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The Effect of Self-Efficacy and Outcome Expectations Training on the Enhancement of Physical Activities Among Women Suffering From Breast Cancer: An Evidence-Based Intervention

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Abstract

Background: At present, women tend to have a longer life-expectancy after a diagnosis of breast cancer has been established, primarily due to earlier diagnoses and advances in the treatment of cancer. Unfortunately, because of the complications of medical treatments, women saved from breast cancer experience a considerable level of disability. One of the complications of such treatments is the avoidance of physical activity.

Objectives: The purpose of this study was to conduct a training intervention based on the constructs of self-efficacy and outcome expectations in order to enhance the physical activity levels of women suffering from breast cancer.

Patients and Methods: The present research was a quasi-experimental study with a randomized control group conducted on 70 women with a final diagnosis of breast cancer in Isfahan, Iran (35 patients in each group). The data collection instruments included: (1) Underlying factors questionnaire, (2) self-efficacy in physical activity and outcome expectations measurement, and (3) the International Physical Activity Questionnaire (IPAQ). After collection, the data were entered into SPSS version 19 software. To analyze the data, statistical tests such as the independent t-test, paired t-test, chi-square, and analysis of covariance were used.

Results: A significant increase in the self-efficacy and outcome expectations in the experimental group was observed one month after the training intervention, and the amount of physical activity showed a significant increase three months after the intervention ($P < 0.05$, $t = 4.1$), while the same figures in the control group did not indicate any significant change ($P > 0.05$, $t = 0.2$). In addition, changes in mean scores of self-efficacy (58.4 ± 2.3), outcome expectations (11.3 ± 1.3), and physical activity (418 ± 183.5) before and after intervention were significant in the intervention group ($P < 0.000$).

Conclusions: It seems that health education programs based on the assessment of the needs of the patients can positively affect their behavioral motivation and performance in physical activities.

Keywords: Breast Cancer, Self-Efficacy, Intervention, Physical Activity

1. Background

Despite considerable advances in the medical sciences, cancer is still one of the most important diseases of the current century (1). In fact, cancer is the second most common cause of mortality after cardiovascular diseases in the developed countries and the third most common cause of death in the developing countries (2). At the present, cancer is the third leading cause of mortality in Iran. Among the different kinds of cancer, breast cancer is the most common malignant disease among women and is the leading cause of cancer-attributed death among women all over the world (3). As newer treatments become available and older treatments are improved, the number of cancer survivors is increasing constantly.

Although this increase in survival rates is laudable, unfortunately breast cancer can lead to numerous psychological, social, and physical problems and complications for the survivors, including fatigue, a reduction in physical activity, cognitive disorders, a reduction in bone health, weight gain, lymphedema, and mood disorders (4). Pursuant to treatment-related complications such as fatigue and muscular weakness, most cancer patients take rests and avoid physical activities, while in recent decades, training and exercise programs have received more attention from scientists as an effective intervention for improving

the quality of life for cancer patients (5-7). Based on some studies, physical activity among women suffering from breast cancer decreases from 36 hours during the week to 14 hours (8, 9).

Cancer is a chronic condition requiring long-term management and, at the present, there is a growing need for rehabilitation efforts for women who have survived breast cancer. A strategy for recovery from cancer is the regular enhancement of physical activities (10). For individuals who have recovered from breast cancer, an increase in physical activity based on certain principles and rules can improve their physiological and psychological status and reduce the risk of relapse and complications from this chronic disease. Increase in physical activities greatly contributes to the enhancement of the quality of life and health outcomes in these individuals.4 Numerous studies have shown that motivation plays an important role in participating in physical activities. From among the most important motivational factors, self-efficacy and outcome expectations should be mentioned (11, 12). Additionally, studies have shown that self-efficacy beliefs affect many aspects of personal performance. Individuals who have higher levels of self-efficacy in comparison with others enjoy better physical and psychological health and well-being. High levels of self-efficacy enhances the health of the individual and the ability to perform tasks in a variety of ways (13, 14). Self-efficacy affects people's motivation and leads to better levels of persistence and perseverance in individuals; therefore, in the treatment course of chronic diseases, enhancing self-efficacy is of great importance (15). Moreover, numerous studies have mentioned self-efficacy as one of the most important predictors of physical activity and interventions, emphasizing that the enhancement of self-efficacy has been more successful in increasing physical activities (16-19). According to a study by Patterson et al., weight gain and obesity is considered a dangerous risk factor in the relapse of breast cancer and resultant mortality. Regular physical activity by such patients can lead to a 30% reduction in mortality (20). In general, the results of numerous studies indicate that to succeed in psychosocial interventions aiming to enhance the quality of life, it is necessary to improve such factors as self-efficacy, coping skills, positive outcome expectations, and self-regulation skills (15, 21, 22). According to social-cognitive theory, it has explicitly been stated that self-efficacy and outcome expectations have a positive, direct, and linear relationship with the adoption of behaviors positively related to health (23).

