

Clinical, Therapeutic, and Outcome Profiles of Breast Cancer Patients Treated with Radiotherapy According to Age at the Centre Hospitalier Universitaire de Bogodogo, Burkina Faso

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Abstract

Background: Breast cancer is a heterogeneous disease whose clinical presentation and therapeutic response may vary according to age. Younger women often present with more aggressive disease, whereas in older women comorbidities and menopausal status may influence treatment decision-making.

Methods: This comparative cohort study was conducted in the Radiotherapy Department of the Centre Hospitalier Universitaire de Bogodogo between October 2022 and December 2025, with follow-up through April 2026. Ninety-eight women treated with radiotherapy for breast cancer were included and divided into two age groups: ≤ 50 years ($n = 58$) and > 50 years ($n = 40$). Sociodemographic characteristics, medical history, gynecological factors, histopathological and biological features, treatment modalities, and outcomes were compared between the two groups. Statistical analyses were performed using SPSS version 2021. Fisher's exact test or the chi-square test was used as appropriate, and survival was estimated using the Kaplan-Meier method with comparison by the log-rank test. **Results:** Hypertension was more frequent in patients older than 50 years than in those aged 50 years or younger (40.0% vs. 12.1%; $p = 0.003$). Diabetes followed a similar pattern (17.5% vs. 3.4%; $p = 0.044$). Menopause at diagnosis was markedly more frequent in the > 50 -year group (85.0% vs. 15.5%; $p = 0.001$). Tumor characteristics, treatment variables, and survival did not differ significantly between age groups. However, treatment interruption was more frequent in women older than 50 years

(15.0% vs. 1.7%; $p = 0.035$). The estimated mean survival time was 1587.5 days in patients aged ≤ 50 years and 1273.1 days in those aged > 50 years, without a statistically significant difference (log-rank $p = 0.625$). **Conclusion:** Apart from hypertension, diabetes, and menopausal status, the two age groups were broadly comparable. Treatment interruption was more frequent after the age of 50 years, whereas preliminary therapeutic outcomes were similar. Breast cancer management should therefore remain individualized and based on overall oncologic risk and patient fitness rather than chronological age alone.

Keywords

Breast Cancer, Radiotherapy, Age, Burkina Faso

1. Introduction

Breast cancer is the most common malignant tumor in women worldwide and remains a major cause of morbidity and mortality. Its burden is particularly high in low- and middle-income countries, where late diagnosis, delays in accessing care, and limited technical resources contribute to poorer outcomes [1]. In sub-Saharan Africa, several recent reviews have shown that access to radiotherapy remains limited despite its central role in locoregional disease control, with measurable consequences for survival and quality of care [1]-[3].

Breast cancer is a heterogeneous disease whose course depends on stage at diagnosis, histological grade, nodal status, molecular subtype, and response to systemic therapy. Age at diagnosis is frequently associated with distinct clinical and therapeutic profiles. In younger women, the literature reports a higher proportion of aggressive disease, more frequent use of intensified locoregional strategies, and specific concerns related to fertility, body image, and late toxicities [4] [5]. Recent studies have also confirmed the benefit of a tumor-bed boost in young patients while emphasizing the need to preserve cosmetic outcomes and long-term tolerance [4] [6].

In older women, the issues are different. Cardiovascular and metabolic comorbidities, functional frailty, transportation difficulties, and lower tolerance to some treatment regimens may influence adherence to care and treatment continuity. Available studies indicate that frail older women are less likely to receive complete radiotherapy or to complete treatment without interruption, whereas current recommendations emphasize that chronological age alone should not lead to unjustified treatment de-escalation [4] [6] [7]. Therapeutic decisions should instead be guided by overall oncologic risk, comorbidities, and expected life expectancy [7] [8].

Radiotherapy plays a major role in the locoregional management of breast cancer. After breast-conserving surgery, it reduces the risk of local recurrence and remains a standard of care. After mastectomy, its indication mainly depends on tumor stage, nodal involvement, and associated prognostic factors [5] [6]. Recent

guidelines also support the use of hypofractionated schedules, now widely validated across age groups, as well as modern planning techniques and, in selected situations, partial-breast irradiation [4] [5] [9] [10]. In resource-limited settings, these approaches may also reduce treatment burden and improve access to care [1] [11].

