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ORIGINAL ARTICLE

Effects of exercise training and follow-up calls at home on physical activity and quality of life after a mastectomy

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Abstract

Aim: To determine the effects of exercise training that was supported with follow-up calls at home on the postoperative level of physical activity and quality of life of women with breast cancer.

Methods: The study was carried out with a quasi-experimental design. Women who had underwent an axillary dissection and mastectomy and who were receiving ongoing chemotherapy treatment in the ambulatory unit of a university hospital were included in the study. Sixty-two women were randomly assigned to an intervention (n = 31) or a control (n = 31) group. The women in the intervention group were given exercise training and then they were followed up by phone calls at home for 12 weeks in order to ensure the continuity of the exercises.

Results: At the end of the study, the number of "very active" individuals and the "total physical activity level" increased significantly in the intervention group but decreased significantly in the control group. In the intervention group, "future healthy function" in the functional area subscale significantly increased but "systematic therapy side-effects," "breast symptoms," and "arm symptoms" in the symptom subscale increased significantly.

Conclusion: Exercise training that is supported with home follow-up calls after surgery increases the level of physical activity, which then favorably relates with a good quality of life of women with breast cancer.

Key words: mastectomy, nursing, physical activity, quality of life.

INTRODUCTION

Breast cancer is the commonest cancer in women in both developed and developing countries (WHO, 2018). In Turkey, breast cancer is also the commonest type of cancer among the 10 top cancer types in women (Ministry of Health Republic of Turkey, 2015). Advances in early diagnosis and treatment of breast cancer have increased survival times in recent years, especially in developed countries (WHO). Considering increased survival time, almost every breast cancer survivor has to cope with complications, side-effects and symptoms depending on the disease itself or on the treatment procedures (surgery, radiotherapy, or chemotherapy) (Feiten *et al.*, 2014). Therefore, the question of the quality of life has gained more importance in breast cancer survivors. Also, studies have revealed that exercise interventions reduce the risk of recurrence and mortality in patients with cancer, and facilitate coping with side-effects and symptoms (Can, Arslan, & Ersöz, 2014; Courneya, Rogers, Campbell, Vallance, & Friedenreich, 2015). For example, the positive effects of exercise have been reported on pain, arm-shoulder disability, lymphedema management, depression, and side-effects associated with adjuvant therapy, such as fatigue (Baruth, Wilcox, Der Ananian, & Heiney, 2015; Baumann *et al.*, 2018; De Groef *et al.*, 2015; Furmaniak, Menig, & Markes, 2016). Furthermore, studies have verified that regular physical activity training and interventions are closely associated with better quality of life of cancer survivors. (Battaglini, Mills, &

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Phillips, 2014; Irwin *et al.*, 2017; Murtezani *et al.*, 2014; Siewierska *et al.*, 2018; Zeng, Huang, Cheng, Zhou, & So, 2014). The American Cancer Society recommends moderate physical activity, according to The Metabolic Equivalent of Task (MET) (>600 MET-min/week), for at least 150 min per week to increase the physical activity level and benefit from cancer rehabilitation. However, it is known that 17% of women with breast cancer do not comply with this recommendation (Rock *et al.*, 2012) and that the level of physical activity decreases by 11% in general in women with breast cancer, by 40% in those undergoing chemotherapy, and by 24% in those undergoing radiotherapy (Neil-Sztramko *et al.*, 2014; Rock *et al.*). For this reason, it is strongly and explicitly recommended to encourage an increase in the physical activity level to maximize quality of life with an increased survival rate in breast cancer (Lee & Loh, 2013). In recent years, the use of communication tools, such as telephone and email, in healthcare services has become a new research field. In this context, when the related studies are examined, it is seen that follow up calls at home, by email, and by mobile health applications have high-evidence positive results in increasing the effectiveness of physical activity education in patients with breast cancer. (Hatchett, Hallam, & Ford, 2013; Pinto, Papandonatos, & Goldstein, 2013).

The aim of this study was to determine the effects of exercise training supported with follow-up calls at home on postoperative physical activity levels and quality of life in patients with breast cancer.

METHODS

Study design and participants

This study was conducted with a pretest and post-test quasi-experimental design. Women who had undergone axillary dissection and mastectomy and who were receiving ongoing chemotherapy treatment in the ambulatory unit of a university hospital were included in the study. The study was completed with 62 patients. The sample size was calculated through a power analysis. At the end of the study, the effect size was 0.10, the statistical power was 80%, and the margin of error was accepted as 0.05. The participants were randomly divided into an intervention group (n = 31) and a control group (n = 31). The inclusion criteria were not having a communication problem, having undergone an axillary dissection with mastectomy, not having an open wound or wound infections at the surgical site, and not having any physical hindrance to conducting exercise.