2. Objectives

Given the analysis of the factors related to physical activities among patients suffering from breast cancer and the important role of self-efficacy and outcome expectations, the present study intends to examine the role of these two variables in the improvement of physical activity behavior among patients suffering from breast cancer in a controlled randomized trial study.

3. Patients and Methods

The present research is pretest–posttest clinical trial with a randomized control group (registration number IRCT20144042117379N1) and was conducted on women suffering from breast cancer with a final diagnosis of cancer. The timeframe in which the study was conducted was between March and August 2014. The study's target group included individuals referred to the Seyyed Alshohada hospital and the Palliative medicine center in Isfahan, Iran.

3.1. Sample Selection

The sampling strategy was based on a proportionate stratified random sampling method. The target population was divided into the experimental and control group at random (to determine who was included in each group, the clients referred on Sundays, Tuesdays, and Thursdays were assigned to the experimental group, and participants referred on Saturdays, Mondays, and Wednesdays were assigned to the control group). To determine the sample size, the Stevens table was used (24). In the majority of cognitive interventions among breast cancer patients, the effect size has been reported as above medium (25). Based on Cohen's criteria (26), 0.2, 0.5, and 0.8 indicate small, medium, and large effect sizes, respectively. Therefore, the medium effect size was considered as 0.40 in the present study (α = 0.05, β = 0.1, u = 1). As a result, the size of each group was determined as 32 individuals, and accounting for a 10% dropout rate, the final size was determined as 35 individuals. In total, 70 people were included in the study. Before entering the study and to observe research ethics, the patients were informed about the research project and its objectives, and written consent was obtained from each patient.

The inclusion criteria for the study included: final diagnosis of breast cancer by a physician, presentation of written consents from the individual and her spouse (if married), a written consent from the patient's physician allowing participation in the training program, the ability to read and write, and age between 30 and 55.

The exclusion criteria included: a physician's certification stating that participation in the sessions was forbidden for the patient, unwillingness to participate in the study, absenteeism in more than one training session, and affliction with cognitive disorders as determined during

the training intervention. All 70 patients who were recruited remained in the study. Normal assumptions were checked with the Kolmogorov-Smirnov test and normal distribution of variables was confirmed with a mentional test.