A comparative analysis of women aged 50 years or younger and those older than 50 years may therefore help to clarify differences in clinical background, tumor presentation, treatment patterns, and outcomes, while assessing whether age truly influences the observed results. Such an analysis is particularly relevant in sub-Saharan Africa, where barriers to care and the diversity of clinical presentations may significantly influence treatment pathways [11] [12]. The aim of this study was to compare the sociodemographic, clinical, pathological, therapeutic, and outcome characteristics of breast cancer patients aged 50 years or younger with those older than 50 years treated with radiotherapy at the Centre Hospitalier Universitaire de Bogodogo.

2. Methods

2.1. Study Design and Setting

This study is a retrospective cohort analysis including all women with breast cancer treated with radiotherapy at the CHU de Bogodogo between October 1, 2022 and December 31, 2025, with follow-up censored at the date of last documented contact in the records, and all data collection and analyses performed entirely retrospectively. On 30 April 2026, all patients whose last documented visit occurred more than one month earlier were contacted by telephone to verify their vital status and the absence of clinically reported signs of cancer recurrence. It was designed to compare the clinical, therapeutic, and outcome profiles of two groups of breast cancer patients defined according to age at the time of treatment: 50 years or younger, and older than 50 years. This age cut-off was chosen to explore the potential impact of age on tumor characteristics, treatment strategies, and observed outcomes. The 50-year age cutoff was chosen a priori because it corresponds roughly to the menopausal transition and is commonly used in breast cancer literature and in our local practice to distinguish “younger” from “older” patients in terms of tumor biology, comorbidities, and treatment decision-making.

2.2. Study Population

All women with breast cancer who received radiotherapy during the study period and whose medical records contained the data required for analysis were eligible for inclusion. Cases with incomplete information on key study variables were excluded to reduce information bias. During the study period, we reviewed 103 medical records of women with breast cancer managed in the radiotherapy department. Five patients were excluded because their initial oncologic treatment had been delivered abroad and they were referred only for post-radiation follow-up (n

= 3) or for the management of metastatic lesions ($n = 2$), which did not allow consistent baseline and treatment documentation. The final study cohort therefore comprised 98 patients with complete local treatment and follow-up data, including 58 patients aged 50 years or younger and 40 patients older than 50 years.

2.3. Study Variables

The collected variables were grouped into several domains. Sociodemographic and background variables included age, residence, medical history, family history, and lifestyle-related factors. Medical history comprised hypertension, diabetes, asthma, viral hepatitis, HIV status, and surgical history. Gyneco-obstetric and hormonal variables included contraceptive use and menopausal status at diagnosis.

Clinical and pathological variables included histological subtype, Scarff-Bloom-Richardson (SBR) histological grade, hormone receptor status, HER2 status, tumor stage, pT and pN classifications, and molecular subtype. When available, complete breast and nodal response was also recorded.

Therapeutic variables included neoadjuvant chemotherapy, adjuvant chemotherapy, hormonotherapy, type of breast surgery, irradiated target volume, nodal irradiation, axillo-susclavicular irradiation, early adverse effects, and treatment interruptions.

2.4. Data Collection and Management

Data were retrospectively extracted from medical records, pathology reports, radiotherapy treatment charts, and departmental registers. The information was entered into a database and checked for consistency before statistical analysis.

2.5. Statistical Analysis

All analyses were performed using SPSS version 2021. Categorical variables were summarized as frequencies and percentages and compared between the two age groups using the chi-square test or Fisher's exact test when expected cell counts were insufficient. Pathology and biomarker variables (receptor status, HER2, molecular subtype, and pathological response) were analyzed only in patients with available data for the corresponding variable. The number of patients with missing information for each biomarker is reported in the tables. When analyses were based on a reduced denominator, this is explicitly indicated in the table footnotes and in the Results. Survival was estimated using the Kaplan-Meier method and compared between groups using the Mantel-Cox log-rank test. Statistical significance was set at $p < 0.05$. In addition to univariable analyses, we explored multivariable models (logistic and Cox regression) to assess the association between age group and selected outcomes (treatment interruption, survival) while accounting for comorbidities and menopausal status. Because the number of events was very small (7 treatment interruptions and 6 deaths), these models yielded unstable estimates with large confidence intervals and convergence warnings. We therefore

report these analyses only as exploratory and do not base our main conclusions on multivariable modeling.