Data collection

The data were collected between August, 2014 and March, 2015. Information on participants' age groups, body mass index, and whether they had received exercise training were collected through a general information form. The International Physical Activity Questionnaire was used to measure the categorical physical activity score (<600 MET-min/week *inactive*, 600–300 MET-min/week, *minimal active*, and >3000 MET-min/week *very active*) and continuous physical activity score (*moderate intensity physical activity*, *walking physical activity*, *total physical activity*). *Functional* and *symptom* quality of life subscale scores were measured by using the Quality of Life Questionnaire. The women in the intervention group were given exercise training to increase physical activity level, and they were followed up by phone calls at home once a week for 12 weeks to ensure the continuity of the exercises. A *Physical Exercise Guide* prepared by the researcher and a physiotherapist was used as the training material. In the literature, it is reported that *moderate-intensity physical activity* (including activities between 3 and 6 MET) can be tolerated well in patients with breast cancer (Brunet, Sabiston, & Meterissian, 2012). For this reason, the exercises in this study were designed to increase the level of *moderate intensity* physical activity, and these exercises were also supported by taking a walk in nature for 30 min per day. Furthermore, the participants were approach via phone by the researcher 1 day a week to support their motivation and to increase their adaptation for the exercises. However, standard care and treatment were not applied in the control group. At the end of the study, the data obtained from the intervention and control groups in the first week and 14th week were compared. Figure 1 summarizes the data collection process for the intervention and control groups.

Data assessment

The data were analyzed by the statistics programs SPSS and PAST3. The Shapiro–Wilk test was used to assess compatibility of the univariate data for normal distribution, the Mardia test was used to assess compatibility of the multivariate data for normal distribution, and the Levene's test was applied for variance homogeneity. Paired t test was used to compare two dependent groups. The data were analyzed at 95% confidence level and the value of $P < 0.05$ was accepted as statistically significant. The data were expressed as the mean, standard deviation, number, and percentage.

