



Factors Affecting the Quality of Life in Breast Cancer Patients Undergoing Radiotherapy

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OBJECTIVE

The goal of the study is to research on the factors affecting the quality of life (QoL) in breast cancer patients undergoing radiotherapy (RT).

METHODS

Four hundred and fifty-seven Stage I-III breast cancer patients undergoing adjuvant RT were evaluated using European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 and EORTC-BR23 questionnaires at four different times.

RESULTS

Over time, statistically significant differences were determined in parameters of QoL score as global health, physical, role, emotional, cognitive, and social functions ($p<0.001$) in the functional scale of module-C30; fatigue ($p<0.001$), appetite loss ($p=0.012$), insomnia ($p=0.002$), constipation ($p=0.026$), financial difficulty ($p<0.001$) in its symptom scale; future perspective ($p=0.008$), body image ($p=0.001$), sexual functioning ($p=0.011$) in module-BR23 functional scale; breast symptoms ($p<0.001$), systemic therapy side effects ($p<0.001$), arm symptoms ($p=0.046$), upset by hair loss ($p=0.017$) in its symptom scale. Menopausal status (physical and role functions, fatigue, and appetite loss), the type of breast surgery (physical, role and social functions, fatigue, and financial difficulties), the type of axillary interventions (global health status, social function, fatigue, and financial difficulties), adjuvant chemotherapy (financial difficulties, body image, systemic treatment side effects, arm symptoms, and hair loss), and lymphatic irradiation (global health status, role function, fatigue, systemic treatment side effects, and arm symptoms) have affected some scores of QoL.

CONCLUSION

The QoL scores for certain functions/symptoms were worse compared to the opposite cohort; that is, premenopausal versus postmenopausal, breast-conserving surgery versus modified radical mastectomy, sentinel lymph node biopsy versus axillary lymph node dissection, no adjuvant chemotherapy versus adjuvant chemotherapy, and no lymphatic irradiation versus lymphatic irradiation.

Keywords: Adjuvant radiotherapy; non-metastatic breast cancer; quality of life.

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INTRODUCTION

Breast cancer is the most common type of cancer in women and ranks second in cancer-related deaths.[1] Today, post-operative radiotherapy (RT) is frequently given to patients undergoing breast-conserving surgery (BCS), as well as the patients who have had a modified radical mastectomy (MRM) with negative prognostic factors for local recurrence, such as a large primary tumor and lymph node involvement.[2–6]

With the development of oncologic therapies, the survival period for breast cancer patients has been prolonged. Therefore, the long-term side effects of the treatments administered to the patients have been observed and many of these side effects, such as arm edemas and cardiac side effects, have resulted in impairments in the patients' quality of life (QoL).[7,8] As with other cancer therapies, RT applied in breast cancer has early and late side effects, and these toxic effects can lead to impaired patients' QoL. In addition, certain factors, such as the age, type of surgery, and RT fields, may affect the QoL of the patient.

In cancer patients, people are now concerned not only with the length of life, but also with its quality. QoL is an expression of individual well-being and a subjective expression of satisfaction in different areas of life. Understanding the illness behavior, psychological reactions, and adaptation difficulties in breast cancer individuals and planning care interventions that will support the development of appropriate coping methods can be possible with QoL. Despite the side effects caused by the treatments, improving and maintaining the QoL of patients during and after the treatment are important for the well-being of the patient. Determining the factors that have the potential to impair the QoL of the patient and making interventions for the factors that are likely to intervene may also increase patients' compliance with the treatments.

European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 and BR 23 questionnaires, developed by the European Organization for Cancer Research and Treatment, is tools for assessing health-related QoL in cancer patients and breast-specific QoL in breast cancer patients.[9,10] These questionnaires are reliable, validated, and feasible to use in research. Turkish validity and reliability of both questionnaires were reported by Demirci et al. in 2011.[11]

The goal of the study is to research on the factors affecting the QoL in breast cancer patients undergoing RT.