2.6. Primary and Secondary Endpoints

The primary endpoint was overall survival (OS), defined as the time from the date of diagnosis or date of histologic confirmation to death from any cause or last documented follow-up; patients who were alive at the last recorded contact were censored on that date. Secondary outcome variables included complete breast and nodal response, early adverse effects, and treatment interruption. Complete breast and nodal response were defined as the absence of residual tumor histologically detectable disease in the breast sample after surgery and regional lymph nodes resected after completion of initial treatment (neoadjuvant chemotherapy), as documented in the medical record. Early adverse effects were defined as acute toxicities occurring during radiotherapy or within 180 days after its completion, based on clinician-documented treatment-related events in the records. Treatment interruption was defined as any unplanned break in the radiotherapy course resulting in a prolongation of the scheduled treatment duration, regardless of cause.

2.7. Ethical Considerations

Because the study was based on secondary use of medical records, all data were handled anonymously and confidentially before analysis. According to the source manuscript, the study was authorized by the ethics committee of the Centre Hospitalier Universitaire de Bogodogo and conducted in accordance with local confidentiality and data protection requirements.

3. Results

3.1. Sociodemographic Characteristics

Hypertension and diabetes were significantly more frequent in patients older than 50 years than in those aged 50 years or younger. In contrast, asthma, viral hepatitis, HIV infection, prior surgery, family history of cancer, alcohol consumption, physical activity, and fruit-rich diet did not differ significantly between the two groups. All patients in both groups were non-smokers. **Table 1** summarizes the sociodemographic characteristics across age groups.

3.2. Clinical and Tumor Characteristics

Menopause at diagnosis was significantly more frequent in women older than 50 years. No statistically significant between-group differences were observed for contraceptive use, histological type, SBR grade, estrogen receptor positivity, progesterone receptor positivity, HER2 status, tumor stage, pT classification, pN classification, molecular subtype, or complete breast and nodal response when assessable. Clinical and biological characteristics stratified by age group are shown in **Table 2**. For biomarker analyses (ER, PR, HER2, molecular subtype), only patients

with documented pathology reports were included; the corresponding denominators are shown in each table. Pathological complete response was assessed in the subset of patients with evaluable post-treatment assessment, as indicated by the footnotes.

Table 1. Sociodemographic and comorbidity characteristics by age group.

Variable	Category	≤50 years (n = 58)	>50 years (n = 40)	p-value
Hypertension	Yes	7 (12.1%)	16 (40.0%)	0.003
	No	51 (87.9%)	24 (60.0%)	
Diabetes	Yes	2 (3.4%)	7 (17.5%)	0.044
	No	56 (96.6%)	33 (82.5%)	
Asthma	Yes	1 (1.7%)	2 (5.0%)	0.742
	No	57 (98.3%)	38 (95.0%)	
Viral hepatitis	Yes	2 (3.4%)	2 (5.0%)	1.000
	No	56 (96.6%)	38 (95.0%)	
HIV infection	Positive	5 (8.6%)	1 (2.5%)	0.416
	Negative	53 (91.4%)	39 (97.5%)	
Previous surgery	Yes	16 (27.6%)	10 (25.0%)	0.958
	No	42 (72.4%)	30 (75.0%)	
Family history of breast cancer	Yes	14 (24.1%)	14 (35.0%)	0.346
	No	44 (75.9%)	26 (65.0%)	
Alcohol use	Yes	3 (5.2%)	3 (7.5%)	0.965
	No	55 (94.8%)	37 (92.5%)	
Physical activity	Yes	4 (6.9%)	5 (12.5%)	0.556
	No	54 (93.1%)	35 (87.5%)	
Fruit-rich diet	Yes	4 (6.9%)	5 (12.5%)	0.556
	No	54 (93.1%)	35 (87.5%)	

No smokers were reported in the cohort. Note: Percentages are calculated within each age group: ≤50 years (n = 58) and >50 years (n = 40).

