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Impact of Chemotherapy on Quality of Life in Breast Cancer Patients: A Prospective Interventional Study Using the EORTC QLQ-BR23 Questionnaire

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ABSTRACT

Background: Chemotherapy remains a cornerstone in breast cancer management, but its impact on quality of life (QoL) is a growing concern. This study evaluated changes in QoL before and after chemotherapy using the EORTC QLQ-BR23 questionnaire.

Methods: In this prospective cohort with pre-post assessment design, seventy breast cancer patients scheduled for six months of chemotherapy were enrolled; 65 completed follow-ups. QoL was assessed at baseline and after chemotherapy. Adverse events were documented using ADR reporting forms. Subgroup analyses were performed by menopausal status, disease stage, and chemotherapy regimen. Pre-post comparisons were conducted using paired t-tests.

Results: A total of 65 patients were analyzed. Chemotherapy resulted in substantial declines in QoL across multiple domains. Systemic therapy side effect scores increased by a mean of 11.8 points (95% CI: 8.7-14.9; p<0.001), body image scores decreased by 11.2 points (95% CI: 7.9-14.5; p<0.001), and future perspective declined by 11.3 points (95% CI: 7.8-14.8; p<0.001). Alopecia was nearly universal (93.8%). Fatigue (78.5%), nausea/vomiting (70.8%), and neuropathy (44.6%) were common. Subgroup analyses revealed more pro-

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nounced deterioration in advanced-stage patients and postmenopausal women. Regimen-specific patterns showed higher neuropathy with taxane-based protocols and cardiotoxicity with trastuzumab-containing regimens.
Conclusion: Chemotherapy significantly impairs QoL across multiple domains. Integrated supportive care, including toxicity management, body image interventions, and psychosocial support, is essential to optimize patient well-being during therapy.

1.Introduction

Breast cancer is the most frequently diagnosed malignancy among women worldwide and remains a leading cause of cancer-related mortality[1]. While advances in screening and multimodal therapy have improved survival, treatment-related toxicity continues to pose a major challenge[2,3]. Chemotherapy, although pivotal in reducing recurrence risk, is associated with adverse effects that can significantly impair quality of life (QoL)[4].

Assessment of QoL is increasingly recognized in oncology, both as a secondary outcome in clinical trials and as a determinant of treatment adherence, satisfaction, and survivorship outcomes[5,6]. Patient-reported outcomes complement traditional clinical endpoints[7]. The European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire–Breast Cancer module (EORTC QLQ-BR23) is a validated instrument widely used to evaluate breast cancer–specific QoL domains[8,9].

Previous studies have reported declines in QoL during chemotherapy, especially fatigue, alopecia, nausea, and psychosocial distress[10–12]. However, prospective interventional data assessing QoL changes in real-world patient populations are limited. This study aimed to evaluate QoL changes in breast cancer patients undergoing chemotherapy over six months using EORTC QLQ-BR23. Secondary objectives included documenting chemotherapy-induced adverse events and assessing regimen- and menopausal status–specific QoL patterns.

2.Methods

2.1. Study Design and Setting

This prospective cohort with pre and post assessment study was conducted at a tertiary care teaching hospital between January 2023 and June 2023. Ethical approval was obtained from the institutional review board (Approval No.: 8461/IEC/2022), and all participants provided written informed consent.

2.2. Participants

Eligible patients were women aged 33–64 years with histologically confirmed breast carcinoma (stages I–IV) scheduled for chemotherapy. Exclusion criteria included prior systemic chemotherapy, cognitive impairment preventing questionnaire completion, and concurrent major psychiatric illness.

2.3. Sample Size

Based on a minimum clinically important difference of 10 points on the EORTC QLQ-BR23 functional scales (SD = 20), with 80% power and $\alpha = 0.05$, a sample size of 60 was calculated. Allowing for 15% attrition, 70 patients were recruited.

2.4. Intervention

All participants received chemotherapy as per institutional protocols recommended by National

