Brief Report

The Impact of Radiodermatitis on Breast Cancer Patients' Quality of Life During Radiotherapy: A Prospective Cohort Study

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Abstract

Context. In the oncology field, quality of life (QoL) is recognized as an essential component. However, few studies have evaluated radiotherapy (RT) and its adverse events, specifically radiodermatitis.

Objectives. The objective of this study was to investigate the influence of radiodermatitis severity on QoL of women with breast cancer (BC) throughout RT.

Methods. A prospective cohort study was conducted with 100 BC patients evaluated weekly during RT. The Dermatology Life Quality Index questionnaire and the Radiation Therapy Oncology Group scale were used. The generalized estimated equations were used to examine the association between the total score of QoL and their domains, time of RT, and the radiodermatitis score, controlled by confounding factors. Estimated marginal means and 95% CIs were compared pairwise by applying Sequential Sidak.

Results. The total QoL score and their domains (work/school, leisure, daily activities, symptoms, and feelings) were significantly associated with the evaluation times of RT ($P < 0.001$), the radiodermatitis score ($P \leq 0.002$), and the interaction between timing (T) of treatment and radiodermatitis score ($P < 0.001$). When assessing post hoc, it was identified that the worst QoL scores were in the presence of Grade 3 (mean = 6.00) in T3 and Grade 4 (6.50; 7.00) in T5 and T6, respectively, and this difference was statistically significant.

Conclusions. RT negatively influenced the QoL of women with BC, with the greatest impact resulting from severe radiodermatitis. Actions aimed at minimizing the impairment on QoL need to be adopted to make this exhausting process less traumatic and easier to complete. J Pain Symptom Manage 2019;58:92–99. © *2019 Published by Elsevier Inc. on behalf of American Academy of Hospice and Palliative Medicine.*

Key Words

Breast neoplasms, radiotherapy, dermatitis, quality of life

Introduction

In the oncology field, quality of life (QoL) is recognized as an essential component to direct the actions of health professionals and has been extensively studied in patients with breast cancer (BC).[1–5] However, few studies have evaluated radiotherapy (RT) and its adverse events, specifically radiodermatitis. The studies regarding toxicity are generally clinical trials[6–8] and focus on the effect of the product tested, and the health quality is not the primary outcome. The fact is that the lack of data can impair physician-patient communication, suspend the progression of the treatment, and limit patient

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Accepted for publication: March 25, 2019.

0885-3924/$ - see front matter
https://doi.org/10.1016/j.jpainsymman.2019.03.017

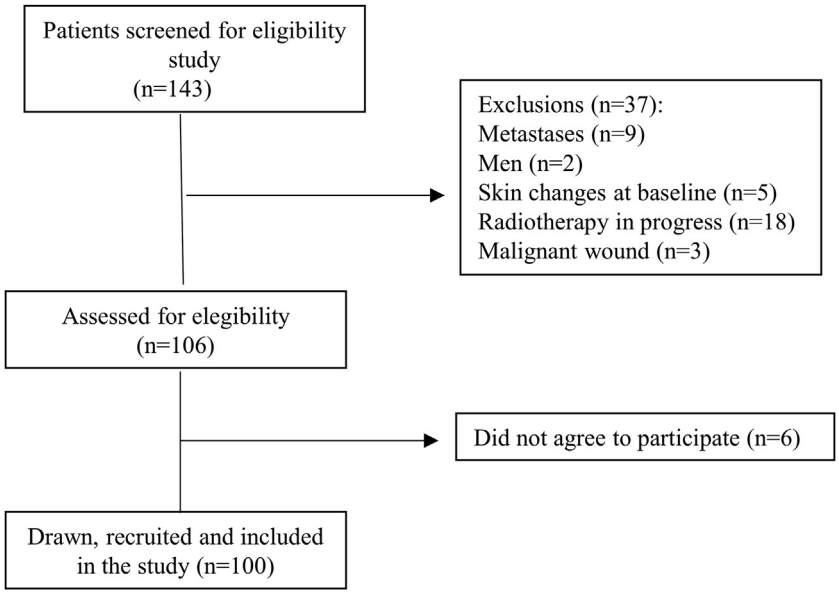

Fig. 1. Women with breast cancer during radiotherapy included in the study, 2016–2017.