Table 2. Clinical and pathological features by age group.

Variable	Category	≤50 years (n = 58)	>50 years (n = 40)	p-value
Any contraception	Yes	21 (36.2%)	11 (27.5%)	0.494
	No	37 (63.8%)	29 (72.5%)	
oral contraception	Yes	8 (13.8%)	6 (15.0%)	1
	No	50 (86.2%)	34 (85.0%)	
Injectable contraception	Yes	4 (6.9%)	1 (2.5%)	0.613
	No	54 (93.1%)	39 (97.5%)	
Contraceptive implant	Yes	17 (29.3%)	7 (17.5%)	0.273
	No	41 (70.7%)	33 (82.5%)	

Continued

Menopause at diagnosis	Yes	9 (15.5%)	34 (85.0%)	0.001
	No	49 (84.5%)	6 (15.0%)	
Histological type	IDC-NOS*	54 (93.1%)	39 (97.5%)	0.613
	Others	4 (6.9%)	1 (2.5%)	
SBR** grade	0 - 1	9 (15.5%)	7 (17.5%)	0.794
	2 - 3	49 (84.5%)	33 (82.5%)	
Estrogen receptor	Positive	27 (46.6%)	15 (37.5%)	0.495
	Negative	31 (53.4%)	25 (62.5%)	
Progesterone receptor	Positive	25 (43.1%)	12 (30.0%)	0.270
	Negative	33 (56.9%)	28 (70.0%)	
HER2 status	Positive	1 (1.7%)	1 (2.5%)	1.000
	Negative	57 (98.3%)	39 (97.5%)	
Tumor stage	I-II	29 (50.0%)	27 (67.5%)	0.130
	III	29 (50.0%)	13 (32.5%)	
pT classification	pT0	10 (17.2%)	4 (10.0%)	0.476
	≥pT1	48 (82.8%)	36 (90.0%)	
pN classification	pN0	27 (46.6%)	23 (57.5%)	0.390
	≥pN1	31 (53.4%)	17 (42.5%)	
Molecular subtype	Triple-negative	30 (51.7%)	24 (60.0%)	0.418
	Luminal/HER2+	28 (48.3%)	16 (40.0%)	
PCR*** (breast + nodal)	Yes	8 (24.2%)	4 (22.2%)	0.871
	No	25 (75.8%)	14 (77.8%)	

*Invasive Ductal Carcinoma, Not Otherwise Specified (IDC-NOS); **Scarff-Bloom-Richardson; ***Percentages for pathological complete response (PCR) are calculated among evaluable patients only (n = 33 for ≤50 years; n = 18 for >50 years), based on the counts provided in the source table. Percentages for biomarker variables and pathological complete response are calculated among patients with available data for the corresponding variable; missing data were excluded from these specific analyses and the denominators are reported in the table. Note: Percentages are calculated within each age group: ≤50 years (n = 58) and >50 years (n = 40).

3.3. Treatment Characteristics

Most patients underwent total mastectomy and received adjuvant radiotherapy. Chest wall irradiation was the predominant target volume in both groups, and nodal irradiation was performed in approximately three-quarters of cases. Rates of neoadjuvant chemotherapy, adjuvant chemotherapy, hormonotherapy, nodal irradiation, axillo-susclavicular irradiation, and early adverse effects were similar between the two groups. However, treatment interruption was significantly more frequent in patients older than 50 years. **Table 3** reports treatment characteristics according to age group. Percentages are calculated within each age group: ≤50 years (n = 58) and >50

years (n = 40), except for nodal target volumes, for which percentages are calculated among patients who received nodal irradiation in each age group.

Table 3. Treatment characteristics by age group.

