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Original Article

The Effect of Designed Exercise Program on Fatigue in Women with Breast Cancer Receiving Chemotherapy

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Abstract

Background: Fatigue identified as the most prevalent, disturbing and disabling symptom that has profound impact on quality of life in patients with breast cancer receiving chemotherapy. In these patients, unnecessary bed rest and prolonged sedentariness can potentially contribute significantly to the development of fatigue, so this study was carried out to investigate and determine the effect of designed exercise program on fatigue in women with breast cancer receiving chemotherapy.

Methods: This research was a quasi-experimental study with control and experimental groups carried out in cancer institute center of Tehran Imam Khomeini Hospital in 2006. The Piper Fatigue Scale used in order to measure subjective fatigue in behavioral, affective, sensory and cognitive dimensions before and after intervention. The intervention consisted of a designed exercise program at home 20 to 30 minutes every day, 3 to 5 days per week for 9 weeks (3 chemotherapy cycles). The control group during the study did not use any intervention except routine procedures.

Results: Data analysis showed that the posttest mean of fatigue in four dimensions (Behavioral, Affective, Sensory, and Cognitive) in the experimental group was lower than the control group.

Conclusion: According to the results, the designed exercise program was effective in reducing fatigue in women with breast cancer receiving chemotherapy. Therefore, it can be used as an effective approach for reducing fatigue in cancer patients, and improving the patient's quality of life.

Keywords: *Breast Cancer, Chemotherapy, Fatigue, Designed Exercise Program, Nurse*

Introduction

Breast cancer is the greatest concern in women health, because it is the most common cancer and is second after lung and bronchus cancer (1).

Women with breast cancer receiving chemotherapy suffer from a variety of side effects during diagnosis and treatment process (2); especially fatigue is the most common, and disturbing symptom that has profound impact on quality of life (3, 4). Studies examining the prevalence of fatigue among the patients have found that up to 99% experience some level of fatigue that range from moderate to sever (5).

Many of the patients may experience persistent fatigue as a long-term side effect of adjuvant chemotherapy treatment (6) and there is growing evidence to suggest that fatigue may persist for months or even years after completion of breast cancer treatment (5, 6). In addition, unnecessary rest and prolonged rest can contribute significantly to the development of fatigue and weakness (3, 7, 8).

Fatigue influences well-being sense, daily performance, activities of daily living, relationships with others, and complication with treatment (7, 9, 10). Therefore, it is necessary to identify this disabling symptom and taking some steps toward managing it in order to improve the quality of life. In this regard evaluating fatigue in patients with cancer has become a global issue (4), and proposing effective interventions of managing fatigue in patients with cancer has been considered by oncology nursing society (11) as a priority for research.

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Above the all more new randomized, clinical trials are needed to provides more convincing evidence on the effectiveness of caring interventions (2, 8, 12).
Since Previous, study limitations about cancer fatigue call for further research on the effect of exercise on fatigue of patients with cancer receiving treatment. Some of these limitations are as small samples, the absence of appropriate control groups, not using randomized clinical trials, and heterogeneity of samples regarding sex, age, cancer type and treatment type and so on (2,13-15).
In addition, many of the researches, which have studied the effect of exercise on patients receiving treatment, have followed a similar pattern in designing the exercise plan (14, 16, 17). Considering the above-mentioned issues, there is a need for research on designing the newest and yet the most effective techniques of exercise for decreasing fatigue of patients receiving chemotherapy (15).
So, this study was conducted to investigate the effect of designed exercise program on fatigue in women with breast cancer receiving chemotherapy.