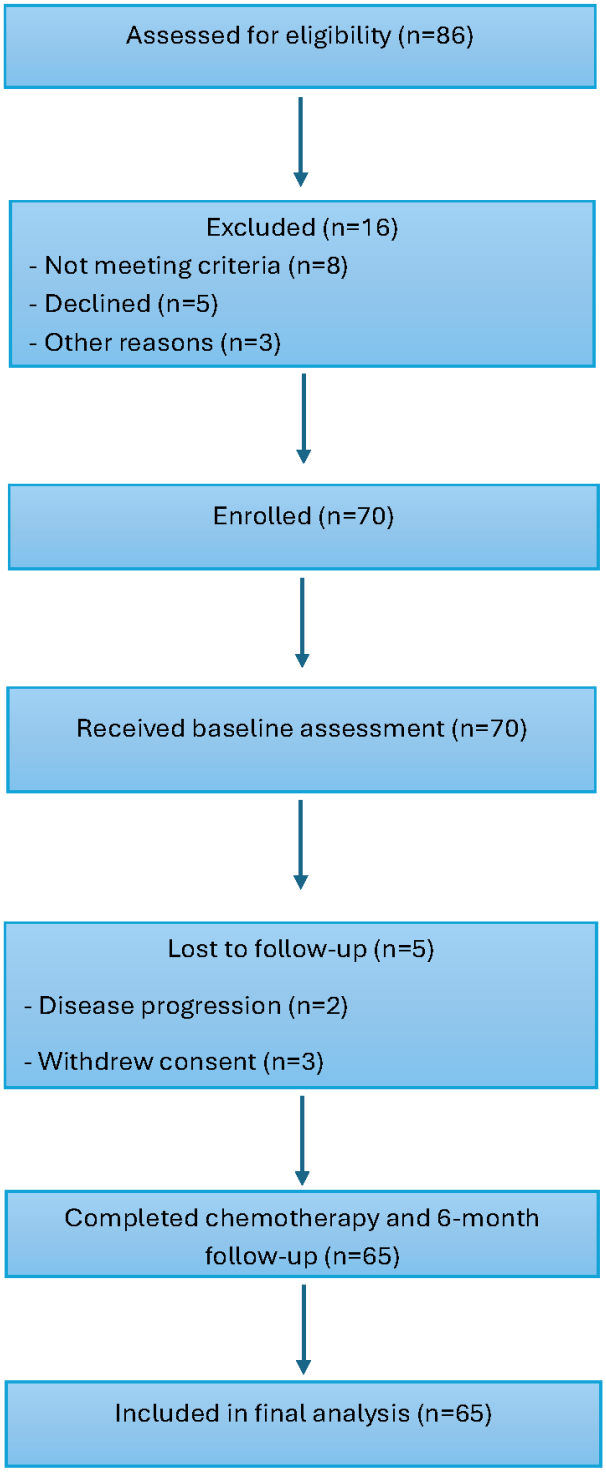

Figure 1. Flow chart for patient inclusion in the final analysis

Table 1. Baseline demographic and clinical characteristics (N = 70)

Characteristic	**n (%) or Mean ± SD**
Age (years), mean ± SD	51.2 ± 8.6
Menopausal status	
– Premenopausal	19 (27.1)
– Postmenopausal	51 (72.9)
Stage of disease	
– Stage I	6 (8.6)
– Stage II	32 (45.7)
– Stage III	22 (31.4)
– Stage IV (palliative)	10 (14.3)
Hormone receptor status	
– ER and/or PR positive	48 (68.6)
– HER2 positive	21 (30.0)
– Triple-negative	12 (17.1)
Chemotherapy regimen	
– AC → T (Anthracycline + Cyclophosphamide → Taxane)	25 (35.7)
– FEC (5-FU + Epirubicin + Cyclophosphamide)	12 (17.1)
– TCH (Docetaxel + Carboplatin + Trastuzumab)	11 (15.7)
– Single-agent taxane (Docetaxel/Paclitaxel)	15 (21.4)
– Others (Capecitabine, oral, palliative regimens)	7 (10.0)

Comprehensive Cancer Network (NCCN) guidelines. Regimens included anthracycline-taxane sequential (AC→T), fluorouracil-epirubicin-cyclophosphamide (FEC), and trastuzumab-containing regimens (TCH), single agent taxane and others (capecitabine/palliative). Treatment duration was six months. Patients were followed prospectively to assess QoL and adverse events.

2.5. Data Collection

Sociodemographic and clinical details were documented. Adverse events were recorded using ADR reporting forms.

2.6. Quality of life (QoL) Assessment

Quality of Life (QoL) was assessed using the EORTC QLQ-BR23 questionnaire which is created and validated by European Organisation for Research and Treatment of Cancer (EORTC). The first QoL assessment was conducted at baseline, prior to initiation of the first chemotherapy cycle, while the final assessment was performed at six months post-chemotherapy. Prior approval was obtained from EORTC for using the questionnaire and received in english and regional language. EORTC QLQ-BR23 is a specific questionnaire for assessing QoL in Breast Cancer Patients containing 23 questions and separated as two main domains symptom scale and functional scale. Scores (from 0-Not at all to 4-Very much) were linearly transformed to a 0–100 scale according to EORTC guidelines. Reverse scoring is applied in sexual enjoyment related questions. Higher functional scores indicate better QoL; higher symptom scores indicate greater burden.