Variable	Category	≤50 years (n = 58)	>50 years (n = 40)	p-value
Neoadjuvant chemotherapy (NAC)	Yes	33 (56.9%)	18 (45.0%)	0.341
	No	25 (43.1%)	22 (55.0%)	
Adjuvant chemotherapy	Yes	27 (46.6%)	26 (65.0%)	0.111
	No	31 (53.4%)	14 (35.0%)	
Hormone therapy	Yes	28 (48.3%)	16 (40.0%)	0.547
	No	30 (51.7%)	24 (60.0%)	
Surgery type	Mastectomy	49 (84.5%)	36 (90.0%)	0.625
	Lumpectomy	9 (15.5%)	4 (10.0%)	
Target volume	Chest wall	49 (84.5%)	36 (90.0%)	0.625
	Breast	9 (15.5%)	4 (10.0%)	
Nodal irradiation	Yes	45 (77.6%)	31 (77.5%)	1.000
	No	13 (22.4%)	9 (22.5%)	
Nodal target volume[†]	Axillary/SCF	23 (51.1%)	9 (29.0%)	0.116
	SCF only	22 (48.9%)	22 (71.0%)	
Early adverse effects	Yes	5 (8.6%)	4 (10.0%)	1.000
	No	53 (91.4%)	36 (90.0%)	
Treatment interruption	Yes	1 (1.7%)	6 (15.0%)	0.035
	No	57 (98.3%)	34 (85.0%)	

All patients underwent surgery and radiotherapy in both age groups. [†]Percentages for nodal target volume are calculated among patients who received nodal irradiation: n = 45 in the ≤50 years group and n = 31 in the >50 years group. SCF = supraclavicular field.

3.4. Outcome Data

At the date of last follow-up, survival remained high in both groups, with no statistically significant difference. The estimated mean survival time was longer in the group aged 50 years or younger than in the group older than 50 years; however, comparison of the survival curves did not show a statistically significant difference (**Table 4** and **Figure 1**).

Table 4. Outcome data according to age group.

Variable	≤50 years (n = 58)	>50 years (n = 40)	p-value
Alive at last follow-up	54 (93.1%)	38 (95.0%)	1.000
Dead	4 (6.9%)	2 (5.0%)	—
Estimated mean survival (days)	1587.5	1273.1	—
Log-rank (Mantel-Cox)	—	—	0.625

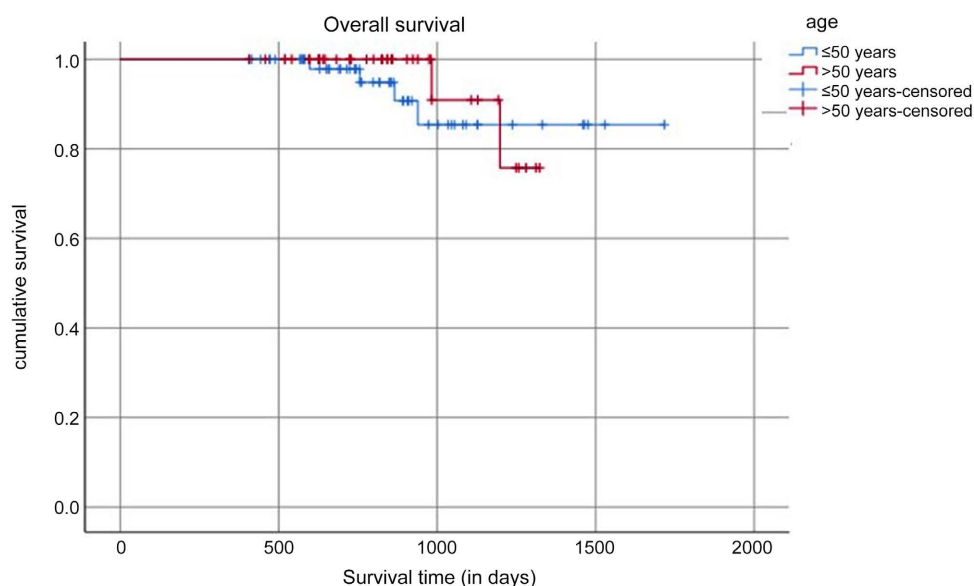


Figure 1. Kaplan-Meier overall survival curves according to age group.

Figure 1 compares overall survival between patients aged 50 years or younger and those older than 50 years. Although the estimated mean survival time was longer in the younger group, the difference between the survival curves was not statistically significant (log-rank $p = 0.625$).

