women who had been diagnosed with breast cancer were asked to introduce one of their first-degree relatives (mother, sister, and daughter) to enter the study, if they have met criteria and were willing. After evaluating the samples for eligibility for inclusion in the study, randomized block design was used for random allocation in control and intervention groups. After performing a pre-test in both groups, the appropriate educational program based on the HBM was implemented during four 90-min sessions via lecture, group discussion, question and answer, PowerPoint presentation, and movies in the intervention group. The content of the first session was about breast cancer, its prevalence in Iran and in the world, and the complications and consequences of it. The purpose of this session was to increase perceived susceptibility and perceived seriousness in the participants. In order to reach further effect, each person was asked to share the problems, difficulties, and traumatic experiences with others. With the purpose of increasing the perceived susceptibility, in the second session, the symptoms and risk factors of breast cancer were mentioned. In the third session, the main aspects of breast cancer screening, effective self-care strategies, and practices for dealing with breast cancer were discussed with the purpose of increasing perceived benefits and self-efficacy. In the fourth session, an overview of the previous sessions was provided. Then the barriers to self-care behaviors and effective approaches for dealing with them were discussed in order to decrease perceived barriers and increase self-confidence and self-efficacy.

In the control group, no education was used. Two months after the intervention, the questionnaires were completed again by the groups. All ethical considerations were addressed such as willingness to take part in the study, the written informed consent form, confidentiality of data, freedom to leave the study, and the provision of the education booklet containing the educational contents to both groups. The collected data was analyzed using the SPSS v.16 software. To compare the

demographic characteristics, independent *t* test, chi-square, and Fisher's exact tests were used. The independent *t* test was used for comparing the groups and the paired *t* test was used to compare the groups before and after the intervention. The effect size of the intervention was calculated using Cohen's *d* (95% CI). Multivariate regression analysis was used to assess the effect of the educational program adjusted to demographic variables and baseline self-efficacy. The significance level was set less than 0.05.

Findings

Of 80 participants included in the first phase of the study, three participants in the intervention group (one of them due to absence in one education session and two of them due to unwillingness to continue with the study) were excluded.

The mean age of the participants was 39.55 ± 10.34 years in the control group and 37.35 ± 11.01 years in the intervention group. The majority of women were housewives (70.3% in the intervention group and 67.5% in the control group), married (64.9% in the intervention group and 72.5% in the control group), and had a diploma education level (51.4% in the intervention group and 35% in the control group). It should be noted that the chi-square, Fisher's exact test, and independent *t* test showed that the two groups had no significant differences in terms of demographic variables (Table 1).

Comparison of the HBM constructs' score by the independent *t* test showed that there were no significant differences in the susceptibility, seriousness, barriers, and perceived benefits before the intervention between the groups ($p > 0.05$). However, after the intervention, using the paired *t* test, there was a significant increase in the susceptibility, seriousness, barriers, and perceived benefits of women in the intervention group (Table 2). The effect size of the intervention on the susceptibility, seriousness, benefits, and perceived barriers domains were $d = 1.17$, 95%CI 0.69–1.66, $d = 1.11$, 95%CI 0.62–1.59, $d = 1.58$, 95%CI 1.06–2.09, and $d = -0.73$, 95%CI 0.27–1.19, respectively. The paired *t* test showed that there was no significant difference between the mean scores of HBM constructs before and after the intervention in the control group, but there was a significant difference in the intervention group (Table 2).

The independent *t* test showed that there was no significant difference between self-efficacy score in the intervention and control groups before intervention ($p = 0.77$). However, 8 weeks after the educational intervention, the paired *t* test showed that there was a significant difference in the mean of

Table 1 Descriptive characteristics of participants

Variable		Intervention group ($n = 37$)		Control group ($n = 40$)		*p* value
		Number	Percent	Number	Percent	
Age (year)	< 30	10	27	7	17.5	0.36
	39–30	9	24.3	15	37.5	
	49–40	12	32.4	10	25	
	> 49	6	16.3	8	20	
Education	Under the diploma	8	20.16	12	30	0.38
	Diploma	19	51.4	14	35	
	Higher education	10	28.44	14	35	
Job	Housewife	26	70.3	27	67.5	0.79
	Employed	11	29.7	13	32.5	
Marital status	Single	13	35.1	9	22.5	
	Married	24	64.9	29	72.5	0.31
	Widowed or divorced	0	0	2	5	
Husband education	Under the diploma	8	33.2	10	32.3	
	Diploma	12	50	15	48.4	0.93
	Higher education	4	16.8	6	19.4	
Husband job	Employed	5	20.8	4	12.9	
	Worker	7	29.2	7	22.6	0.31
	Retired	7	29.2	5	16.1	
	Other jobs	5	20.8	15	48.3	
Health insurance	Yes	33	89.2	34	85	0.81
	No	4	10.8	6	15	

Table 2 Comparison of mean scores of constructs of the health belief model between the intervention and the control groups before and after the intervention