understanding of RT and its outcomes.[9] The importance of evaluating QoL in clinical practice is widely disseminated in the literature. In addition, treatments can be planned or even altered according to the QoL.[10,11]

The aim of our study was to investigate the influence of the degree of radiodermatitis and the evaluation times of RT on the QoL of breast cancer patients during treatment. We hypothesized that patients undergoing RT have impairment to their quality of life due to the presence of severe radiodermatitis.

Methods

Recruitment Strategy

This prospective cohort study was conducted in a University Hospital with BC patients during RT, from April 2016 to June 2017.

Women before the beginning of RT were consecutively selected from the daily list in the RT sector and those that met the inclusion criteria were invited to participate in this research.

Eligibility Criteria

The study included women over the age of 18 years, of any ethnicity with a diagnosis of a nonmetastatic BC and who underwent external RT at the University Hospital. Those patients who presented ulceration, wound or skin tumor at the irradiation site, lupus erythematosus history, rheumatoid arthritis, ataxia telangiectasia, and other hereditary diseases involving the skin were excluded from the study, as well as those with a history of previous RT, or those that had already started RT.

Figure 1 depicts the flowchart of study participant selection.

Data Collected and Variables Analyzed

Those patients that met the inclusion criteria were invited to participate before beginning their radiotherapy process (T0) and the sociodemographic data were collected. Data related to treatment were obtained from the patients' medical records.

Patients were evaluated at the following times during their treatment beyond T0:

T1—seven days after beginning treatment, ± 3 days;
T2—14 days after beginning treatment, ± 3 days;
T3—21 days after beginning treatment, ± 3 days;
T4—28 days after beginning treatment, ± 3 days;
T5—35 days after beginning treatment, ± 3 days;
T6—42 days after beginning treatment, ± 3 days;
T7—49 days after beginning treatment, ± 3 days.

On all occasions, a physical dermatological examination was performed focusing on the area of skin within the field of RT, photographs were taken as evidence, and a quality of life questionnaire was completed.

Variables Analyzed

The following variables were analyzed: age, schooling, marital status, menopause (according to WHO),[12] cutaneous phototype,[13] body mass index,[14,15] chemotherapy and type of regimen, surgery, and endocrine therapy. The pathological stage was defined by the sixth edition of the Cancer Staging Manual[16] and molecular subtype in accordance with the American Society of Clinical Oncology.[17,18] Radiotherapy-related variables were also analyzed:

tangential field separation (breast width, in cm, at the posterior border of the medial and lateral tangential beams),[19] number of fields of radiation, total prescribed dose, daily dose, maximum radiation dose, energy of radiation, boost.

Topical Products and General Recommendations to Radiodermatitis Prevention and Management

Skin care included gently washing with mild soap, patting dry with a soft towel instead of rubbing; wearing soft, loose clothing, not exposing the skin to the sun, applying a damp cloth with cold water to the skin, oral hydration, not wearing a bra, and washing the region before radiotherapy session. Besides that, health professionals guided the use of the following topical products for the prevention of radiodermatitis: canola oil with calendula (prepared by the hospital itself), Dersani®, moisturizing gel (RD care®), with the most common being canola oil with calendula. The topical products for the management of radiodermatitis Grade 2, 3, or 4 were as follows: nystatin cream, silver sulfadiazine, hydrogel, with the most common being nystatin cream.