MATERIALS AND METHODS

The study included approximately 457 breast cancer patients who received adjuvant RT for breast cancer in the Sivas Cumhuriyet University School of Medicine, Radiation Oncology Department. Questionnaires were collected between January 2010 and January 2019, only by all authors, who retrieved the remaining information from patients' charts, created the database and anonymized the data. The present study was conducted after the approval of the ethics committee (Sivas Cumhuriyet University Ethics Committee) and in accordance with the Helsinki Declaration.

Breast cancer patients with local disease, who completed their adjuvant RT and followed up in our center, were eligible for this study. The patients with metastatic breast cancer were excluded from the study.

Staging of the disease was determined according to the TNM staging system and was developed by the International Union Against Cancer and the American Joint Committee on Cancer, 2017 (8th edition).

Treatments

Breast surgery was applied to all patients. MRM was performed for 193 (42%) patients and BCS for 264 (58%) patients. Regarding the axillary interventions, a total 104 (21%) patients had a sentinel lymph node biopsy (SLNB) and 350 (77%) patients underwent an axillary lymph node dissection (ALND).

Adjuvant chemotherapy was administered to 387 (85%) patients; 317 (69%) patients received hormone-therapy (tamoxifen, letrozole anastrozole, etc.). All patients had adjuvant RT. RT was started within 3 weeks following adjuvant chemotherapy.

RT

RT was performed using a linear accelerator device (Varian Clinac DHX, Varian Medical Systems, Inc., Palo Alto, CA, USA) and the TomoTherapy (Accuray). From January 2010 to June 2015, a total of 230 (50%) patients were treated with three-dimensional conformal radiation therapy (3D-CRT). The 3D-CRT planning was done using the Varian Eclipse treatment planning (Varian Medical Systems, Inc., Palo Alto, CA, USA [United States of America]), taking into account tissue inhomogeneity during the dose calculation. From June 2015 to April 2018, 227 (50%) patients were treated with intensity modulated RT (IMRT). IMRT planning was done using the TomoTherapy Planning Workstation (TomoTherapy Inc., Madison, WI).

RT was performed using six to 18 MV photon energy and electron energy (six, nine, 12, 16, 20 Mev, etc.) for

boost treatments. The doses of RT ranged from 50 to 60 Gy. All patients underwent conventional fractionated radiation with two Gy per day and 5 days a week. A total of 60 Gy was applied to 264 (58%) patients and 50 Gy RT to 193 (42%). Regarding the RT fields, there was intact breast field in 152 (33%) patients, intact breast + lymphatic field in 112 (25%) patients, chest wall field in 18 (4%) patients, and chest wall+lymphatic field in 175 (38%) patients.

QoL Scale

Each patient completed the EORTC QLQ-C30 and EORTC-BR23 at the following four different time periods: The start of RT (T1); the end of RT (T2); 1 month after completion of RT (T3); and 6 months after completion of RT (T4).

The QoL was assessed using the module-C30 version 3.0, which is a 30-item questionnaire. The components of the module-C30 are the global health status, five functional scales (physical, role, cognitive, emotional, and social) and nine symptom scales/items (fatigue, nausea/vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties). The responses of the patients were scored according to the module-C30 scoring manual.[12]

The module-BR23 contains 23 questions. Four functional scales (body image, future perspective, sexual functioning, and sexual enjoyment) and four symptom scales (systemic treatment side effects, breast symptoms, arm symptoms, and upset by hair loss) were evaluated using these questions.

The principle for scoring the module-C30 and BR23 scales is the same in all cases; it starts with estimating the average score of the items that contribute to the scale (raw score) and uses a linear transformation to standardize the raw score. The scores for the symptom components were linearly transformed to a scale ranging from 0 to 100. A high score for a functional scale indicates a relatively high level of function, while a high score for a symptom scale indicates a greater severity symptom or financial difficulties.[9,10]

Statistical Analysis

Data of the study were analyzed using the Statistical Package for the Social Sciences version 22.0 statistics program (Chicago, IL, USA). The medians and frequencies were calculated for the demographic characteristics of the patients, and the questionnaire scores were compared based on the 4-time periods using a repeated-measures analysis of variance. The effects of the menopausal status, the type of surgery applied to the breast, the type of axillary interventions, the use

of adjuvant chemotherapy, and lymphatic irradiation on changes to the QoL over time were analyzed using a two-way repeated-measures analysis of variance. of $p \leq 0.05$ was accepted as statistically significant.

