

# Postoperative physical activity limitations and balance changes on patients who have been operated for breast cancer

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## ABSTRACT

**OBJECTIVE:** The purpose of this study is to assess the postoperative physical activity limitations and balance changes in patients who have been operated on for breast cancer. Some physical activity limitations and balance disorders can be expected after breast cancer surgery.

**METHODS:** From 2008 to 2016, 112 patients who underwent breast cancer surgery were included in this study. The patients who have some neurological, physical, pulmonary or cardiac diseases were not included. Patients were invited to the hospital. Lack of balance and physical activity limitations were evaluated with a questionnaire including 17 questions.

**RESULTS:** On the postoperative frequency distribution of physical activities criteria out of 112 patients %33.1 (n=37) people got 4 points and over while %66.9 (n=75) people got less than 4 points. After the operation, since more than 75 people got less than 4 points, it is accepted as inadequate in terms of physical activity. Looking at balance changes, in patients with breast-conserving surgery (BCS) were approximately 5.94–0.82 where as average modified radical mastectomy (MRM) was 5.94–0.41. According to criteria on postoperated patients' balance changes, the value of f was 3.162, contrary to this, as the value of p was found 0.078. Differences between operation and balance changes were not significant.

**CONCLUSION:** The patients who have had breast cancer surgery, physical activities were limited and life quality was down after the operation. On the other hand, there was no significant difference on balance changes depending on the operations.

*Keywords: Balance changes; breast cancer; limitation; physical activity; surgery.*

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Today, breast cancer is the most common type of cancer in the world and ranks second among the causes of cancer-related death [1]. Depending on the stage, with early diagnosis, long survival rates can be achieved with combined treatments with surgery. Surgical treatment methods for the treatment of breast cancer are generally modified radical mastectomy (MRM) or breast-conserving surgery (BCS) [1, 2]. The weight of the breasts

has an important effect on women's posture in balancing the body center against gravity. One of the expected long-term effects of mastectomy is deterioration in body balance and posture after the surgery [3]. In this study, we aimed to evaluate the possible postoperative physical activity restrictions and the balance changes in patients who had undergone surgery for breast cancer in light of subjective criteria.

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## MATERIALS AND METHODS

Between January 2008 and December 2016, the files of a total of 580 patients, aged between 18–90 years, who underwent MRM or BCS for breast cancer treatment in the General Surgery Clinic of Umraniye Training and Research Hospital Clinical, were retrospectively examined. After elimination due to the exclusion criteria, 112 patients were included in our study. The exclusion criteria of our study were: balance disorders, physical disability that will affect balance (polio sequelae) and neurological diseases with balance system and/or peripheral nervous system involvement (diabetic neuropathy and familial/genetic neuropathies, Parkinson's Disease, Multiple Sclerosis, Alzheimer's Disease), bone metastasis, patients who have undergone reconstructive surgery. Patients who have a history of drug use that may affect the balance, have rheumatological diseases such as congestive heart failure, arrhythmia, asthma, advanced chronic obstructive pulmonary disease, rheumatoid arthritis, ankylosing spondylitis that can go with spinal involvement, have a history of hip or knee arthroplasty and also who have another diagnosed malignancy.

The study was initiated after the approval of the Umraniye Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 23.05.2017, number: 08/01) and the patient's demographic and contact information, the type and date of the previous surgery, and the pathology results were obtained from the hospital records. All patients gave informed consent according to the institutional review board guidelines and the Declaration of Helsinki.

The patients were called by phone and invited to the hospital. The balance and daily physical activity of the patients were determined by the 17-question questionnaire prepared by the Physical Therapy and Rehabilitation Clinic of our hospital, taking into account the "Tinetti Balance and Gait Assessment Test" and the "Berg Balance Scale" for this study. Scoring was done according to the answers given to the questions in the questionnaire. The first 7 questions in the questionnaire were about daily physical activity, and the other 10 questions were about balance changes. All interviews with patients were made and recorded by the same physician. Scoring according to the postoperative daily physical activity criteria was shown in the frequency distribution of Score1 table and the scoring according to the criteria of balance changes was shown in the frequency distribution of Score2 tables.

### Highlight key points

- Balance and physical activity deficits are theoretically expected in patients operated on for breast cancer.
- A significant decrease in the physical activity occurred, their balance did not deteriorate in the follow-ups.
- This was independent of the type of the surgery performed.

**TABLE 1.** Frequency distribution of Score1 according to physical activity criteria

Value	n	%
1	8	7.1
2	9	8.0
3	58	51.8
4	4	3.6
5	2	1.8
6	4	3.6
7	27	24.1
Total	<b>112</b>	<b>100.0</b>

### Statistics

Statistical analysis was performed using the Statistical Package for the Social Sciences 21.0 ([SPSS] Inc., Chicago, IL, United States of America). For postoperative physical activity and balance changes in patients with breast cancer, the ANOVA test was used to compare continuous variables, and the Pearson correlation test was used to evaluate the relationship between balance scores.  $p < 0.05$  was considered as significant.