Skin Evaluation

The Radiation Therapy Oncology Group (RTOG) scale was used to classify skin toxicity, with Grade 0 being no change over baseline; Grade 1, follicular, faint, or dull erythema/epilation/dry desquamation/decreased sweating; Grade 2, tender or bright erythema, patchy moist desquamation/moderate edema; Grade 3, confluent, moist desquamation other than skin folds, pitting edema; and Grade 4, ulceration, hemorrhage, necrosis.[20] Aiming to reduce subjectivity related to evaluation, the irradiated area was recorded, using a Canon EOS Rebel T5i 18-55 mm camera, with a resolution of 18 MP. The women were always evaluated under the same conditions. The photos were taken with a view to record all possible sites for the occurrence of radiodermatitis. It should be emphasized that several photos of each patient were taken; however, the utmost care was taken to maintain the confidentiality. The photos were independently evaluated by three nurses in the field of RT and each evaluator classified the photos according to the RTOG scale.

The grade of cutaneous toxicity used for the final evaluation was the one in which there was agreement between two or three of the evaluators. The photos where there was no agreement among evaluators were reviewed later. It is emphasized that, before the individual evaluation of the photos, there was a meeting between the professionals, where aspects related to scale and its description were discussed.

Quality of Life

To evaluate the impact caused by radiodermatitis, the Dermatology Life Quality Index (DLQI) was used. The questionnaire was created in the U.K. and then adapted and validated for the south of Brazil. The maximum summed score is 30 and the minimum is 0; the higher the score, the more quality of life is impaired.[21] Besides total score, other DLQI domains can be calculated: symptoms and feelings; daily activities; leisure; work and school; personal relationships; and treatment.

To include the largest number of patients, regardless of schooling, the QoL questionnaire was read by the nurse, together with the patient at all times. The questionnaires were applied individually and in a reserved room to maintain confidentiality and avoid bias.

The DLQI was chosen because it is a specific scale of the dermatological field, and it is adequate to evaluate the impact of radiodermatitis, an adverse event of RT that affects the patient's skin.

Sample Size Calculation

This study, for which 100 women were required according to the sample calculation using the G*Power software (Department of Psychology, Germany), version 3.0,[22] was part of a larger project that aimed to evaluate the predictive factors of radiodermatitis, including the time of day in which patients with BC were treated during RT. The calculations were based on regression, fixed models, with expected effect size of 0.15, defined by Cohen,[23] as small effect, an alpha level of 0.05, 93% power.

Statistical Analysis

Demographics, treatment, and clinical characteristics were described using measures of central tendency and dispersion for continuous variables and proportions for categorical data. Statistical Package for the Social Sciences (SPSS®) software (version 21; SPSS, Inc., Chicago, IL) was used to perform the statistical analysis.

We applied generalized estimating equations (GEEs) using independent correlation and maximum likelihood estimation. We included the identification number of the subject as random effect in the statistical model. In addition, eight evaluation times and the RTOG score were considered as within-subject variable. We used this test to compare the differences between the variables total quality of life score, domain symptoms and feelings, daily activities, leisure, personal relationships, work and school and treatment, adjusted for age, schooling, and socioeconomic class. In addition, using the same variables, we evaluated the differences between the RTOG score and the

Table 1
Main and Interaction Effects on Quality of Life

Quality of Life	Effect	Df	*P*-value	Wald χ^2
Score total	Time	7	<0.001	43.907
	RTOG	4	<0.001	32.261
	Time × RTOG	11	<0.001	148.430
Symptoms and feelings	Time	7	<0.001	38.224
	RTOG	4	<0.001	52.690
	Time × RTOG	13	<0.001	91.605
Daily activities	Time	7	<0.001	32.035
	RTOG	4	0.002	17.534
	Time × RTOG	9	<0.001	183.937
Leisure	Time	6	0.001	21.777
	RTOG	4	0.001	18.441
	Time × RTOG	6	<0.001	61.744
Work and school	Time	4	<0.001	6958.102
	RTOG	4	<0.001	669.383
	Time × RTOG	4	<0.001	188.615

Df = degrees of freedom.
Quality of life according to Dermatology Quality of Life Index (DLQI); RTOG: Radiation Therapy Oncology Group. Grade 0: No change over baseline; Grade 1: follicular, faint, or erythema/epilation/dry desquamation/decreased sweating; Grade 2: tender or bright erythema, patchy moist desquamation/moderate edema; Grade 3: confluent, moist desquamation other than skin folds, pitting edema; Grade 4: ulceration, hemorrhage; necrosis. Time: moments that patients were evaluated during radiotherapy. *P*-value: Sidak Sequential; Wald χ^2: Wald chi-square values, according to generalized estimating equations (GEEs).

evaluation timing and interaction between evaluation timing and RTOG (timing × RTOG). The Gamma model with log link was selected. Estimated marginal means and 95% CIs were compared pairwise by applying Sequential Sidak for multiple tests.