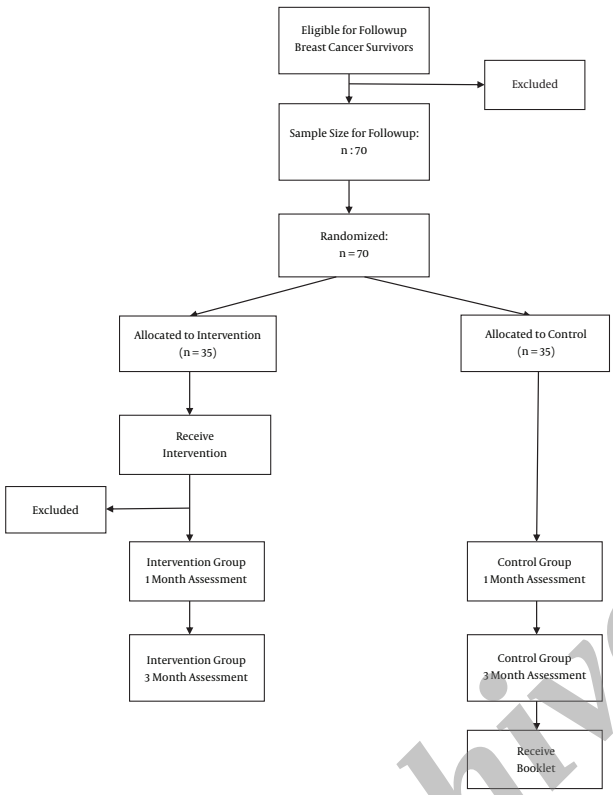

Figure 1. Flowchart of the Study

3.2. Instruments

In this study, three questionnaires were used: (1) Background data; (2) assessment of self-efficacy in physical activity and outcome expectations; and (3) the International Physical Activity Questionnaire (IPAQ). The first questionnaire involves demographic information of the patients including age, marital status, time since diagnosis, economic status, and employment. Bandura's self-efficacy questionnaire had 18 questions, and the outcome expectations questionnaire included 11 questions. The reliability of the self-efficacy questionnaire, which was designed by Bandura in 1977 to assess exercise self-efficacy among diabetic patients (with a Cronbach's alpha of 0.89), was also tested on a population of women suffering from diabetes by Noroozi et al. (27) and its reliability was determined as 0.92. The internal consistency (Cronbach's alpha) of this questionnaire was determined as 0.94 in the present study. The reliability of the outcome expectations questionnaire was also confirmed with a reliability of 0.84 for positive questions and 0.82 for negative questions. The options in this questionnaire were presented as 5-option Likert items (e.g., 'If I do regular physical activity, I feel less stressed').

The Persian version of the International Physical Activity Questionnaire (IPAQ) was used in this study, before intervention and three months after the training intervention. This instrument includes 27 questions which, in five separate sections, assess physical activities related to one's job, moving and carrying activities, activities done at home, and physical activity during leisure times. This questionnaire was designed in 1998 by a group of Italian researchers and its reliability and validity have been acceptable in various countries. To date, numerous studies have used this research instrument in determining the level of physical activity among the Persian speaking population (28, 29). The criteria for this classification are metabolic equivalent of task (MET) minutes per week. The intensity of each activity measured by the questionnaire is determined in metabolic equivalents (MET). MET is a unit used to estimate the energy used for each physical activity, and one MET is almost equal to the amount of energy used by an individual at rest. In this questionnaire, walking is considered to involve 3.3 MET, moderate physical activity is 4 MET, and intense physical activity involves the expenditure of 8 MET. To calculate the general level of activity for each week, it is necessary to add the amount of walking (days $\times$ minutes $\times$ MET) to the amount of moderate physical activity and the amount of intense physical activity. This questionnaire was examined and confirmed as reliable and valid by Fesharaki et al. in a study on 749 individuals. The content validity ratio (CVR) coefficient was 0.6 in this study. The reliability of the questionnaire as determined by Cronbach's alpha and the test-retest methods was 42 and 70, respectively.

3.3. Intervention Program

After obtaining the permission of the physician in charge, the pretest questionnaires were completed by the two groups. According to the results of the initial needs assessment, it became clear that the target group had numerous problems in some aspects of self-efficacy and outcome expectations for doing physical activities. Based on this, five 90-minute training sessions were designed to occur over four weeks. The framework for the program included three training sessions to enhance self-efficacy using strategies such as verbal persuasion, emotional arousal, substitution experience, and performance accomplishment, and the training content included the

prevention and control of lymphedema after physical activity, stress management, prevention of iron deficiency anemia and the fatigue resulting from it, and how to exercise while suffering from this disease. Two sessions were designed to enhance outcome expectations through strategies such as thought showers about the barriers to the performance of physical activities and posing questions to the group; the training content included energy management, recounting successful experiences by the members of the group, and the advantages of physical activity based on various studies carried out on cancer patients. The training sessions were presented by experts and specialists on the topic using PowerPoint presentations in the Entekhab Palliative medicine center. At the end of the final session, training CDs containing the responses of the specialists to the questions of the patients were handed out to the participants.