4. Discussion

This study shows that age was mainly associated with comorbidity burden and menopausal status, whereas tumor characteristics, major treatment modalities, and survival outcomes remained broadly comparable between the two groups. This pattern is consistent with recent evidence indicating that, among older breast cancer patients, cardiovascular and metabolic comorbidities influence the care trajectory more strongly than chronological age alone [8] [12]. Studies evaluating radiotherapy in older women have also emphasized that treatment adherence and completion may decline when frailty, general condition, or functional constraints complicate the therapeutic pathway [7] [8] [13].

The absence of statistically significant differences in histological and biological characteristics between the two age groups contrasts with some international series reporting a higher proportion of high-grade tumors, aggressive subtypes, and less favorable clinical behavior in younger women [4] [6]. Several explanations may account for this discrepancy. First, the sample size in this study limits the power to detect moderate differences. Second, the study population was drawn from a radiotherapy department, which selected patients who had already accessed specialized locoregional treatment and may therefore have reduced age-related contrasts. Finally, the local context, characterized by diagnostic delays and barriers to care, may partly homogenize patient profiles by the time they reach treatment [1] [11].

Current evidence confirms that radiotherapy remains a cornerstone of locoregional treatment in breast cancer. After breast-conserving surgery, it reduces the risk of local recurrence and improves local control, whereas after mastectomy its indication depends mainly on stage, nodal involvement, and recurrence risk [4] [5]. Recent recommendations broadly support hypofractionation as a standard option because of equivalent efficacy and greater convenience, including in several postoperative indications [9] [10]. In this context, the higher rate of treatment interruption observed among patients older than 50 years in our cohort may reflect the combined effects of comorbidities, tolerance issues, transportation difficulties, and socioeconomic constraints [9] [10].

In younger patients, recent studies have also highlighted the importance of a tumor-bed boost after whole-breast irradiation, while emphasizing the balance that must be achieved between reducing local recurrence and preserving cosmetic outcomes [4] [6]. This issue is relevant when interpreting therapeutic strategies in the younger age group, in whom locoregional control must be optimized without excessively increasing late toxicity. Our study did not show a major survival difference between the two groups, suggesting that in this cohort age alone was not a sufficient determinant of medium-term prognosis. This finding is consistent with more recent work emphasizing that therapeutic decisions should be based on global oncologic risk, functional status, frailty, and patient preferences rather than an arbitrary age threshold [7] [14] [15].

This lack of difference in survival should nevertheless be interpreted cautiously. The relatively short follow-up may limit the detection of late events, particularly local recurrences and delayed toxicities, both of which are clinically important in breast cancer. In addition, the small number of observed events reduces the precision of survival comparisons. These results should therefore be viewed as preliminary and hypothesis-generating. Multicenter studies with larger samples and longer follow-up will be required to confirm these findings and better define the actual impact of age on radiotherapy outcomes [5].

This study also has the usual limitations of a retrospective single-center cohort, including modest sample size, potential missing data, and limited power for uncommon events such as recurrence. Follow-up duration was probably insufficient to fully assess recurrence-free survival, long-term overall survival, or late toxicity. Furthermore, recruitment from a single center may limit the generalizability of the findings to other settings. The study is underpowered for reliable multivariable modeling, with only a few events (treatment interruptions and deaths) in each age group. Attempts at adjusted logistic and Cox regression produced unstable estimates and convergence issues, so we did not present detailed multivariable results. This limitation reduces our ability to formally confirm whether age remains independently associated with treatment interruption or survival after adjustment for comorbidities and menopausal status. Despite these limitations, the study provides useful local data on the profile of breast cancer patients managed in a radiotherapy center in sub-Saharan Africa and supports a more individualized approach to care based on clinical background and tumor-related risk.

5. Conclusion

In this cohort of 98 breast cancer patients treated with radiotherapy at the Centre Hospitalier Universitaire de Bogodogo, women older than 50 years had more comorbidities and were more frequently postmenopausal at diagnosis, but tumor characteristics, treatment patterns, and survival did not differ significantly from those of women aged 50 years or younger. These findings support an individualized therapeutic strategy based on overall oncologic risk and general condition rather than age alone.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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