Material and Methods

This quasi-experimental research, with two groups of control and experimental has been carried out on women with breast cancer receiving outpatient chemotherapy in cancer institute center of Tehran Imam Khomeini Hospital in 2006.
Sample size (α= 0.05, β= 0.05) was set according to the statistical formula of "Pokuk" and based on the results obtained from a quasi-experimental research (18). The samples were estimated 30 patients for the control and experimental groups. They selected and simple no probability sampling carried out according to the given characteristics for the research samples.
This characteristics include: Women with breast cancer (stage 0, 1, 2, 3); Age between 18 and 65; Receiving chemotherapy; Not receiving radiotherapy or other treatments; Without any documented other organ diseases or metastasis of other regions; Without any documented psychiatric or neurological conditions; able to read, write and speak.
Sampling of the control group was done before that of the experimental group for being sure from not distribution of the program in the control group and probable interaction between them. Until the end of the research, four patients were excluded from the study, because of completing the treatment, and going under surgery.
The exercise program after review of literature and based on the patients physical condition was designed by researchers. Finally, safety, feasibility and facility of this exercise program verified after two pilot studies.
Our exercise program consisted of a series of simple, light exercises for upper and lower extremities and trunk, accompanied by music and was done according to a visual CD supposed to instruct how to do the exercises.
The patients were doing the exercise program at home, 3-5 d per week, preferably in some specific hours (9-10 am) during 3 cycles of chemotherapy. The exercise program included three successive stages (warm-up, main training, cool-down) accompanied by some music appropriate to each stage.
The above-mentioned program was designed for 9 weeks (three chemotherapy cycles) and the main training differed for each 3 weeks (one cycle) and was changing in terms of the type and duration of exercises according to the progress of the chemotherapy period.
The total duration of the program during the day was 20 min at the beginning of the study and increased gradually up to 30 min until the end of it.
In a 3-week cycle of chemotherapy, the exercise program was being followed once a day in the first week and twice a day in the next second weeks; once in the morning and once in the afternoon.
After taking informed content from patient and making sure of their willingness to participate in the study, each sample was considered as a research sample right from the beginning of the research and was studied during three chemotherapy cycles (9 weeks). In the control group, no intervention was made during the research period and only fatigue was measured before and after the intervention.

Questionnaires and checklists were used in order to recording of demographic and clinical characteristics of the patient; recording of the type, duration and characteristics of any specific exercise, their heart rate at the end of exercise as well as the reasons in case of not doing the exercise.

In addition, Piper fatigue scale instrument was used in order to measuring patient's fatigue with four dimensions (behavioral, affective, sensory and cognitive) (19- 21).

The content and concurrent validity of this instrument is already established in several studies abroad (22). In the present study, the masters of Tarbiat Modares University and Tehran Medical Sciences University verified the validity.

The Split Half method and Pearson correlation coefficient were adopted for determining the reliability of the scale that was 0.86.

Results

Table 1 shows the patients' demographic and clinical characteristics.

Based on the data in Table 2 the post test mean of fatigue in four dimensions (Behavioral, Affective, Sensory, Cognitive) in the experimental group was lower than the control group and this difference between two groups was statistically significant.

Results from t-test did not show significant differences in none of them behavioral (P= 0.67), Affective (P= 0.87), Sensory (P= 0.72) and Cognitive (P= 0.74) dimensions of fatigue. Also total fatigue between two groups before intervention was not significant (P= 0.92).

After the intervention above variables changed significantly as incremental direction (behavioral (P= 0.002), Affective (P= 0.009), Sensory (P= 0.050) and cognitive (P= 0.02)), and total fatigue (P= 0.005) (Table 3).

The statistical paired t-test showed that this increase is significant in affective (P= 0.03), sensory (P= 0.02), cognitive (P= 0.03) and total fatigue (P= 0.03). In the experimental group, mean of the fatigue in four dimensions as well as total fatigue after the intervention decreased rather than before the intervention.

This decrease is significant only in the behavioral dimension (P= 0.01). On the other hand, the statistical independent t-test showed a significant difference between two groups regarding the difference of behavioral (P= 0.01), affective (P= 0.01), sensory (P= 0.02), cognitive (P= 0.03) dimension as well as total fatigue mean (P= 0.006) before and after intervention.