For the control group, no special program was designed except for the normal medical care. In order to observe ethical research principles, after the trial was finished, the training pamphlet containing the contents of the training sessions was made available to the control group. SPSS software version 19 was used for analysis of the data.

3.4. Statistical Analysis

First, test assumptions were examined and, based on the results of this examination; the normality of the gathered data was tested and confirmed by the Kolmogorov-Smirnov test. Chi-square test, independent-samples t-test, paired-samples t-test, and analysis of covariance (ANCOVA) were used to analyze the data.

4. Results

The analysis of underlying factors showed that the mean age of the individuals under study was 44.5 years old (SD = 6.5). The majority of the research participants were married (75.7%), had a high-school diploma (36.8%), and were housewives (78.6%). Of the participants, 60% reported belonging to the middle class. The results showed that the mean time from diagnosis was 27.2 months and most participants were at the drug therapy stage (48.6%). Based on this, the independent t-test in terms of age and the duration of time from the diagnosis, the chi-square in terms of marital status and employment, and the Mann-Whitney test in terms of educational attainment, economic status, and the disease stage showed no significant differences between the two groups (Table 1).

Given the fact that, before the training intervention, the mean scores for self-efficacy and outcome expectations as determined by a pretest were not significantly different between the two groups based on an independent t-test (P = 0.04) and the two groups were similar in this regard, analysis of covariance was used to control for this issue.

The mean scores obtained in the pretest for outcome expectations as the covariate had a significant relationship with the scores obtained in the posttest (F (1, 67) = 20.93, P < 0.01, partial $\eta^2 = 0.24$).

Additionally, after controlling for the effect of the pretest scores, the training intervention had a significant effect on the variables of outcome expectations and self-efficacy (F (1, 67) = 212.6, P < 0.01, partial $\eta^2 = 0.76$).

The mean scores for self-efficacy and outcome expectations showed an increase for the experimental group 1 month after the training intervention in comparison with the period before the intervention, and the paired t-test showed that this difference was statistically significant (P < 0.000, t = 15.8). Additionally, the independent t-test shows a significant difference between the mean scores of the experimental and the control group after the intervention (P < 0.00, t = 7.9). This indicates that training had a positive effect on the levels of self-efficacy and positive outcome expectations in the experimental group (Table 2).

Another finding of this research suggested that self-efficacy and outcome expectations have an important role in the enhancement of physical activity. Based on an intra-group paired t-test, a significant increase in the physical activity of the experimental group in comparison with the period before the intervention was observed (P < 0.000, t = 4.1). Moreover, an independent t-test showed that during the pretest stage, there was a significant difference between the mean scores for physical activity of the experimental group (m = 1606, SD = 798.2) and the control group (m = 1252, SD = 653.4) (P = 0.04, t = 2.0), meaning that at the starting point (before the training intervention) this difference was significant. Based on this, ANCOVA was used to eliminate the confounding effects of the pretest scores. The results of the analysis of covariance showed that, after eliminating the effects of the scores of the pretest, the difference between the physical activity scores of the two groups was still statistically significant (P < 0.000, F = 28.8), which indicates the positive effects of the training intervention in the enhancement of physical activities in the experimental group (Table 3).

5. Discussion

The objective of the present study was to enhance the amount of physical activity among women suffering from breast cancer using an interventional program based on self-efficacy and outcome expectation constructs. In this study, the mean score for self-efficacy obtained by the

Table 1. The Frequency Distribution of the Demographic Characteristics of the Women Participating in the Study