RESULTS

The median age of the patients was 51 years with a range of 24–84 years. Approximately 174 patients had at least one comorbid disease. While 287 (63%) patients were experiencing the postmenopausal period, 170 (37%) were experiencing the premenopausal period. Although an invasive ductal carcinoma was observed in 373 (82%) patients, other histopathological types were observed in 84 (18%) patients. The stage of the disease was Stage I in 95 patients (21%), Stage II in 156 patients (34%), and Stage III in 206 patients (45%).

The module-C30 questionnaire response rates were 100% (n=457) at T1, 96% (n=438) at T2, 77% (n=351) at T3 and 63% (n=287) at T4. According to the questionnaire, an improvement over time was observed in all scores except for nausea and vomiting, pain, dyspnea, and diarrhea. Table 1 summarizes the module-C30 QoL results for the 4-time periods.

The module-BR23 questionnaire response rates were 57% (n=259) at T1, 57% (n=259) at T2, 57% (n=259) at T3 and 43% (n=197) at T4. According to the questionnaire, a statistically significant improvement over time was detected in all scores in the functional scale except for sexual enjoyment. On the symptoms scale, all scores improved except for arm symptoms over time. Arm symptoms decreased somewhat after RT, but started to increase again on 6 months after completion. The breast symptom scores deteriorated considerably at the end of RT but started to improve 1 month after completion of RT. Table 2 shows the module-BR23 QoL results at the 4-time points.

The comparison of patients for the components of the module-C30 and BR23 based on the menopausal status, type of breast surgery, type of axillary interventions, adjuvant chemotherapy, and lymphatic irradiation is shown in Table 3. When the patients were compared according to their menopausal status, the results of the physical and role functions, and the fatigue and appetite loss symptoms were found to be statistically significantly worse in the postmenopausal patients. The results of the physical, role, and social functions, as well as the fatigue and financial difficulties, showed that the symptoms were worse in the patients who underwent MRM compared to BCS. In patients with ALND, the global health status, social function, and fatigue and fi-

Table 1 The comparison of module-C30 scores in four time periods.

QLQ-C30	T ₁	T ₂	T ₃	T ₄	P
No of patients (%)	457 (100)	438 (96)	351 (77)	287 (63)	
Global health status	76±18	76±19	79±19	83±18	<0.001
Functional scale, mean±SD					
Physical	74±20	76±18	79±19	81±18	<0.001
Role	72±26	74±23	79±23	81±25	<0.001
Emotional	74±20	77±19	81±19	84±19	<0.001
Cognitive	78±17	80±16	82±18	85±16	<0.001
Social	83±21	87±18	89±17	92±17	<0.001
Symptom scale					
Fatigue	27±19	25±15	23±19	20±21	<0.001
Nausea and vomiting	4±14	3±8	2±7	2±6	0.079
Pain	14±18	17±16	14±18	14±18	0.053
Dyspnea	10±18	10±19	11±20	10±20	0.801
Insomnia	21±25	19±24	16±23	14±21	0.002
Appetite Loss	7±17	8±15	8±16	4±12	0.012
Constipation	7±16	5±13	4±12	3±11	0.026
Diarrhea	3±12	2±9	3±11	1±6	0.161
Financial difficulties	19±26	19±23	19±24	13±21	<0.001

T₁: Start of RT; T₂: End of RT; T₃: 1 month after completion of RT; T₄: 6 months after completion of RT. RT: Radiotherapy; SD: Standard deviation