Results

In this study, 100 breast cancer women were evaluated during RT and 95% of them were treated in the Varian® linear accelerator, Clinac 600c model, and 5% in the linear accelerator brand Elekta®, Precise model. Simple planning was performed in 92% of patients and 8% in 3D. The energy of the radiation was 6 MeV in 98% of patients. The median total prescribed dose to the chest wall was 50 Gray (Gy) (ranging from 44.0 to 57.6 Gy) and a sequential boost of 9−16 Gy. The daily dose is 1.8 Gy in 37% of the patients and 2 Gy in 63%. Fourteen percent of patients needed to interrupt treatment owing to radiodermatitis (the minimum = seven days and maximum = 17 days). The mean treatment time, defined as the period in days between the start and end date of RT, including days without treatment and weekends, was 36 days (minimum and maximum: 27−50 days). The median tangential field separation was 19 cm (ranging from 14 cm to 29 cm), whereas the number of fields of radiation ranged from two to five. Dosimetric analysis showed that the mean chest wall volume that received >105% of prescription dose was 68.1% ($n = 64$) and that >110% was 28.7% ($n = 27$).

Clinical and treatment characteristics are described in the supplementary material (Appendix).

The total QoL score, showed by GEE analysis, as well as its domains (work and school, leisure, daily activities, symptoms, and feelings) were significantly associated with the time of treatment, the radiodermatitis score, and the interaction between the time of treatment and radiodermatitis score (Table 1). It was not possible to perform the statistical analysis of the personal relationships and treatment domains because of the large number of responses with zero punctuation.

When assessing post hoc (Sequential Sidak), the total QoL score showed interaction with the degree of radiodermatitis with statistical significance and worse mean scores in the presence of radiodermatitis Grade 3 (mean = 6.00 and 5.25 in T3 and T5, respectively), Grade 4 (mean = 6.50 in T5 and mean = 7.00 in T6, respectively). Considering the domain symptoms and feelings, we found worse scores in the presence of Grade 3 (2.00) in T3 and Grade 4 (2.50, 3.00, in T5 and T6, respectively), being statistically significant (Tables 2 and 3, Fig. 2).

Discussion

This is the first cohort study, according the literature, to provide prospective data evaluating the influence the degree of radiodermatitis has on the QoL of patients throughout RT, that is, during the active period of treatment. The results of our study showed a negative impact on the general QoL of patients presenting severe radiodermatitis (Grade 3 and 4), specifically in T3 (21 days after starting treatment, ± 3 days), T5 (35 days after starting treatment, ± 3 days), and T6 (42 days after starting treatment, ± 3 days), because these values are clinically significant. The domains symptoms and feelings, daily activities, leisure, work, and school also presented a statistically significant difference, according to the degree of radiodermatitis and the evaluation timing of RT.

Table 2

The Mean Scores of Total QoL and Frequency of Degree of Radiodermatitis According to RTOG, During Treatment