Table 1: Demographic and clinical characteristics of study participants

Characteristics \ Group	Control (n = 28)		Experimental (n = 28)		X^2	*P*
	n	%	n	%		
Age, years					0.51	
19-30	2	7.1	1	3.6		P : 0.77
31-45	14	50	16	57.1		
46-65	12	42.9	11	39.3		
Education level						
Primary school	9	32.1	6	21.4	2.67	0.44
Junior high school	5	17.9	9	32.1		
High school diploma	10	35.7	7	25		
Some college	4	14.3	6	21.4		
Marital status						
Married	24	85.7	26	92.9	1.08	0.58
Single	1	3.6	1	3.6		
Divorced	3	10.7	1	3.6		
Menopause status						
Menopaused	8	28.6	9	32.1	2.86	0.23
Induced by chemotherapy	2	7.1	6	21.4		
Not menopaused	18	64.3	13	46.4		

Table 1: Countinued...

***BMI**						
< 20	3	10.7	1	3.6	1.31	0.72
21-25	10	35.7	12	42.9		
26-30	8	28.6	7	25		
> 31	7	25	8	28.6		
Stage of cancer						
1	1	3.6	3	10.7	2.95	0.70
2	18	64.3	20	71.4		
3	9	32.2	5	17.9		
Type of surgery					0.22	
****MRM**	26	92.9	25	89.3		0.63
Lumpectomy	2	7.1	3	10.7		

* Body Mass Index
** Modified Radical Mastectomy

Table 2: The mean of fatigue before and after intervention

Dimension of fatigue	**Time** \ **Group**	**control**	**Experimental**	***t**	***P***
Behavioral	Before	4.68 ± (3.39)	4.35 ± (2.39)	0.41	0.67
	After	5.38 ± (2.58)	3.10 ± (2.58)	3.30	0.002
Affective	Before	4.58 ± (3.49)	4.72 ± (3.22)	- 0.15	0.87
	After	6.14 ± (3.26)	3.79 ± (3.22)	2.70	0.009
Sensory	Before	3.99 ± (2.97)	4.25 ± (2.59)	- 0.35	0.72
	After	5.29 ± (2.93)	3.76 ± (2.75)	2.00	0.050
Cognitive	Before	2.86 ± (2.36)	2.66 ± (2.27)	0.32	0.74
	After	3.73 ± (2.45)	2.34 ± (2.14)	2.26	0.02
Total	Before	3.98 ± (2.85)	3.91 ± (2.11)	0.09	0.92
	After	5.05 ± (2.43)	3.16 ± (2.41)	2.92	0.005

* Independent *t*-test

Table 3: Changes in mean of fatigue from before to after intervention in the control group and the experimental group

Dimension of fatigue	**Group**	*** Before**	***After**	**** *t***	***P***	***** Difference**	****** *t***	***P***
Behavioral	Control	4.68 ± (3.39)	5.38 ± (2.58)	-1.16	0.25	+ 0.7 ± (3.15)	-2.55	0.01
	Experimental	4.35 ± (2.39)	3.10 ± (2.58)	2.64	0.01	-1.25 ± (2.50)		
Affective	Control	4.58 ± (3.49)	6.14 ± (3.26)	-2.19	0.03	+1.56 ± (3.75)	-2.64	0.01
	Experimental	4.72 ± (3.22)	3.79 ± (3.22)	1.50	0.14	- 0.93 ± (3.27)		
Sensory	Control	3.99 ± (2.97)	5.29 ± (2.93)	-2.39	0.02	+ 1.3 ± (2.87)	-2.26	0.02
	Experimental	4.25 ± (2.59)	3.76 ± (2.75)	0.85	0.40	- 0.49 ± (3.01)		
Cognitive	Control	2.86 ± (2.36)	3.73 ± (2.45)	-2.18	0.03	+0.87 ± (2.11)	-2.19	0.03
	Experimental	2.66 ± (2.27)	2.34 ± (2.14)	0.86	0.39	- 0.32 ± (1.94)		
Total	Control	3.98 ± (2.85)	5.05 ± (2.43)	-2.26	0.03	+1.07 ± (2.52)	-2.87	0.006
	Experimental	3.91 ± (2.11)	3.16 ± (2.41)	1.77	0.08	-0.75 ± (2.23)		

* Data are mean±SD, ** Paired t-test, *** After – Before, **** Independent *t*-test

Discussion

Fatigue is a subjective, multicausal, multidimensional and complex concept (2) and of a vast range regarding its occurrence rate and its effects on patient's functional ability and quality of life (11).