## RESULTS

The mean age of 112 female patients included in the study was  $52 \pm 10.9$  (30–83) years. BCS was performed in 75 (68.8%) of 112 patients, and MRM was performed in 37 (31.2%) patients. At the time of this study, the average postoperative follow-up period was 40 months. When the pathology results of the patients were evaluated, it was observed that 73% had invasive breast carcinoma, 13% had invasive lobular carcinoma, 10% had ductal carcinoma in situ and 4% had lobular carcinoma in situ. According to the postoperative daily physical activity criteria, 37 patients (33%) of 112 patients scored 4 and above in the frequency distribution of Score1, while 75 patients (67%) scored below 4 points (Table 1). A score below 4 after surgery is considered as insufficient

**TABLE 2.** Frequency distribution of Score2 according to balance changes criteria

Value	n	%
4	7	6.2
5	8	7.1
6	84	75.0
7	10	8.9
8	3	2.7
Total	<b>112</b>	<b>100.0</b>

in terms of physical activity. All 112 patients scored 4 and above in the Score2 frequency distribution table according to the criteria for post-operative balance changes (Table 2). Getting a score of 4 and above after surgery is considered as sufficient for the balance.

A score below 4 after surgery is considered as insufficient in terms of physical activity. All 112 patients scored 4 and above in the Score2 frequency distribution table according to the criteria for post-operative balance changes (Table 2).

When 112 patients were evaluated in terms of physical activity and the surgical method; according to the physical activity criteria in daily movements, the mean of patients with BCS in the Score1 frequency distribution was  $3.98 \pm 1.97$ , and the mean of patients with MRM was  $3.77 \pm 1.95$ . According to the Score2 balance changes, the mean of patients with BCS was  $5.94 \pm 0.82$ , while the mean of patients with MRM was  $5.94 \pm 0.41$  (Table 3).

According to the results of the one-way analysis of variance Anova test, the Score1 was found, that is, the f-value was 0.289 and the corresponding p-value was

**TABLE 3.** Mean Score1 and Score2 of both surgical methods

Surgery	Score1	Score2
BCS		
n	77	77
Mean	3.9870	5.9481
SD	1.97013	0.82552
MRM		
n	35	35
Mean	3.7714	5.9429
SD	1.95667	0.41606
Total		
n	112	112
Mean	3.9196	5.9464
SD	1.95968	0.72085

SD: Standard deviation; BCS: Breast-conserving surgery; MRM: Modified radical mastectomy.

$p > 0.05$  in the evaluation of daily physical activity after surgery (Table 4). In other words, no significant difference was found between the operations in terms of physical activity. Similarly, when the post-operative balance changes were examined; the f-value was found to be 0.001 and the corresponding p-value as  $p > 0.05$  according to the Anova result, and yet there was no significant difference related to the type of surgery in terms of post-operative balance changes in our study (Table 4).

Considering the score distribution of the patients from Score1 and Score2 in both types of surgery, it was seen that there was no significant difference between the two methods in terms of physical activity and balance in the late period after surgery (Table 5, 6).

**TABLE 4.** Score1 and Score2 Anova table

	Sum of squares	df	Root mean square	f	p
Score1				0.289	0.592
Between groups (combined)	1.118	1	1.118		
In groups		110	3.865		
Total		111			
Score2				0.001	0.972
Between groups (combined)	0.001	1	0.001		
In groups		110	0.524		
Total		111			

**TABLE 5.** Score1 score table by type of surgery

	Surgery	
	BCS	MRM
Score1		
1	5	3
2	5	4
3	41	17
4	3	1
5	1	1
6	2	2
7	20	7
<b>Total</b>	<b>77</b>	<b>35</b>

BCS: Breast-conserving surgery; MRM: Modified radical mastectomy.

According to the Anova table for Score1, f-value was found as 3.306 and on the other hand, p-value was found as  $p > 0.05$ . There was no significant difference between the postoperative physical activity of the patients and the type of surgery performed. According to the balance change criteria for Score2, the f-value was 3.162 and on the other hand, the p-value was  $p > 0.05$ . According to this result, no statistically significant relationship was found between the style of the operation and the balance change (Table 7).

## DISCUSSION

The age group in which breast cancer is most common in the world is the age range of 20–59 years, and it is the most common cause of death from cancer in women [4]. The mean age of the patients included in our study is also consistent with the literature.

**TABLE 6.** Score2 score table by type of surgery

	Surgery	
	BCS	MRM
Score 2		
4	7	0
5	4	4
6	55	29
7	8	2
8	3	0
<b>Total</b>	<b>77</b>	<b>35</b>

BCS: Breast-conserving surgery; MRM: Modified radical mastectomy.