Time Dose × Median (Min−Max)	RTOG0 *n* (%) Total Score Quality of Life Mean (CI)	RTOG1 *n* (%) Total Score Quality of Life Mean (CI)	RTOG2 *n* (%) Total Score Quality of Life Mean (CI)	RTOG3 *n* (%) Total Score Quality of Life Mean (CI)	RTOG4 *n* (%) Total Score Quality of Life Mean (CI)	Total *N* (%)
0	100 (100)					100 (100)
0	1.35 (1.08−1.69)					
1	51 (57.3)	38 (42.7)				89 (100)
800 (180−1800)	2.00 (1.55−2.58)	1.59 (1.24−2.03)				
2	10 (10.2)	78 (79.6)	10 (10.2)			98 (100)
1800 (1000−3000)	2.25 (1.12−4.54)	1.93 (1.61−2.32)	2.38 (1.24−4.56)			
3		65 (71.4)	25 (27.5)	1 (1.1)		91 (100)
3200 (1800−3800)		2.25 (1.87−2.69)	1.85 (1.38−2.48)	6.00 (6.00−6.00)		
4		26 (28.0)	60 (64.5)	7 (7.5)		93 (100)
4140 (2800−5000)		2.26 (1.73−2.95)	3.14 (2.48−3.96)	2.29 (1.51−3.46)		
5		17 (21.5)	52 (65.8)	8 (10.1)	2 (2.5)	79 (100)
5040 (3800−6000)		1.46 (1.03−2.07)	2.79 (2.19−3.55)	5.25 (3.17−8.71)	6.50 (4.72−8.95)	
6		10 (31.3)	17 (53.1)	4 (12.5)	1 (3.1)	32 (100)
5490 (4200−6000)		4.67 (2.13−10.22)	3.27 (2.13−5.02)	2.25 (1.57−3.23)	7.00 (7.00−7.00)	
7		5 (71.4)	1 (14.3)	1 (14.3)		7 (100)
5940 (5200−6480)[a]		4.25 (1.97−9.19)	1.00 (1.00−1.00)	1.00 (1.00−1.00)		

QoL = quality of life.

Total score quality of life according to Dermatology Quality of Life Index (DLQI); RTOG: Radiation Therapy Oncology Group. Grade 0: no change over baseline; Grade 1: follicular, faint, or erythema/epilation/dry desquamation/decreased sweating; Grade 2: tender or bright erythema, patchy moist desquamation/moderate edema; Grade 3: confluent, moist desquamation other than skin folds, pitting edema; Grade 4: ulceration, hemorrhage; necrosis. T0—beginning their radiotherapy process, T1—seven days after beginning treatment, ± 3 days; T2—14 days after beginning treatment, ± 3 days; T3—21 days after beginning treatment, ± 3 days; T4—28 days after beginning treatment, ± 3 days; T5—35 days after beginning treatment, ± 3 days; T6—42 days after beginning treatment, ± 3 days; T7—49 days after beginning treatment, ± 3 days. Mean: estimated according to generalized estimating equations (GEEs).

[a]Radiation dose, considering boost in the end.

Table 3

The Mean Scores of Symptoms/Feelings Domain and Frequency of Degree of Radiodermatitis According to RTOG, During Treatment

Time Dose Median (Min−Max)	RTOG0 *n* (%) Symptoms and Feelings Mean (CI)	RTOG1 *n* (%) Symptoms and Feelings Mean (CI)	RTOG2 *n* (%) Symptoms and Feelings Mean (CI)	RTOG3 *n* (%) Symptoms and Feelings Mean (CI)	RTOG4 *n* (%) Symptoms and Feelings Mean (CI)	Total *N* (%)
0	100 (100)					100 (100)
0	1.09 (1.00−1.20)					
1	51 (57.3)	38 (42.7)				89 (100)
800 (180−1800)	1.24 (1.05−1.45)	1.04 (0.96−1.13)				
2	10 (10.2)	78 (79.6)	10 (10.2)			98 (100)
1800 (1000−3000)	1.33 (1.00−1.77)	1.10 (1.02−1.18)	1.38 (1.08−1.75)			
3		65 (71.4)	25 (27.5)	1 (1.1)		91 (100)
3200 (1800−3800)		1.17 (1.07−1.28)	1.16 (1.01−1.33)	2.00 (2.00−2.00)		
4		26 (28.0)	60 (64.5)	7 (7.5)		93 (100)
4140 (2800−5000)		1.18 (0.99−1.41)	1.61 (1.42−1.83)	1.71 (1.27−2.32)		
5		17 (21.5)	52 (65.8)	8 (10.1)	2 (2.5)	79 (100)
5040 (3800−6000)		1.10 (0.93−1.30)	1.51 (1.31−1.75)	2.13 (1.36−3.31)	2.50 (1.89−3.30)	
6		10 (31.3)	17 (53.1)	4 (12.5)	1 (3.1)	32 (100)
5490 (4200−6000)		1.80 (1.25−2.59)	1.64 (1.31−2.07)	1.33 (0.89−1.99)	3.00 (3.00−3.00)	
7		5 (71.4)	1 (14.3)	1 (14.3)		7 (100)
5940 (5200−6480)[a]		1.25 (0.89−1.76)	1.00 (1.00−1.00)	1.00 (1.00−1.00)		