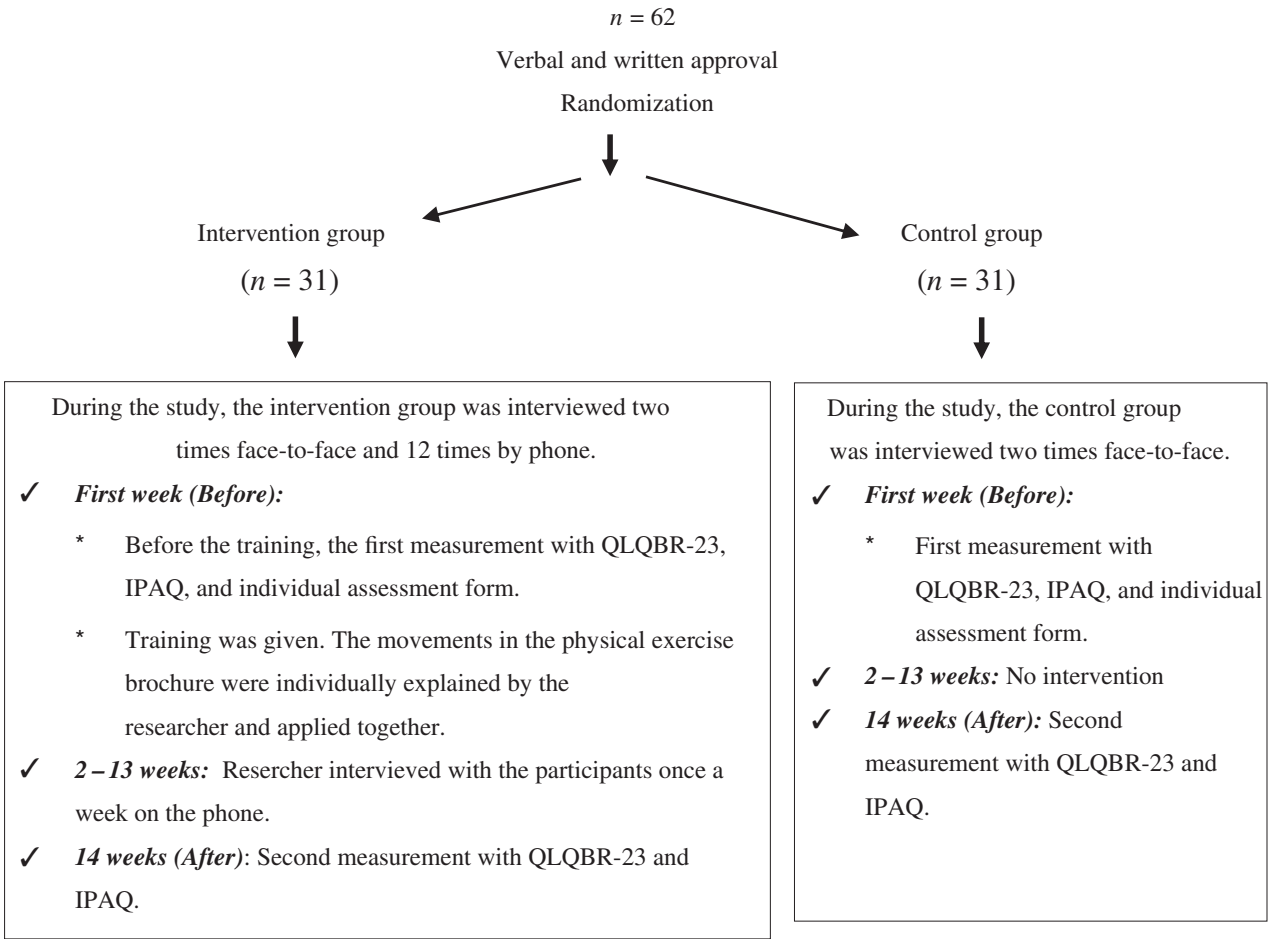

Figure 1 Data collection process for the intervention and the control group. IPAQ, International Physical Activity Questionnaire; QLQBR-23, Quality of Life Questionnaire.

Ethical considerations

Ethical approval for this study was received from the institutional review board of a university in August 2014. Prior to collecting the data, each participant received information about this study, including the purpose, potential risks, and being able to withdraw at any time if they did not want to participate in this study. Including informed consent, protecting confidentiality or anonymity were considered when conducting this study.

RESULTS

The results of the study revealed that the women had a mean age of 52 ± 10.35 years in the intervention group and 49 ± 10.80 in the control group (Table 1), their mean Body Mass Index was 31 ± 6.48 kg/m^2 in the intervention group and 30 ± 4.02 in the control group (Table 1). It was found that 77% of the intervention group and 71% of the control group had been informed only by a standard exercise brochure. This brochure mentioned exercises aimed only at providing arm-shoulder range of motion. Furthermore, while 13% of the intervention group and 32% of the control group were *very active* before exercise training, after follow-up at home, 48% of the intervention group and 19% of the control group were *very active* (Table 2). This change in the physical activity levels of the groups after and before the training was statistically significant ($P < 0.05$) (Table 2).

At the end of the study, the intervention group had a higher *total moderate-intensity physical activity score* (1832.90 ± 1395.32 before and 2676.61 ± 1589.18 after) and *total physical activity score* (3125.72 ± 1590.48 before, 2085.08 ± 1404.00 after). This

Table 1 General characteristics of the participants

Characteristic	Intervention group (n = 31)	Control group (n = 31)	$\chi 2$	P
Age (mean ± SD)	52.00 ± 10.35	49.00 ± 10.80	7.371	0.11
Body Mass Index (mean ± SD)	31.00 ± 6.48	30.00 ± 4.02	4.291	0.42
Being informed about exercise at discharge (%)				
Not informed	8	6		
Information was verbally given by a nurse	10	16	**0.587**	**0.95**
Information was verbally given by a doctor	7	7		
Only a brochure was given	77	71		

Bold P values are accepted values. SD, Standard deviation.