The results of this study revealed that women with breast cancer receiving chemotherapy in the experimental group experienced lower fatigue in behavioral, affective, sensory and cognitive dimensions; it means, this program has been effective on reducing fatigue.

These results are consistent with those obtained by other researches that investigated the effect of a relaxation breathing exercise on fatigue in haemopoietic stem cell transplantation patients. The results showed that experimental group had a greater decrease in fatigue than the control group (3).

On the other hand, based on the data from Table 2, in control group the mean of fatigue in four dimensions and the total fatigue has had an ascending direction after the intervention. That is, the mean of fatigue in the four dimensions and the total fatigue mean after the intervention was larger than the corresponding means before the intervention; whereas the theses variables in the experimental group have had a descending direction, and the fatigue mean after the intervention were smaller than the mean of fatigue before the intervention.

Since the influencing conditions were equal for all patients in both groups, therefore the difference between can be attributed to the designed exercise program during the study. Thus, it can be concluded that the designed exercise program has been effective in decreasing the fatigue.

These results go well with those obtained by other foreign researches. Their results showed that walking exercise program at home could decrease fatigue in women with breast cancer receiving treatment (chemotherapy/radiotherapy) (18).

The results another study too showed that fatigue scores on exercise days were lower than on no exercise days in women with breast cancer receiving chemotherapy (16).

In comparison of results of two above foreign researches (16, 18) our study results show that designed exercise program in this study similar to walking exercise program can have necessary effectiveness in order to decrease of fatigue in women with breast cancer receiving chemotherapy.

The results of a similar study abroad also suggested a reverse relationship between activity level and fatigue. The study measured activity level and rest periods in patients with breast cancer. Results of this descriptive study provided some support for the hypothesis of "There is a relationship between lack of activity (low daily activity) and high level of fatigue during chemotherapy period. That is, the less activity and the more rest result in more level of fatigue in this patients and exercise can be an effective intervention for managing caner- related fatigue through raising the level of individual' s activity" (23).

It is now accepted that rest alone is generally not effective in returning cancer patients with chronic fatigue to their previous level of functioning (3, 7); because Unnecessary rest and prolonged sedentariness can contribute significantly to the development of fatigue and weakness, which may result in rapid and potentially irreversible losses in energy and functioning (3,7,8).

Another researcher also believes that reduction in physical activity lead to reduced energy capacity and subsequently to fatigue and decreased functional status. He continue that activity and exercise programs ameliorate fatigue through preservation of energy efficiency; therefore there should be a balance between activity and resting and so exercise can be regarded as an option which is likely to reduce fatigue related to cancer and its treatments (10).

In another point of view, the results from of several intervention studies have demonstrated that physical activity and exercise can increase the level of self-control, independence, self-esteem and can improve mood, adaptation with diseases, body image and ability of concentration (7, 17, 24), and totally their quality of life (11).

As conclusion we reach to this that exercise is a non-pharmacological, non-invasive, and low cost

therapeutic approach in managing fatigue and can easily be trained by the members of medical team including nurses and oncology nurses have a responsibility to apply the knowledge of exercise for cancer-related fatigue to practice through education, limited exercise prescription, and referral. Finally based on the results of the present study nurses can use designed exercise program for managing fatigue in women with breast cancer receiving chemotherapy; in should be noted that regarding the study small and convenience samples, testing this program during future studies with larger samples for being sure about its effectiveness is highly recommended.

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