Variable	Experimental Group	Control Group	P Value
Age[a]	45.17 (6.25)	43.97 (6.95)	0.45
Duration of time from diagnosis[a]	29.37 (20.5)	25.17 (26.8)	0.46
Marital status[b]			0.88
Single	3 (8.6)	4 (11.4)	
Married	27 (77.1)	26 (74.3)	
Widowed	3 (8.6)	4 (11.4)	
Divorced	2 (5.7)	1 (2.9)	
Total	35 (100)	35 (100)	0.63
Educational attainment[b]			
Ability to read and write	2 (5.7)	2 (5.7)	
Primary school	4 (11.4)	3 (8.6)	
Secondary school	8 (22.9)	7 (20)	
High school diploma	13 (37.1)	14 (40)	
Associate's degree	4 (11.4)	4 (11.4)	
Bachelor's degree and higher	4 (11.4)	5 (14.3)	0.91
Total	35 (100)	35 (100)	
Economic status[b]			
Good	35 (100)	10 (28.6)	
Medium	12 (34.3)	23 (65.7)	
Weak	19 (54.3)	2 (5.7)	
Total	4 (11.4)	35 (100)	
Disease stage[b]			0.14
Surgery	2 (5.7)	2 (5.7)	
Chemotherapy	9 (25.7)	4 (11.4)	
Radiation Therapy	1 (2.9)	4 (11.4)	
Drug Therapy	17 (48.6)	17 (48.6)	
Completion of Treatment	6 (17.1)	8 ()22.9	
Total	35 (100)	35 (100)	
Occupational status[b]			0.18
Housewife	28 (80)	27 (77.1)	
Employed	7 (20)	5 (14.3)	
Retired	0	3 (8.6)	
Total	35 (100)	35 (100)	

[a] data are presented as Mean (SD).
[b] data are presented as n (%).

participants was 54.6, which indicates a low level of self-efficacy among these patients. In a study by Akin, conducted on 141 patients suffering from breast cancer, about their quality of life and self-efficacy, similar results were obtained (30). Another study by Haas on 73 patients suffering from breast cancer showed that cancer-related fatigue led to a decrease in the physical activity self-efficacy among these patients, and given the important role of self-efficacy in doing physical activities, Haas suggested that some intervention measures be taken to improve self-

Table 2. The Distribution of the Mean and Standard Deviation of the Scores of Outcome Expectations and Self-Efficacy Before and 1 Month After the Intervention

Variable	Experimental Group	Control Group	Independent t-test		ES[a]
Outcome expectations	**Mean (SD)**	**Mean (SD)**	**P Value**	**t**	
Before intervention	37.1 (4.5)	39.2 (3.6)	0.04	2.0	0.7
1 Month after intervention	48.4 (3.2)	37.4 (4.1)	0.00 >	12.2	
Paired t-Test					
P value	0.000 >	0			
T	14.7	3.0			
Self-efficacy			0.00	2.6	
Before intervention					
1 Month after intervention	113 (17.6)	69.4 (27)	0.00	7.9	
Paired t-test	54.6 (19.9)	71.1 (30.4)			
P value	0.000 >	0.2			
t	15.8 (1.1)				

[a] Effect size.

Table 3. The Distribution of the Means and the Standard Deviations of the Physical Activity Scores before and 3 Months after the Intervention

Variable	Experimental Group	Control Group	Independent t-test	
	Mean (SD)	**Mean (SD)**	**P Value**	**t**
Physical activity				
Before intervention	1606 (798.2)	1252.15 (653.4)	0.04	2.0
3 Months after intervention	2024 (614.7)	1261.92 (639.5)	0.000 >	5.0
Paired t-test				
P value	0.000 >	0.046		
t	4.1 (0.2)			