Table 2 Comparison of the measurement of the categorical physical activity score using the International Physical Activity Questionnaire

	Intervention group (n = 31)		Control group (n = 31)	
Variable	Before	After	Before	After
Inactive (<600 MET-min/week)	32	0	29	13
Minimal active (600–3000 MET-min/week)	55	52	39	68
Very active (>3000 MET-min/week)*	13	48	32	19
	P = 0.001		***P = 0.04***	
	χ2 = 17.51		***χ2 = 9.41***	

"Very active" is recommended for healthy life. MET, The Metabolic Equivalent of Task.

increase was statistically significant ($P < 0.05$) (Table 3). The control group had a lower *moderate physical activity score* (2655.00 ± 2388.63 before, 1598.39 ± 1668.80 after) and *total physical activity score* (3235.17 ± 2542.48 before, 1824.72 ± 1789.21 after). This increase was statistically significant ($P < 0.05$) (Table 3). In the intervention group, *future health function, systemic therapy side-effects, breast symptoms, and arm symptoms* subscale scores in relation to quality of life changed significantly ($P < 0.05$) (Table 4). These changes were associated with good quality of life. In addition, the scores of the *body image functioning and sexual functioning* subscale decreased in the intervention group (Table 4). This decrease was statistically significant and associated with poor quality of life ($P < 0.05$). However, in the control group, scores of the *systemic therapy side-effects and arm symptoms* subscale in relation to quality of life changed significantly ($P < 0.05$) (Table 4).

DISCUSSION

In the literature, it is emphasized that having the motivation to perform physical activity and being informed

Table 3 Comparison of the measurement of the continuous physical activity score using the International Physical Activity Questionnaire

Variable (MET-min/week)	(n = 31) Mean ± SD		t	P
	Before	After		
Total moderate-intensity physicalactivity level				
Intervention group	1832.90 ± 1395.32	2676.61 ± 1589.18	−7.054	**<0.010**
Control group	2655.00 ± 2388.63	1598.39 ± 1668.80	4.399	**<0.001**
Total walk physical activity level				
Intervention group	231.53 ± 238.70	428.47 ± 127.06	−6.204	**<0.01**
Control group	381.62 ± 424.48	181.50 ± 144.22	1.008	0.110
Total physical activity level				
Intervention group	2085.08 ± 1404.00	3125.72 ± 1590.48	−8.837	**<0.010**
Control group	3235.17 ± 2542.48	1824.72 ± 1789.21	5.050	**<0.001**

Bold P values are accepted values. MET, The Metabolic Equivalent of Task; t, paired t-test scores.

Table 4 Comparative of measurements of quality of life (QLQ BR-23)

Variables	Groups	(n = 31) Mean ± SD Before	After	*t*	*p*
†**Body image functioning**	Intervention group	13.16 ± 1.98	11.80 ± 2.07	0.501	<0.01
feel physically less attractive, feeling less feminin, difficult to look at yourself naked, dissatisfied with body	Control group	12.03 ± 2.68	10.13 ± 2.44	0.000	1.00
†**Sexual functioning**	Intervention group	2.67 ± 0.74	2.32 ± 0.47	2.356	0.02
interested in sex, sexually active	Control group	2.93 ± 0.96	2.09 ± 11.67	0.393	0.69
†**Sexual enjoyment**	Intervention group	1.19 ± 0.40	1.29 ± 0.46	−1.360	0.18
	Control group	1.09 ± 0.39	1.03 ± 0.17	0.812	0.42
†**Future health function**	Intervention group	2.00 ± 0.93	3.06 ± 0.57	−5.750	**<0.01**
worry about health in the future	Control group	2.80 ± 0.98	3.09 ± 0.83	−1.393	0.17
‡**Systemic therapy side-effects**	Intervention group	20.93 ± 3.20	18.96 ± 2.70	6.669	**<0.01**
dry mouth, food and drink taste different than usual, painful- irritated-watery eyes, lost of hair, feel ill or unwell, hot flushes, headaches	Control group	21.32 ± 2.41	22.25 ± 2.16	−3.153	**=0.004**
‡**Breast symptoms**	Intervention group	8.09 ± 1.83	6.41 ± 1.08	5.429	**<0.01**
pain, swell, oversensitivety, skin problems (itchy, dry, flaky) in the area of affected breast	Control group	8.16 ± 1.63	8.90 ± 2.15	−2.016	0.53
‡**Arm symptoms**	Intervention group	8.06 ± 1.31	6.25 ± 1.61	5.845	**<0.01**
pain in the arm or shoulder, swell in the arm or hand, it difficult to raise they arm or to move it sideways	Control group	6.93 ± 1.80	7.93 ± 1.54	−3.327	**=0.002**
‡**Upset by hair loss**	Intervention group	3.61 ± 0.61	3.48 ± 0.62	2.108	0.43
upset by the loss of hair	Control group	3.22 ± 0.92	3.12 ± 0.95	0.000	1.00