Table 2 The comparison of Module-BR23 scores in four time periods

QLQ-BR23	T ₁	T ₂	T ₃	T ₄	P
No of patients (%)	59 (57)	259 (57)	259 (57)	197 (43)	
Functional scale, mean±SD					
Body Image	87±18	90±17	93±14	94±13	0.001
Sexual functioning	10±17	17±20	22±20	19±21	0.011
Sexual enjoyment	42±16	50±19	50±19	50±19	0.436
Future perspective	75±28	82±24	84±26	85±25	0.008
Symptom scale					
Systemic therapy side effects	27±18	16±11	16±24	13±15	<0.001
Breast symptom	8±12	30±19	12±15	11±17	<0.001
Arm symptom	18±17	14±15	14±17	18±22	0.046
Upset by hair loss	19±30	3±13	4±17	3±15	<0.001

T₁: Start of RT; T₂: End of RT; T₃: 1 month after completion of RT; T₄: 6 months after completion of RT. RT: Radiotherapy; SD: Standard deviation

financial difficulties were more negatively affected than the patients with SLNB. The financial difficulties, body image, systemic treatment side effects, arm symptoms, and upset by hair loss scores were worse in the patients who received adjuvant chemotherapy compared to patients who did not chemotherapy. None of the QoL scores were affected in the patients who received hormone therapy. The global health status, role function, fatigue, systemic treatment side effects, and arm symptoms negatively affected the patients whose lymphatics of the breast were irradiated more than those without lymphatic irradiation. The factors affecting the QoL scores are shown in Table 3.

DISCUSSION

Breast cancer is the most common type of cancer for women and it is the cancer that has the biggest improvement after treatment. In the present study, where we investigated the factors affecting the QoL in patients receiving adjuvant RT for breast cancer, we noticed that the QoL of these patients did not deteriorate during and after RT. However, we also determined that the menopausal status, type of surgery performed on the breast, type of axillary interventions, the use of adjuvant chemotherapy, and axillary irradiation negatively affect the QoL of these patients.

Table 3 The comparison of patients for the components of the module-C30 and BR23 questionnaires based on the menopause status, type of breast surgery, type of axillary interventions, adjuvant chemotherapy and lymphatic irradiation

	T ₁	T ₂	T ₃	T ₄	P
	Mean±Standard deviation				
Premenopausal vs postmenopausal					
Physical functioning					
Pre-	80±16	82±17	84±18	86±17	<0.001
Post-	70±22	71±18	75±18	78±21	
Role functioning					
Pre-	72±25	80±22	83±23	83±23	0.004
Post-	69±26	70±23	76±23	79±27	
Fatigue					
Pre-	23±15	23±15	23±20	15±18	0.007
Post-	30±21	26±15	24±18	23±22	
Appetite loss					
Pre-	5±13	4±12	4±12	2±8	<0.001
Post-	9±20	10±17	10±19	5±14	
MRM vs BCS					
Physical functioning					
MRM	68±24	73±19	76±18	79±20	0.006
BCS	78±17	78±17	81±19	83±19	
Role functioning					
MRM	68±29	69±29	78±24	79±27	0.033
BCS	74±23	77±21	81±23	83±23	
Social functioning					
MRM	80±24	84±20	85±19	89±20	0.001
BCS	85±19	90±17	92±15	94±14	
Fatigue					
MRM	32±20	27±16	26±20	21±24	0.008
BCS	24±17	23±14	21±19	18±18	
Financial difficulties					
MRM	24±27	26±24	26±24	16±22	<0.001
BCS	15±25	14±22	13±22	11±20	
ALND vs SLNB					
Global health status					
ALND	74±18	74±20	78±20	82±19	0.024
SLNB	80±17	80±17	81±19	88±15	
Social functioning					
ALND	81±21	86±19	88±18	92±18	0.020
SLNB	89±18	90±16	94±15	94±14	
Fatigue					
ALND	28±19	25±15	25±20	21±21	0.025
SLNB	23±17	23±14	18±16	16±18	
Financial difficulties					
ALND	21±26	22±24	21±25	13±21	0.010
SLNB	14±25	11±18	10±18	11±18	
Adjuvant chemotherapy; no vs yes					
Financial difficulties					
No	12±18	6±13	7±13	7±16	0.005
Yes	20±27	21±24	20±25	14±21	
Body image					
No	97±17	96±9	99±4	98±6	0.014
Yes	86±19	89±17	92±15	93±14	

Table 3 Cont.