Constructs of HBM	Before intervention			After intervention			
	Intervention group Mean (SD)	Control group Mean (SD)	*p* value	Intervention group Mean (SD)	Control group Mean (SD)	*p* value	Cohen's *d* (95% CI)
Susceptibility	5.06 (1.23)	5.31 (1.26)	0.38	14.78 (0.53)	5.26 (1.20)	< 0.001	1.17 (0.69, 1.66)
Seriousness	4.49 (1.38)	4.08 (1.26)	0.17	5.56 (0.91)	4.20 (1.17)	< 0.001	1.11 (0.62, 1.59)
Benefits	7.56 (1.18)	7.31 (1.03)	0.32	14.15 (1.74)	7.41 (0.98)	< 0.001	1.58 (1.06, 2.09)
Barriers	7.56 (1.18)	7.31 (1.03)	0.72	14.15 (1.74)	11.35 (2.43)	< 0.001	− 0.73 (0.27, 1.19)

HBM health belief model, *SD* standard deviation

self-efficacy score in the intervention group before and after the intervention ($p < 0.0001$), but there was no such a difference in the control group ($p = 0.45$). Also, the independent *t* test showed a significant difference between the mean score of self-efficacy in the intervention and control groups 8 weeks after the intervention ($p < 0.0001$). The effect size of the intervention on the self-efficacy of women was $d = 1.72$, 95%CI 1.19, 2.25 (Table 3).

According to multivariate regression analysis, none of the demographic variables had an effect on self-efficacy of participants at follow-up period. The only effective variables were the self-efficacy of participants at the baseline and the group.

Discussion and Conclusion

The purpose of this study was to investigate the effect of the education program based on the HBM on self-efficacy of the first-degree relatives of patients with breast cancer in the prevention of breast cancer. The results of this study confirmed the positive impact of education on improving the constructs of the health belief model and improving the self-efficacy of patients.

Table 3 Comparison of mean scores of self-efficacy between the intervention and the control groups before and after the intervention

Time	Intervention group	Control group	
	Mean (SD)	Mean (SD)	*p* value[b]
Before intervention	7.58 (1.40)	7.49 (1.46)	0.77
After intervention	9.70 (0.96)	7.56 (1.40)	< 0.001
p value[a]	< 0.001	0.45	
Cohen's *d* (95% CI)	1.72 (1.19, 2.25)		

SD standard deviation

[a] Paired *t* test

[b] Independent *t* test

There was no significant difference between the mean score of self-efficacy in the intervention and control groups at the beginning of the study, but at the end of 8 weeks, a significant difference between the groups was reported. Comparison of mean of self-efficacy in each group showed that the control group did not have a significant difference at the end of 8 weeks compared with that at the beginning of the study. However, in the intervention group, the mean of self-efficacy score was increased from 7.58 to 9.7, which was statistically significant indicating an increase in self-efficacy in the intervention group. Similar results were reported about increasing self-efficacy after education in other studies. In this regard, the study of Ilka et al. with the aim of evaluating the effect of health-based education on promoting self-efficacy of addicted women in preventing high-risk behaviors showed that at the end of 8 weeks, the self-efficacy score was increased in the intervention group [18]. In the study of Abdolaliyan et al., after education, there was a significant difference in the mean of self-efficacy score [19]. However, Vakili et al. showed a slight increase after the intervention in the self-efficacy score of the intervention group [20], which could be due to differences in the selection of educational methods and samples.

In the present study, the mean score of perceived susceptibility and perceived seriousness after the intervention was significantly increased compared with that before the intervention. These results indicated that the susceptibility of samples was related to the importance of breast cancer and its preventive methods, as well as the perception of the subjects in relation to the seriousness and consequences of the disease. In the study of Mehdizadeh et al., the mean of susceptibility and perceived seriousness in the intervention group was increased compared with that before education [21]. However, in the study of Bakhtiari Aghdam et al., who aimed to determine the effect of education using the HBM on changing beliefs and screening behaviors in relation to breast cancer, there was no significant difference in perceived susceptibility in the intervention group before and after education. This contradiction could be due to differences during follow-up or

education [22]. The study by Beydağ et al. also showed the positive effect of education on breast self-examination behaviors [23].

In the present study, the comparison of mean scores of perceived benefits and perceived barriers showed a significant difference before and after education. The findings of Karimi et al.'s study also showed significant changes in the mean score of perceived benefits and perceived barriers after education compared with that before the intervention in the intervention group [24]. However, in the study of Bakhtiar Aghdam et al., there was no significant reduction in the perceived barriers of the intervention group after the educational intervention [22]. In the study of Moody et al., the comparison of the mean scores of the constructs of the health belief model, including perceived benefits and perceived barriers before and after education in the intervention group, showed significant differences, which was consistent with the findings of the present study [25].

Conclusion

The results of this study showed that the HBM can be used for providing appropriate education to promote self-efficacy for the prevention of breast cancer in women, especially in those with a family history of breast cancer. In fact, through designing a health promotion program, self-efficacy can be increased and ultimately the behavior is changed. The results of this study showed that the health education program based on this model had a positive effect on awareness, health beliefs, and promotion of women's self-efficacy in adopting preventive behaviors for breast cancer. This can play a significant role in preventing breast cancer and, ultimately, in reducing the incidence of breast cancer mortality.

The limitation of the study was data collection regarding self-care behaviors associated with breast cancer through mass media and the general public. However, the presence of a control group and similarities of the groups reduced this limitation.

Compliance with Ethical Standards This research was approved by the Ethics Committee of the Tehran University of Medical Sciences (decree code IR.TUMS.VCR.REC.1395.60) and was registered at the Iranian Center for Clinical Trials (IRCT) with the code of IRCT2016082129446N1. It should be noted that this study was conducted in collaboration with Tehran University of Medical Sciences and the Cancer Research Center.

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