

Effect of Self-administered Exercise on Breast Cancer Patients' Quality of Life

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ABSTRACT

Patients with cancer often experience psychological symptoms and mood changes. In the present study we introduced a walking program for mild exercise after breast cancer surgery, and prospectively examined the mental status and quality of life (QOL) of Japanese patients with breast cancer. Twenty-eight patients with early-stage breast cancer were recruited. Depressed mental status and QOL were assessed with the Center for Epidemiologic Studies Depression Scale (CES-D) and the 36-Item Short Form Health Survey (SF-36). We instructed the walking program to patients 1 month after surgery. The CES-D and SF-36 scores and physical activity data were measured 1 month and 3 months after surgery. A depressed mental status was present before surgery in 8 patients (29%) but was present 3 months after surgery in only 4 patients. Six subscales of SF-36 had significantly improved 3 months after surgery. Physical activity after intervention was correlated with the scores of CES-D and 7 subscales of SF-36. This prospective study is, to our knowledge, the first to show that exercise improves mental status and QOL of Japanese patients with breast cancer. Adequate attention must be paid to the mental health of patients with breast cancer, regardless of whether they have a mental illness.

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Key words : breast cancer, exercise, quality of life, mental health, depression

INTRODUCTION

Patients with cancer experience psychological symptoms and mood changes, and about 20% of them have depression in the treatable stage¹. Breast cancer is associated with a high rate of psychological symptoms : within 1 year of diagnosis, 48% of patients will have depression or anxiety or both². The presence of psychological symptoms greatly affects treatment, with the concern that interrupting

treatment might a cure less likely. Additionally, treatment itself is related to decreased quality of life (QOL) and to fatigue and influences psychological symptoms³. In terms of the relationship between psychological stress and the survival rate of patients with cancer, previous studies have shown that psychological factors and survival rates are related each other in patients with breast cancer^{4,5}.

Numerous studies have shown that exercise therapy is effective for psychological symptoms and decreased QOL in

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patients with breast cancer⁶⁻⁹. This study investigated whether a self-administered walking program can improve depressive mental state and QOL in Japanese patients with breast cancer.

MATERIALS AND METHODS

Study Protocols

We requested subjects from among patients with primary breast cancer (clinical stages 0-III) who were 20 years or older, and had decided to have breast cancer surgery at The Jikei University School of Medicine Hospital, Tokyo. A walking program was introduced to these subjects at an outpatient clinic 1 month after they had surgery. One day before surgery and 1 month and 3 months after surgery, we evaluated psychological questionnaire responses and data on the amount of physical activity.

This study was approved by the ethics committee of The Jikei University School of Medicine (approval number : 24-337).

Exercise subjects

From April 2013 through August 2014, 28 subjects were recruited. We explained the study to the subjects before surgery, and they gave written consent. Patients were excluded as subjects for any of the following reasons : a history of or present treatment for mental illness ; limited exercise because of a history of heart disease, respiratory disease, or musculoskeletal disease ; and exercise could not be introduced.

Evaluation Items

1. Evaluation of mental state and QOL

We evaluated depressed mental states and QOL with self-response questionnaires. We used the following evaluation scales :

a) The self-response depression evaluation scale (Center for Epidemiologic Studies Depression Scale ; CES-D). This depression evaluation scale has 20 items. Each item is scored on a scale of 0 to 3, and a total score of at least 16 is considered to indicate depression¹⁰.

b) The 36-Item Short-Form Health Survey (SF-36), Japanese version. This survey was used to measure health-related QOL and contains 8 general-health subscales. Each subscale is scored on a 0 to 100 scale, with high scores indi-

cating greater health^{11,12}.

2. Evaluation of the amount of physical activity

Subjects were loaned a physical activity monitors (Lifecorder PLUS, Suzuken Co., Ltd., Nagoya, Japan) when they were discharged from the hospital after surgery and were instructed to wear the monitor at the waist all day. Recorded internal data of the amount of physical activity and exercise intensity were collected during outpatient visits (1 month and 3 months after surgery). The subjects were interviewed to record activities and the duration of exercise that could not be measured with the monitor, such as swimming. The amount of physical activity was then calculated.

1) Baseline amount of activity

The amount of physical activity was monitored until 1 month after surgery. A baseline of physical activity was established from the mean amount of physical activity during this period.