	T ₁	T ₂	T ₃	T ₄	P
	Mean±Standard deviation				
Systemic treatment side effects					
No	13±14	11±15	13±10	12±11	0.006
Yes	29±18	17±11	19±14	17±15	
Arm symptoms					
No	12±8	11±15	8±10	7±20	0.045
Yes	19±18	15±15	15±18	20±23	
Upset by hair loss					
No	4±17	-	-	-	0.028
Yes	22±31	3±14	5±19	4±16	
Lymphatic irradiation; no vs yes					
Global health status					
No	78±18	77±19	82±18	87±15	0.032
Yes	74±18	75±20	77±20	81±20	
Role functioning					
No	76±24	76±22	82±23	83±23	0.022
Yes	68±27	72±24	78±23	79±26	
Fatigue					
No	24±20	23±14	20±17	18±17	0.012
Yes	29±18	26±15	25±20	21±22	
Systemic treatment side effects					
No	23±20	14±11	14±10	13±25	0.004
Yes	30±17	18±11	21±15	19±16	
Arm symptoms					
No	13±15	11±12	11±13	11±15	0.004
Yes	21±18	17±17	16±19	23±15	

T₁: Start of RT; T₂: End of RT; T₃: 1 month after completion of RT; T₄: 6 months after completion of RT. RT: Radiotherapy; MRM: Modified radical mastectomy; BCS: Breast-conserving surgery; ALND: Axillary lymph node dissection; SLNB: Sentinel lymph node biopsy

RT can cause a deterioration in the QoL of patients, because it contains some side effects such as skin reaction and fatigue during and after RT. Lee et al. examined the effects of RT on the QoL of breast cancer patients in 2007. Approximately 61 women who underwent surgery due to breast cancer and had RT to their breast or chest wall were included in the study. The patients who underwent axillary RT were excluded from the study. The module-C30 and BR-23 questionnaires were used by the patients at the start of RT, end of RT and 7 months after RT. There was no difference in the QoL of the women at the baseline, completion or 7 months after completion of RT. The fatigue and breast symptoms increased during RT but returned to the baseline levels at 7 months.[13] In the study conducted by Budischewski et al. in 2007, 61 women who underwent RT after BCS were included in the study, and the module-C30 was given to the patients at the beginning of RT and four and 6 weeks after RT. A statistically significant increase was observed in the role and emotion-

al functions scores 6 weeks after RT compared to the beginning of RT. However, a statistically significant decrease was determined in the score cognitive function 6 weeks after RT compared to the beginning of RT.[14] Kindts et al. evaluated the module-C30 and BR23 questionnaires at 6-time points (between the beginning of RT and 2 years) in 175 patients who underwent BCS and subsequently received postoperative RT. According to the study's findings, the global health status and the physical and cognitive functions decreased initially with no significant decrease, and there was an increase in fatigue initially, although this dropped to a lower level than the baseline up to 1 year after RT. In addition, breast symptoms increased during RT but decreased after RT, and future perspective increased a small amount of from the baseline to 1 year after RT.[15]

In the present study, none of the scores in the functional scale of module-C30 showed a decrease during and after RT; they showed a trend of gradually increasing over time. Similarly, there was also an improvement

in the symptom scores in the module-C30 symptom scale. There was a statistically significant decrease in the module-C30 symptom scale over time, except for the nausea and vomiting, pain, dyspnea, and diarrhea scores, which were stable over time. According to the module-BR23 questionnaire results, an improvement over time occurred in body image, sexual functioning, and future perspective in the functional scale, apart from sexual enjoyment, which was stable over time. In the module-BR23 symptom scale, except for the breast symptoms, the scores of the systemic therapy side effects and upset by hair loss symptoms decreased over time compared to the measurements before RT. However, arm symptoms also decreased somewhat after RT, but began to increase again at 6th-month measurements. The breast symptom scores reached the highest level at the end of RT, but showed an improvement 1 month after completion of RT. In our study, the improvement over time in all QoL scores except for breast symptoms and other stable symptoms and functions may be related to the fact that 85% of the patients were receiving chemotherapy and still experiencing chemotherapy's effects during the RT initiation. The breast symptom scores due to the skin-related side effect of RT increased significantly at the end of RT.