Symptoms/feelings domain according to Dermatology Quality of Life Index (DLQI); RTOG: Radiation Therapy Oncology; CI: Confidential Interval. Group. Grade 0: No change over baseline; Grade 1: follicular, faint, or erythema/epilation/dry desquamation/decreased sweating; Grade 2: tender or bright erythema, patchy moist desquamation/moderate edema; Grade 3: confluent, moist desquamation other than skin folds, pitting edema; Grade 4: ulceration, hemorrhage; necrosis. T0—beginning their radiotherapy process, T1—seven days after beginning treatment, ± 3 days; T2—14 days after beginning treatment, ± 3 days; T3—21 days after beginning treatment, ± 3 days; T4—28 days after beginning treatment, ± 3 days; T5—35 days after beginning treatment, ± 3 days; T6—42 days after beginning treatment, ± 3 days; T7—49 days after beginning treatment, ± 3 days. Mean: estimated according to generalized estimating equations (GEEs)

[a]Radiation dose, considering boost in the end.

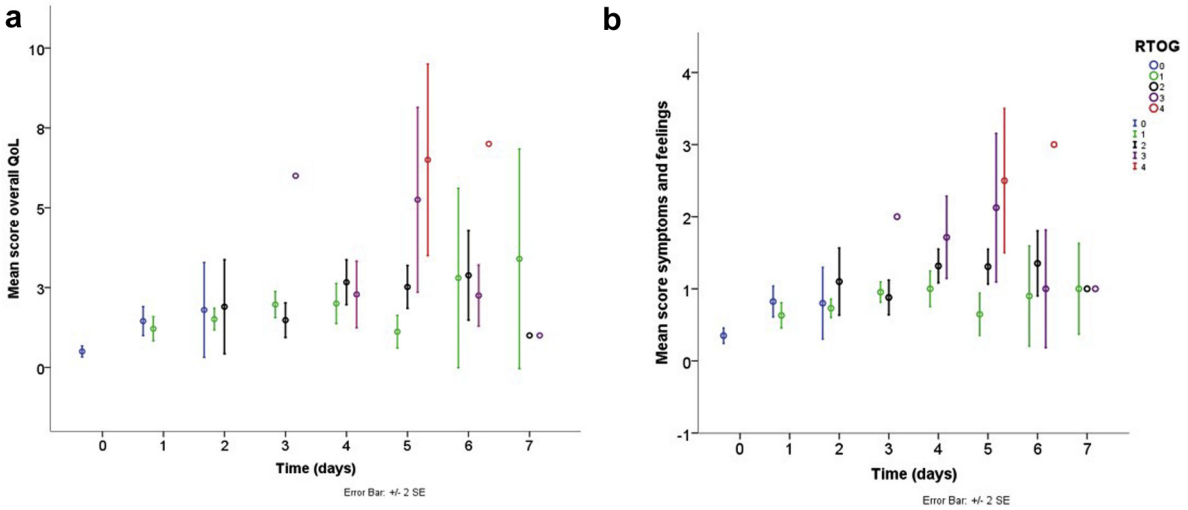

Fig. 2. a) The mean scores of total QoL and b) symptoms/feelings domain, in terms of evaluation timing and RTOG. The color should be used for this figure. Overall QoL and symptoms/feelings domain according to Dermatology Quality of Life Index (DLQI); RTOG: Radiation Therapy Oncology Group. Grade 0: no change over baseline; Grade 1: follicular, faint, or erythema/epilation/dry desquamation/decreased sweating; Grade 2: tender or bright erythema, patchy moist desquamation/moderate edema; Grade 3: confluent, moist desquamation other than skin folds, pitting edema; Grade 4: ulceration, hemorrhage; necrosis. Time 0: before beginning their radiotherapy process; T1—seven days after beginning treatment, ± 3 days; T2—14 days after beginning treatment, ± 3 days; T3—21 days after beginning treatment, ± 3 days; T4—28 days after beginning treatment, ± 3 days; T5—35 days after beginning treatment, ± 3 days; T6—42 days after beginning treatment, ± 3 days; T7—49 days after beginning treatment, ± 3 days. Mean: estimated according to generalized estimating equations (GEEs). Error bar: ± 2 SE. QoL = quality of life.

The great differential of our study was the QoL evaluation at different moments throughout the treatment showing QoL deterioration related to cutaneous toxicity of RT. Most data on QoL in breast cancer patients are derived from cross-sectional studies[10,24] that are unable to indicate the course of QoL over time. The impact of RT on functionality and the daily lives of the patients is sometimes underestimated when compared with the chemotherapy period. However, our study and the literature show that this period presents unique changes, including modifications in their daily routine due to the treatment plan, an increase in physical discomfort, and changes in the breast appearance.[9]