2) Introduction of exercise

Subjects were instructed to begin the walking program after the baseline amount of physical activity was measured until 1 month after surgery. The physical activity goals for individual subjects were to increase the amount of physical activity exceeding moderate intensity (corresponding to over 3 metabolic equivalents of task (METs) : on the physical activity monitor, display of 4 to 9 intensity¹¹) from moderate intensity of the each baseline physical activity every-day. Subjects confirmed their amount of physical activity each day before bedtime, and record whether they met their goals on a recording sheet. If the mean amount of physical activity after introducing the walking program exceeded the baseline, we defined as the goal as having been achieved.

Control subjects

In a previous research study from January 2009 through December 2010 we selected 39 patients, who had had surgery for breast cancer but did not engage in exercise, by using the same eligibility criteria that we used in the present study. From these 39 patients we collected psychological questionnaires and recorded CES-D scores at discharge and 3 months after surgery. These patients were used as a control group to conduct a comparison with the subjects of the present study. However, we were unable to compare SF-36 scores because of the difference in measurement intervals between the previous study and the present study.

Statistical analysis

Subject characteristics, the amount of physical activity, and the results of each evaluation scale were shown by mean values \pm standard deviation. We compared CES-D depression scores from each measurement period with a chi-squared test. The CES-D and SF-36 scores were analyzed with single-factor analysis of variance, and a multiple comparison test was performed. The amount of physical activity and the control group's CES-D scores were analyzed with t-tests. We performed correlation analysis on the relationship between CES-D and SF-36 scores 3 months after surgery and the amount of physical activity from 1 month to 3 months after surgery.

Endpoints

The primary end point is the evaluation data of mental state and QOL at 1 month and 3 months after surgery. The secondary endpoint is the correlation between the amount of physical activity and evaluation of mental state and QOL.

RESULTS

Patient characteristics

Characteristics did not differ significantly between the exercise patients and the control subjects (Table 1).

Mental state and QOL evaluation

1. Depression evaluation

Before surgery the CES-D scores showed that depression was present in 8 patients who would later exercise (29%) (Table 2). Three months after surgery, the percentage of patients with depression did not differ significantly between the exercise patients and control patients ($p = 0.41$). From before surgery to 3 months after surgery, CES-D scores in exercise patients improved significantly ($p = 0.01$). However, in control patients, CES-D scores did not significantly from 1 month to 3 months after surgery ($p = 0.60$). Between exercise patients and control patients, CES-D scores did not differ significantly 1 month ($p = 0.76$) or 3 months after surgery ($p = 0.34$).

The number of control patients who were found with the CES-D to be depressed was greater 3 months after surgery (13 patients, 33%) than at 1 month after surgery (10

Table 1. Patients characteristics

	Exercise patients ($n = 28$)	Control patients ($n = 39$)
Age (years)	51.0 \pm 10.1 (38-73)	51.6 \pm 8.0 (33-65)
Height (cm)	158.4 \pm 5.5 (145-170)	158.1 \pm 5.2 (149-168)
Weight (kg)	55.4 \pm 6.7 (45-67)	54.1 \pm 7.4 (38-73)
Body mass index (kg/m ²)	22.1 \pm 2.5 (17.6-26.8)	21.7 \pm 3.4 (17.1-32.0)
Menopausal		
Premenopausal	16	20
Postmenopausal	12	19
Disease stage		
0	3	3
I	9	17
II	14	14
III	2	5
Surgery		
Lumpectomy	16	22
Mastectomy	12	17
Breast reconstruction		
Yes	5	5
No	23	36
Adjuvant therapy		
Hormone therapy	18	27
Chemotherapy	7	18
Radiation	14	26

Table 2. The CES-D results from each measurement period

CES-D score	Exercise patients ($n = 28$)			
	Before surgery	1 month after surgery	3 months after surgery	p value
< 16	20	21	24	<u>0.41</u>
≥ 16	8	7	4	
Mean \pm SD	11.7 \pm 7.3	11.3 \pm 7.7	9.1 \pm 6.4	0.01

CES-D score	Control patients ($n = 39$)			
	Before surgery	1 month after surgery	3 months after surgery	p value
< 16	-	29	26	<u>0.46</u>
≥ 16	-	10	13	
Mean \pm SD	-	11.9 \pm 8.6	11.1 \pm 9.5	0.60

patients, 24%), but this difference was not significant.

2. QOL evaluation

In exercise patients 6 of 8 SF-36 subscales (excluding general health perception and social functioning), analysis of variance showed significant change (Table 3). Furthermore, a multiple comparison test found that physical functioning, role-physical, role-emotional, and mental health significantly improved from 1 month after surgery to 3 months after surgery.