In breast cancer patients, menopause has a prognostic importance and affects the treatment of patients. It is also worth considering that menopause can affect the patient's QoL. In a multicentric study conducted by Hopwood et al. (START study), which involved 31 centers and was published in 2006, the effects of age, duration of surgery, type of surgery, chemotherapy, and endocrine therapy on the QoL were investigated. The study included 2208 patients; a mastectomy was applied to 17% of them and an extensive local excision (BCS) was applied to the others. The module-C30, BR23, body image scale, and hospital anxiety and depression scale were used to assess the QoL. In the study, a young age and adjuvant chemotherapy were significant risk factors that negatively affected the QoL.[16] Imran et al. evaluated the results of the 284 breast cancer patients' module-C30 and BR-23 questionnaire. According to the results, the physical function and sexual enjoyment in postmenopausal patients were more negatively affected than the premenopausal patients.[17] Ganesh et al. conducted a study on 223 patients with breast cancer, 64% of whom were postmenopausal. In their study, module-C30 and BR23 questionnaires were given to the patients and the results of the questionnaires were compared according to their menopausal status and the type of surgery. The social function, fatigue, pain, insomnia, appetite loss, constipation, body image, fu-

ture perspective, systemic treatment side effects, and breast symptoms scores were worse in the premenopausal patients; however, the sexual functioning was better than the postmenopausal patients.[18] Except for Imran et al.'s study, the other studies agreed that the QoL of the patients before menopause is worse than the postmenopausal patients. On the contrary, in our study, the results of the postmenopausal patients were more negative. The physical and role functions and the fatigue and appetite loss scores were more negatively affected in the postmenopausal patients.

The type of surgery performed in breast cancer patients may have the potential to change the QoL of patients. In particular, MRM may cause several symptoms, such as back pain or chest pain during arm movements due to the large tissue loss. Munshi et al. compared the QoL in the early stages in patients who underwent RT after MRM (n=113) and BCS (n=142) in 2010. The module-C30 and BR23 questionnaires were given to the patients at the beginning, middle and end of RT. There was no significant difference in the change of the QoL scores between MRM and BCS at the RT completion compared to the baseline. However, in the module-C30 questionnaire, the score of social function was higher in the patients who underwent MRM. In the module-BR23 questionnaire, the sexual enjoyment and future perspective scores were significantly better in the BCS.[19] In Hopwood et al.'s study, according to the surgery type, the appetite loss and anxiety due to the body image were higher in the patients undergoing MRM, whereas the arm symptoms were higher in those who underwent BCS.[16] Enien et al. evaluated the QoL of the patients undergoing MRM (n=172) and BCS (n=53), according to the type of surgery. They used the module-C30 and BR23 questionnaires in their studies. The patients with MRM had a more favorable global health status and body image in the functional scale. The functional scale was better in BCS with the significant role function. In the symptoms scale, the fatigue, pain, systemic side effects, and arm symptoms were statistically significant better in the BCS.[20] In Ganesh et al.'s study, MRM (n=180) and BCS (n=22) were performed on 202 patients. In their study, module-C30 and BR23 questionnaires were given to the patients and the results of the questionnaires were compared according to the type of surgery. In the patients with MRM, nausea, vomiting, and systemic treatment side effects were worse than the BCS.[18] Jendrian et al. evaluated the QoL of patients undergoing MRM and BCS using the module-C-30 and BR23 questionnaires. In this study, they found that the women after BCS (n=46) showed significantly better

outcomes than the women after a mastectomy (n=61) regarding body image, social, emotional, and role functions.[21] In Imran et al.'s study, the systemic treatment side effect scores were higher in the patients who underwent BSC compared to MRM.[16] In the present study, the physical, role and social functioning, fatigue, and financial difficulties scores were more negatively affected in patients who underwent MRM compared to BCS. Body image deterioration could be expected in women who lost their breasts with MRM; however, in our study, we did not detect any deterioration in the function and symptoms scale of module-BR23 compared to the patients undergoing BCS.