In our study, we identified a change of at least four points in QoL throughout the treatment, indicating a clinically important impact[25] and a moderate effect[6–10,21] of the worst grades of radiodermatitis on the overall QOL score at T3 (Grade 3: mean score of QoL equal to 6.00), T5 (Grade 4: 6.50), and T6 (Grade 4: 7.00). Similar results were found by Pignol et al.[26] However, this study used a general QoL instrument applied in only three moments (at the beginning of treatment, in the last week, and one month after the end of treatment).[26]

Considering the domains that presented a statistically significant difference, we highlight the "symptoms and feelings" (related to the shame or concern about the appearance of the irradiated area and also the influence of symptoms such as pruritus, increased sensitivity, pain, and burning in QoL) (Grade 3 = 2.00 and 2.13 in T3 and T5, respectively; Grade 4 = 2.50 and 3.00 in T5 and T6, respectively) at the same time points identified in the general QoL score and may indicate that the worst scores were identified in the presence of worse grades of radiodermatitis. This influence of domain "symptoms and feelings" on the overall QoL score was also identified in another study.[27] However, the researchers used the Quality of Life Breast Cancer Patient Version (COH-QoL-breast) to assess overall QoL.[27] Thus, our data suggest the necessity to adopt measures to prevent radiodermatitis and to reduce the impact of those already affected. QoL assessments using the DLQI dermatological questionnaire are feasible and simple to apply by professionals during consultation, mainly after 21 days of treatment, and the results may be useful in directing the clinical practice.

The effort to promote QoL in patients with BC is considered one of the most important topics in women's health care.[28] However, what is observed in clinical practice is a divergence between the patients' complaints and the symptoms evaluated by physicians and other health professionals. Practitioners focus on treatment outcomes rather than on adverse events and their impact on QoL.[29] The results of the present

study allow a better understanding of the experiences of radiodermatitis from the patients' point of view, throughout the treatment, as well as its impact on QoL.

The main limitation of our study was the decrease in the number of participants over time and the lack of representativeness of Grades 3 and 4. Another limitation of our study is that we did not collect data for a longer follow-up period. This period of 49 days after the start of radiotherapy may not be sufficient to evaluate the potential long-term effects of breast radiotherapy on QoL. The strength of the study resides in its comprehensive nature and the quality of the data. The evaluation of radiodermatitis was performed in a way to reduce subjectivity, through the photographic registry and the independent evaluation by three nurses. In addition, a specific dermatological questionnaire (DLQI) was used, allowing for a more reliable interpretation of the impact of radiodermatitis on QoL. The statistical analysis adopted (GEE) also allowed the analysis of variation over time, even with the loss of some patients.