Amount of physical activity evaluation in exercise patients

The mean amount of physical activity from 1 month to 3 months after surgery in exercise patients was significantly greater than that at baseline, i.e, until 1 month after surgery ($p < 0.01$). Of the 28 exercise patients, 21 achieved their individual goals ; therefore, the success rate was 75%.

Relationship between amount of physical activity and questionnaire scores

The mean amount of physical activity from 1 month to 3 months after surgery and the CES-D score 3 months after surgery were negatively correlated ($p = 0.01$) (Fig. 1). The amount of physical activity and the scores from the 7 of the 8 subscale items (except bodily pain) of the SF-36 were positively correlated.

DISCUSSION

The present study found that the introduction of self-administered walking program positively influenced the depressed mental state and QOL of patients with breast cancer. Before surgery CES-D scores showed that 8 of 28 patients (29%) were depressed. Potential changes in mental state are commonly documented in patients with breast cancer.

Table 3. The SF-36 results from each measurement period in exercise patients

SF-36 subscales	Before surgery	1 month after surgery	3 months after surgery	p value
Physical functioning	48.1 \pm 10.0	46.4 \pm 7.0	50.5 \pm 6.4	< 0.05 ^c
Role-physical	43.4 \pm 13.7	34.5 \pm 12.8	44.7 \pm 10.1	< 0.01 ^{ac}
Bodily pain	52.1 \pm 10.6	42.4 \pm 8.5	46.5 \pm 9.5	< 0.01 ^{ab}
General health perception	46.5 \pm 9.1	46.3 \pm 8.7	47.6 \pm 8.3	0.39
Vitality	47.0 \pm 11.9	48.9 \pm 9.5	52.4 \pm 6.8	< 0.05 ^b
Social functioning	45.3 \pm 13.6	40.0 \pm 12.4	44.6 \pm 12.7	0.11
Role-emotional	46.4 \pm 9.6	43.3 \pm 11.2	49.1 \pm 7.9	< 0.01 ^c
Mental health	47.5 \pm 10.5	49.4 \pm 7.9	55.7 \pm 6.2	< 0.01 ^{bc}