The application of BCS or MRM to patients diagnosed with breast cancer is planned and applied according to many variables such as; tumor multicentricity, lymph node metastasis, tumor biology, and patient demand [5]. In our study, BCS was applied to 68.8% of our patients and MRM was applied to 31.2% of them.

The diagnosis and treatment of cancer, especially the surgical treatment, greatly affects the psychological health of these patients. The sense of bodily integrity is a basic emotion for humans, and its deterioration with psychological health significantly affects the quality of life and physical activity level of patients. The weight of the breasts also has an important effect on keeping the body center balanced against gravity and on the nature of the female posture. One of the expected long-term effects of mastectomy is deterioration in body balance [3]. There are various hypotheses on this subject, but there are not enough studies in the literature.

**TABLE 7.** Anova table

	Sum of squares	df	Root mean square	f	p
Score1				3.306	0.072
Between groups (combined)	12.438	1	12.438		
In groups	413.838	110	3.762		
Total	426.277	111			
Score2				3.162	0.078
Between groups (combined)	1.612	1	1.612		
In groups	56.067	110	0.510		
Total	57.679	111			

In this study, we tried to evaluate the physical activity and balance of the patients with the questionnaire we prepared, taking into account the “Berg and Tinetti balance scales”, in order to seek an answer to the question of whether there is a relationship between breast surgery performed on patients and maintaining their body balance.

We also evaluated “the level of physical activity” using a questionnaire; it was found to be significantly lower after having the breast surgery. However, no correlation was found between the low level of physical activity and the type of surgery performed on these patients. There are very few studies in the literature that question physical activity after having breast cancer surgery. In a study by Freire et al. [6], it was shown that patients who underwent breast reconstruction after breast cancer surgery were more physically active. In the same study, the authors commented that since the breast is the symbol of female identity, the frequency of physical activity decreases because patients are getting less socialization after the mastectomy, but with reconstructive breast implants they are more active because they regain this image.

There are many studies evaluating the anxiety and depression status of the patients after getting the breast cancer diagnosis [7]. However, the effect of this on their physical activity has not been looked at before as far as we know. One of the reasons we attributed to the low level of physical activity in our group is that it may be due to possible subclinical depression and social isolation, and more studies should be done on this subject.

Although lymphedema is a condition that affects the physical activity in patients, we did not include patients with lymphedema in our study. However, when we questioned the fear of lymphedema of 112 patients we surveyed, we got the answer that all of our patients are afraid of lymphedema. Studies in the literature have shown that the frequency of lymphedema is less with the correct information of patients and starting the early exercise [8].

We think that post-surgery patients can be more active with correct information on exercise and lymphedema. Long-term follow-up studies are still needed on the relationship between lymphedema and physical activity.

The weight of the breasts has an important effect on female posture in keeping the body center in balance against gravity [3]. The balance of the body is provided by the relationship of three factors; the center of gravity is the line of gravity and the support surface [9]. Since the center of gravity and gravity line change in the female body after both MRM and BCS, our hypothesis was that these surgeries would cause balance disorder.

However, in the tests we performed in our patient group, it was revealed that there was no balance disorder and this result was not affected by the type of surgery performed. Since the patients included in our study were followed up at an average of 40 months after surgery, we think that compensatory mechanisms are activated in the direction of balance and therefore they do not experience balance disorders. We think that new studies on balance will be in the direction of disorder if they are done in the early stages after surgery. There are very few studies on this subject in the literature [3, 10]. In a study performed with 101 patients from Poland in 2016 and evaluated with dynamic systems shortly after surgery, it was shown that balance disorder was present in both surgical groups [11].

We think that the missing aspect of our study is the evaluation of late post-operative patients and the use of questionnaires instead of a dynamic method. There are studies in the literature that demonstrated degenerative changes in the spine and development of a compensatory scoliosis after unilateral mastectomy, resulting in balance disorder [12]. However, we did not include patients with spinal pathology in our study group. There is a need for studies showing spinal changes after breast cancer surgery and its effects on both physical activity and postural balance.

## Conclusion

Balance and physical activity deficits are theoretically expected in patients operated on for breast cancer. In our study, it was observed that patients who underwent MRM or BCS for breast cancer treatment; avoided or even did not engage in advanced physical activity, regardless of the type of surgery, a significant decrease in the physical activity occurred, their balance did not deteriorate in the follow-ups, and this was independent of the type of surgery performed. There is still a need for studies in which more objective balance and physical activity tests can be obtained by evaluating the patients with breast cancer surgery with different balance and physical activity measurements.

**Online Appendix:** [https://jag.journalagent.com/nci/abs\\_files/NCI-44538/NCI-44538\\_\(0\)\\_Appendix.pdf](https://jag.journalagent.com/nci/abs_files/NCI-44538/NCI-44538_(0)_Appendix.pdf)

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