efficacy among these patients (31). These results correspond with the results obtained from the present study and indicate that refractory diseases significantly affect and reduce the individuals' self-efficacy. Therefore, appropriate interventions are needed to pave the way for the enhancement of self-efficacy. In the present study, one month after the training intervention was conducted based on the needs assessment taken from the patients, the self-efficacy in the performance of physical activities increased to a mean of 113 in the experimental group, but the same measure in the control group did not show any statistically significant difference. Thus, the training intervention resulted in the enhancement of physical activity self-efficacy among women suffering from breast cancer. The results of the present study match those obtained from studies involving cognitive-behavioral interventions conducted to enhance self-efficacy, including Lev et al. (2001), Lee (2006), Lam (2007), and Mosher (2010) cited in Mohajjel Aghdam (2013) (32). Another finding of the present study is the significant increase in positive outcome expectations in the performance of physical activities in the experimental group from a mean of 37.1 to 48.4. Although this variable was at a satisfactory level from the beginning, the training intervention made the outcome expectations of physical activities even more positive. In a trial study by Rogers conducted on breast cancer survivors, it has also been stated that patients recognize the striking results and the outcomes of appropriate and constant physical activity as effective in the improvement of physical and mental health, such that their outcome expectations are positive, but they are not aware of the type of physical activity that they are allowed to perform (33). This matches the results obtained from the present study. An interventional study by Korstjens conducted on cancer patients indicated that face-to-face training can improve the attitude (outcome expectation) of individuals suffering from cancer (34). Addition-

ally, the results of a study by Short et al. conducted in Newcastle, Australia on 347 women suffering from breast cancer, titled "Movement for Life", demonstrated that when patients suffering from breast cancer received more accurate information relevant to their problems, they reported more desirable quality of life, higher self-efficacy, fewer self-efficacy obstacles, more positive outcome expectations and higher outcome expectancy (22). In the present study, the amount of physical activity performed by the experimental group as measured three months after the training intervention was significantly different from that of the control group. In fact, the training intervention was effective in improving the performance of physical activities by the participants. Based on the results of a review study by Gary, an important factor affecting the performance of physical activities by patients suffering from heart failure is self-efficacy, and the use of the self-efficacy theory can be beneficial in designing training interventions (35). These findings are similar to those of a study by Dinger et al. on sedentary women with an average age of 72. They reported improvements in performance of physical activities after the training intervention. In this study, like the present research, the IPAQ instrument was used to measure the amount of physical activity performed (36).

With earlier diagnoses and improvements in cancer treatments, the number of breast cancer survivors increases on a daily basis. The most important complication of breast cancer and its treatments is the reduction of abilities for a specific time. The reduction in the sense of capability together with the physician's recommendations that the patient take care of his/her health sometimes limits the physical activities of the individuals to the lowest levels. Therefore, many cancer survivors for a long time are in doubt about extending their physical activities and avoid physical activities in order to reduce treatment complications such as fatigue. Based on the results obtained from the present study, it can be stated that designing cognitive-behavioral training interventions based on training needs assessment of the patients can improve the quality of life of these patients and enhance the amount of physical activity, which is a cornerstone of a healthy lifestyle. It is necessary to design and conduct these training interventions continually and constantly, with attention to the limitations of the patients and also by using proper health education models. Therefore, it is recommended that health training programs be planned and conducted in palliative medicine centers and oncology wards of the hospitals in order to solve the problems related to the physical activities of cancer patients under the supervision of experts. From among the limitations of the present study, the use of self-report physical activity questionnaires and a seven-day follow-up test can be mentioned. In the use of such questionnaires, there is the possibility of errors of memory and also untruthful reporting of the information. However, this questionnaire has been used in numerous studies in Iran and other countries. In the present study, the questionnaire was provided to the participants during a one-week interval in order to minimize this type of error.

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Footnotes

Authors' Contribution: Concepts: Raheleh Soleimani; design: Raheleh Soleimani and Ahmad Ali Eslami; definition of intellectual content: Raheleh Soleimani; literature search: Raheleh Soleimani; clinical studies: Raheleh Soleimani, Negar Ra'isi Dehkordi, Noushin Parsa Gohar and Fariborz Mokarian Rajabi; experimental studies: Raheleh Soleimani, Ahmad Ali Eslami, Negar Ra'isi Dehkordi, Noushin Parsa Gohar and Fariborz Mokarian Rajabi; data acquisition: Raheleh Soleimani; data analysis: Akbar Hassanzadeh; statistical analysis: Ahmad Ali Eslami and Akbar Hassanzadeh; manuscript preparation: Raheleh Soleimani; manuscript editing: Mohammad Almasian; manuscript review: Raheleh Soleimani and Ahmad Ali Eslami; guarantor: Ahmad Ali Eslami.

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