The results of this prospective study showed that throughout RT, there was a negative impact on QoL of women with BC, with the greatest impact coming from severe radiodermatitis. It is important to understand the influence of this adverse effect and their domains, as well as the effects the evaluation times with higher scores have on overall QoL. Actions directed to minimize the impairment in QoL need to be adopted to help patients get through the radiotherapy.

Disclosures and Acknowledgments

Thanks to the women who participated in this study and the team of the Radiology Sector of the Clinics Hospital of Federal University of Uberlandia.

The data sets used and/or analyzed during the present study are available from the corresponding author on reasonable request.

The authors have full control over the primary data and agree to allow the journal to review the data if requested. In addition, they declare no conflict of interest.

This study received financial support from Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brazil (CNPq), Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG), and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Ethical approval: This study was approved by the Human Research Ethics Committee (protocol number: 1348706/15) and the entire study was conducted based on the standards of the Helsinki Declaration. All participants signed a free and informed consent form and their right to privacy was observed.

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Appendix

Appendix
Clinical and Treatment Characteristics of the Prospective Study ($N = 100$)

Characteristics	Values (%)
Age (yrs) mean (SD, min−max)	57 (30−84 ± 12.58)
Marital status	
Single	17 (17)
Married	54 (54)
Widowed	18 (18)
Divorced/separated	11 (11)
Years of study	
<8 yrs	55 (55)
From 8 to 11 yrs	10 (10)
>11 yrs	35 (35)
Menopause	
No	31 (31)
Yes	69 (69)
Tumoral subtype	
Ductal carcinoma	80 (80)
Lobular carcinoma	10 (10)
Others	10 (10)
Clinical stage	
0	10 (10)
I	10 (10)
IA	2 (2)
IIA	27 (27)
IIB	22 (22)
IIIA	10 (10)
IIIB	11 (11)
IIIC	8 (8)
Histological grade	
G1	10 (10)
G2	48 (48)
G3	26 (26)
NR	16 (16)
Molecular subtypes	
RE-, RP-, HER2- e CK5/6 + e/ou EGFR+	13 (13)
RE-, RP- e HER2+	5 (5)
RE + e/ou RP+, HER2- e Ki-67 < 14%	30 (30)
RE + e/ou RP+, HER2- e Ki-67 ≥ 14%	28 (28)
RE + e/ou RP+, HER2+	15 (15)
NR	9 (9)
Hormone therapy	
No	30 (30)
Yes	70 (70)
Surgery	
Mastectomy	31 (31)
Conservative surgery	64 (64)
Mastectomy with prosthetic reconstruction	5 (5)
Chemotherapy	
Yes	71 (71)
No	29 (29)
Chemotherapy regimen	
AC→ paclitaxel (T)	45 (45)
AC	5 (5)
ACTH	6 (6)
CMF	3 (3)
Herceptin	3 (3)
T (paclitaxel)	2 (2)
TC	2 (2)
Others	8 (8)
Phototype [a,b]	
Type II (white)	2 (2)
Type III (cream white)	51 (51)
Type IV (moderate brown)	37 (37)
Type V (dark brown)	7 (7)
Type VI (black)	3 (3)

Appendix
Continued

G1 = well-differentiated tumor (low grade); G2 = moderately differentiated tumor (intermediate grade); G3 = poorly differentiated tumor (high grade); RE = estrogen receptor; RP = progesterone receptor; HER2 = human epidermal growth factor receptor 2; − = negative; + = positive; CK = cytokeratin; EGFR = epidermal growth factor receptor; Ki 67 = antigen Ki 67; NR = not registered; AC = adriamycin + cyclophosphamide; CMF = cyclophosphamide, methotrexate, and 5−fluorouracil; TC = cyclophosphamide and docetaxel; ACTH = adriamycin + cyclophosphamide followed by paclitaxel and trastuzumab; RT = radiation therapy.
Values are number (percentage) or median (range).
[a]Absence of patients in the Type I (pale white).
[b]Fitzpatrick T.B. The validity and practicality of sun reactive skin Types I−VI. Arch. Dermatol.1988;124:869−871.