† High score indicates good level of life quality.
‡ High score indicates bad level of life quality.
SD, Standard deviation; t, paired *t*-test scores.

about conducting physical activity are the primary factors affecting participation in physical activity (Can *et al.*, 2014). In this study, it was determined that a majority of the individuals in both groups had been informed about the exercise only by having been given brochures. Husebø, Karlsen, Allan, Søreide, and Bru (2015) stated that adherence to exercise in women with breast cancer is infleucenced by internal and external factors. They also emphasized that adherence to exercise may be developed by considering the side-effects of treatments, supporting individual activities and changing the health behaviors of patients. In this context, when examining studies on the effect of exercise training supported with follow-up at home on physical activity level in patients with breast cancer, Bluethmann *et al*. emphasized that interventions supported by phone and email were more effective in altering physical activity levels and physical activity behavior after treatment in patients with breast cancer (Bluethmann, Vernon, Gabriel, Murphy, & Bartholomew, 2015).

Uhm *et al.* (2017) compared the effects of the use of mobile phones and brochures in informing breast cancer survivors about physical activity. They determined that both applications had similar results, but the use of mobile phones was more effective in terms of patient satisfaction (Uhm *et al.*, 2017). Pope, Lee, Zeng, Lee, and Gao (2018) found that social media-based physical activity training increased the moderate physical activity level of 1.657 MET-min/week.

When compared with similar studies, it was seen that the level of total moderate physical activity and total physical activity in this study increased by 843.7 MET-min/week in the intervention group but decreased in the control group by 1040.64 MET-min/week). The vast majority of studies investigating the effect of home-based exercise interventions on quality of life have shown that well-designed exercises are effective in improving the physiological and psychological health outcomes of women after breast cancer treatment. For example, Yildiz, Varol, and Alacacıoğlu, (2014) reported that appropriate intervention strategies could improve QoL. Cheng, Lim, Koh, and Tam (2017) found that home-based multidimensional

exercise interventions were effective in enhancing breast cancer-related quality of life. Lahart, Metsios, Nevill, and Carmichael (2018) reported that physical activity interventions might have moderate objective beneficial effects on quality of life and measured physical activity.

Shobeiri, Masoumi, Nikravesh, Heidari Moghadam, and Karami (2016) found that exercise intervention was effective in improving the functional areas of cancer-related quality of life, such as body image ($P < 0.001$), sexual function ($P = 0.008$), sexual pleasure ($P = 0.030$), and future prospect ($P < 0.001$), ($P < 0.001$), as well as the systemic side-effects of treatment (($P < 0.001$), breast symptoms ($P < 0.001$), arm symptoms ($P < 0.001$), and worry about hair loss ($P < 0.001$). When compared with similar studies, it is seen that this study determined a significant improvement as a result of the moderate increase in physical activity in the symptoms of *future health function* (such as being anxious about health in the future) ($P < 0.01$), in the functional area of quality of life and *systemic therapy side-effects* (such as dry mouth, taste change in mouth, painful-irritated-watering eyes, unhappiness due to hair loss, feeling sick and uncomfortable, hot flushes, headache) ($P < 0.01$), *breast symptoms* (such as pain in the operated breast area, swelling, oversensitive, itchy) ($P < 0.01$), *arm symptoms* (such as pain in the arm or shoulder on the surgical side, swollen arm or hand, difficulty in raising the arm or moving it sideways) ($P < 0.01$). This improvement in the intervention group was associated with a good quality of life. However, there was a statistically significant decrease in the functional area of quality of life, *body image functioning* (such as feeling physically less attractive as a result of disease or treatment, finding it difficult to look at yourself naked) ($P < 0.01$), and *sexual functioning* (such as interest in sex) ($P = 0.02$).

Physical activity not being measured by an objective measuring instrument and the smaller sample compared to previous studies constitute the most important limitations of this study.

CONCLUSION

This study revealed that exercise training supported with home follow-up calls after surgery increases the level of physical activity, which then favorably relates to good quality of life in women with breast cancer. Thus, regular exercise interventions supported with follow-up calls at home are recommended to be included in nursing care after breast cancer surgery. Regarding the care of breast cancer survivors, double-blind studies with longer follow-up are needed.

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DISCLOSURE

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

A. N. and P. T. K. are responsible for the conception, design, analysis, and interpretation of the data and the final approval of the version to be published, as well as drafting the article and revising it critically for important intellectual content.

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