ALND in breast cancer patients is an intervention that is used in the staging and treatment of the disease. However, ALND has the potential to cause serious side effects due to blockages in the lymphatic system of the arm. On the other hand, SLNB is a minimally invasive surgical method for axillary staging in breast cancer patients. In Peintinger et al.'s study on 56 breast cancer patients using the module-C30 and BR23 questionnaires, they reported that the axillary interventions type did not affect the global QoL in the short-term follow-up. However, they found that the patients recovered immediately after SLNB. They also found that the body image and sexual function scores remained constant for both types of axillary interventions.[22] Arraras et al. evaluated the QoL of patients over 65 years of age who received RT for breast cancer using the module-C30 and BR 23 questionnaires and found that body image was more negatively affected in the patients who underwent ALND than those without ALND or SLNB.[23] In our study, the global health status, social function, fatigue, and financial difficulties scores were worse in the patients who underwent ALNB compared to the SLNB patients.

Chemotherapy agents also have side effects in normal tissue; therefore, they can impair the patients' QoL. Hormone drugs, which have more moderate side effects than chemotherapy, may also impair the QoL. Galalae et al. investigated the effectiveness of adjuvant chemotherapy and hormone therapy on the QoL of 109 breast cancer patients receiving RT. They were assessed on the QoL at the beginning, end and 6th week of RT using the module-C30 and BR23 questionnaires. They divided the patients into the following three groups for comparison: RT + adjuvant chemotherapy versus RT + hormone therapy; RT + adjuvant chemotherapy versus RT; and RT + hormone therapy versus RT. According to their results, the global health status and the role, emotional, cognitive, and social functioning scores were better in the group receiving RT + hormone

therapy than in the group receiving RT + adjuvant chemotherapy. Furthermore, the global health status and the role, cognitive and social function scores were better in the group receiving RT than in the group receiving RT + adjuvant chemotherapy. However, in their study, no difference was found between the RT + hormone therapy group and RT group in terms of the QoL.[24] Hopwood et al. reported that chemotherapy affected most of the QoL scores and resulted in a more negative body image, sexual function, and breast and arm symptoms. [16] In the present study, the financial difficulties, body image, systemic treatment side effects, arm symptoms, and upset by hair loss scores were worse in the patients who received adjuvant chemotherapy than those who did not. However, none of the QoL scores were affected in the patients receiving hormone therapy.

The addition of the lymphatic field to the intact breast or chest wall field expands the field of RT. As a result, as the side effects of RT may increase, there is also an increased risk of lymphedema in the same arm, especially in the patients undergoing ALND. Therefore, the issue of whether lymphatic irradiation affects the QoL in patients receiving RT needs to be investigated. In our study, the global health status, role function, fatigue, systemic treatment side effects, and arm symptoms were more negatively affected in the patients whose lymphatics of the breast were irradiated than those without lymphatic irradiation.

The limitation of this study is that all the patients who participated in the study did not complete their questionnaires at the scheduled times. Second is that the response rate of the BR23 questionnaire in this study was low. Third limitation is that 85% of the included patients received adjuvant chemotherapy. This may have clouded or suppressed a possible negative change in QoL from RT that could be seen in the absence of chemotherapy.

CONCLUSION

Except for the breast symptoms, the QoL scores were not negatively affected by RT. As expected, the scores of the breast symptoms increased at the end of RT due to the RT side effects. However, the breast symptom scores began to improve within 1 month after the completion of RT. The QoL scores for certain functions/symptoms were worse compared to the opposite cohort; that is, premenopausal versus postmenopausal, BCS versus MRM, SLNB versus ALND, no adjuvant chemotherapy versus adjuvant chemotherapy, and no lymphatic irradiation versus lymphatic irradiation.

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Ethics Committee Approval: The study was approved by the Sivas Cumhuriyet University Non-interventional Clinical Research Ethics Committee (no: 2015-12/09, date: 23/12/2015).

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