a : Comparison between before surgery and 1 month after surgery

b : Comparison between before surgery and 3 months after surgery

c : Comparison between 1 month and 3 months after surgery

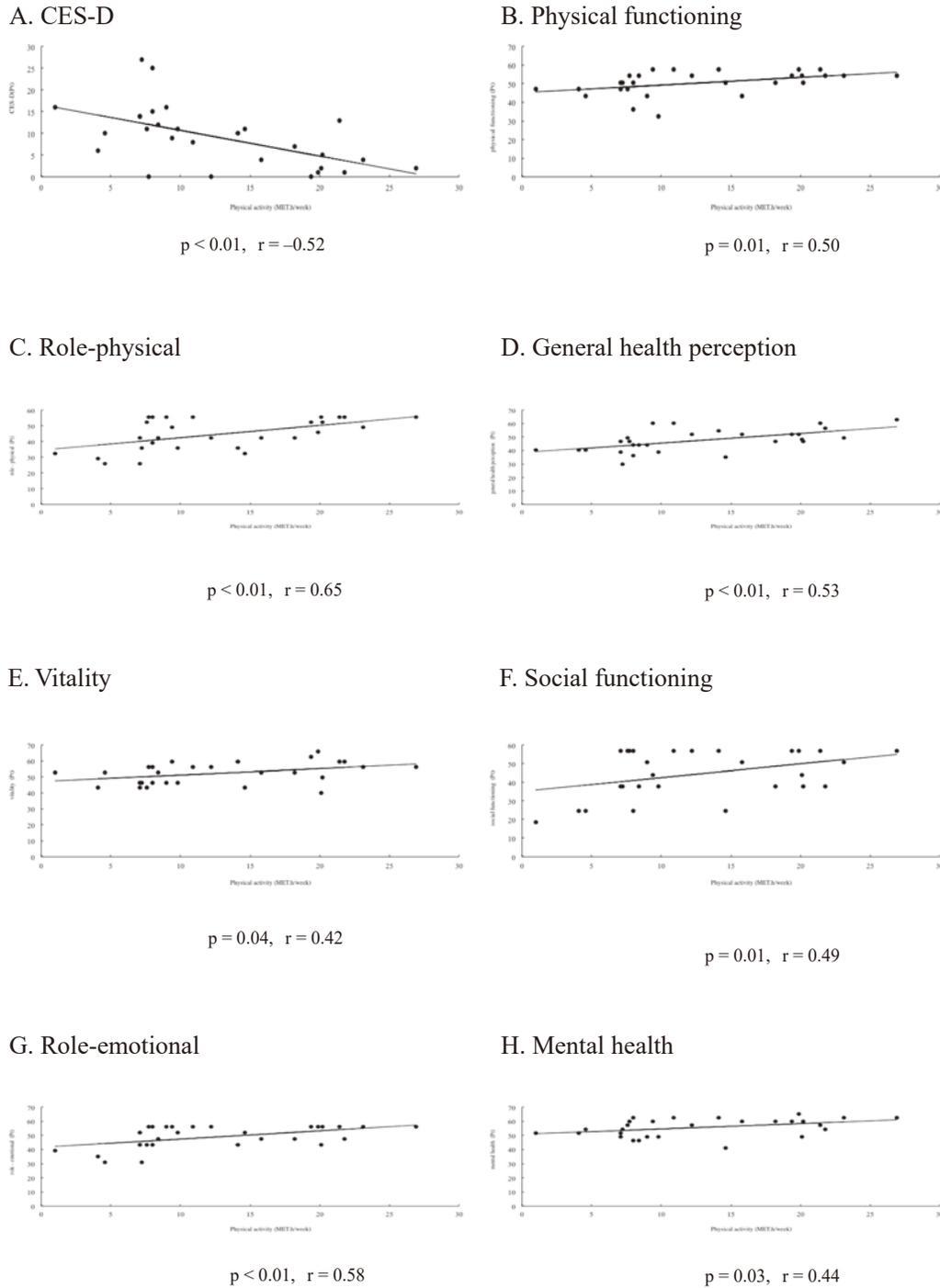


Fig. 1. Relationship between amount of physical activity and questionnaire scores

Depression is related to a decreased survival rate in patients with breast cancer ; research indicates that such factors as social support can improve survival rates⁵. Furthermore, weight gain during treatment can lead to lowered disease-free survival rate, decreased QOL, and an increased risk of complications^{7,14,15}. Addition, obesity and decreased

physical activity among patients with cancer can become risk factors associated with prognoses. Obese women with breast cancer are less physically active than obese women with no history of cancer¹⁶, whereas women who vigorously exercise have a lower risk of breast cancer¹⁷. Maintaining a sufficient amount of physical activity and managing weight

are important for preventing breast cancer and improving prognoses. Walking is convenient method of maintaining physical activity because it can be easily self-monitored and incorporated into daily life.

Although depression is commonly treated with medication and psychological therapy, its symptoms are often reduced with exercise therapy¹⁸. Similarly, exercise therapy has been shown, by many randomized controlled trials, to decrease fatigue and improve physical function, QOL, and mental state in patients with breast cancer¹⁹.

Previous studies offered various types of exercise therapy without establishing standardized efficacy criteria. A meta-analysis of randomized controlled trials of patients with breast cancer found that the most effective therapy for decreasing fatigue and improving QOL is mild exercise for 12 MET hours/week²⁰. This finding suggests that strenuous exercise is not needed to improve the mental state and QOL of patients with breast cancer. In the present study, the mean amount of physical activity after the introduction of walking program was 12.8 ± 6.8 MET hours/week. On the basis of these findings, we believe that a walking program is useful for maintenance of mental state and QOL of patients with breast cancer.

The limitations of our study are small sample size, not randomization, and exercise method. The goals of exercise were set according to individual amounts of physical activity. Therefore, we aimed to increase the amount and quality of physical activity of patients by introducing a self-achievement program that asked them to monitor and record their daily amount of physical activity, as shown by the activity monitor, while adjusting their goals by themselves. This method of improving physical activity might not be objective or uniform. In addition, the data from the control patients was historical and insufficient. To improve the quality of study, we must improve the exercise method and include appropriate control subjects for a prospective study.

Patients with breast cancer will receive stronger treatment (chemotherapy, and radiation therapy) and might experience earlier changes in their mental state, perhaps leading to a mental illness, and decreased QOL. Therefore, adequate attention must be paid to the mental health of patients with breast cancer, regardless of whether they have a mental illness. Using exercise therapy to maintain mental health and QOL may help to make treatment more effective and improve prognoses.

CONFLICT OF INTEREST STATEMENT

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