2.7. Statistical Analysis

Data were analyzed using SPSS version 25. Descriptive statistics summarized baseline characteristics and adverse events. Paired t-tests compared pre- and post-chemotherapy QoL scores. Subgroup analyses by stage, menopausal status, and chemotherapy

Table 2. EORTC QLQ-BR23 scores before and after chemotherapy (N = 65)

Domain	Baseline Mean ± SD	Post-CT Mean ± SD	p-value
Functional Scales			
Body image	72.4 ± 14.5	61.2 ± 16.8	<0.001
Sexual functioning	58.7 ± 18.1	50.2 ± 17.5	0.002
Sexual enjoyment*	62.1 ± 15.3	59.7 ± 16.9	0.214
Future perspective	65.3 ± 17.2	54.0 ± 18.6	<0.001
Symptom Scales			
Systemic therapy side effects	27.8 ± 12.7	39.6 ± 14.5	<0.001
Breast symptoms	22.3 ± 11.4	28.5 ± 12.2	0.016
Arm symptoms	19.7 ± 10.6	25.8 ± 11.9	0.021
Upset by hair loss	31.5 ± 18.2	54.9 ± 21.6	<0.001

Higher symptoms scores= Worse QoL, Higher functional scores= Better QoL

*Sexual enjoyment reported only by sexually active patients (n=36).

regimen were performed using ANOVA. A p-value <0.05 was considered statistically significant.

3. Results.

3.1. Participant Flow

Of the 86 women assessed for eligibility, 16 were excluded (8 did not meet inclusion criteria, 5 declined participation, and 3 for other reasons). A total of 70 patients were randomized and completed baseline assessments. During follow-up, 5 participants were lost (2 due to disease progression, 3 withdrew consent). Thus, 65 patients (92.9%) completed post-chemotherapy assessment and were included in the final analysis (Figure 1).

3.2. Baseline Characteristics

The mean age of participants was 51.2 ± 8.6 years (range: 33–64). A majority were postmenopausal (72.9%). Most patients had stage II disease, followed by stage III. A smaller proportion presented with early-stage disease (Stage I) or metastatic disease (Stage IV, palliative intent). Hormone receptor–positive tumors predominated, followed by HER2-positive and triple-negative subtypes.

3.3. EORTC QLQ-BR23 scores before and after chemotherapy

Table 2 summarizes pre- and post-chemotherapy scores. Functional domains showed significant declines: body image ($p < 0.001$), sexual functioning ($p = 0.002$), and future perspective ($p < 0.001$). Symptom domains worsened significantly, with higher scores for systemic therapy side effects ($p < 0.001$) and upset by hair loss ($p < 0.001$). Arm and breast symptoms showed smaller but significant increases.

3.4. Mean change (post–pre) in QLQ-BR23 domains by chemotherapy regimen

Quality-of-life deterioration varied by regimen. Patients receiving AC→T reported the most pronounced decline in future perspective and highest alopecia-related distress. TCH was associated with significant systemic side effects, consistent with combined cytotoxic and targeted HER2-directed therapy. Single agent taxane and palliative regimens showed more modest but clinically relevant changes, with palliative patients experiencing the lowest body image and future perspective scores. Functional declines were least pronounced in FEC recipients, reflecting comparatively lower-intensity exposure.

Table 3. Mean change (post–pre) in QLQ-BR23 domains by chemotherapy regimen

Domain	AC→T (n=23)	FEC (n=11)	TCH (n=10)	Single-agent taxane (n=14)	Others – palliative (n=7)	p-value
Functional Scales						
Body image	−11.7	−9.3	−10.8	−8.6	−14.2	0.044
Sexual functioning	−8.9	−6.4	−7.5	−6.1	−9.8	0.179
Sexual enjoyment*	−2.6	−1.9	−2.4	−1.8	−3.0	0.507
Future perspective	−12.1	−9.7	−11.5	−9.2	−15.6	0.031
Symptom Scales						
Systemic therapy side effects	+13.9	+10.2	+14.8	+11.4	+15.1	0.028
Breast symptoms	+6.7	+5.1	+6.8	+5.4	+7.2	0.311
Arm symptoms	+6.8	+5.3	+6.9	+6.1	+7.5	0.344
Upset by hair loss†	+25.1	+22.4	+23.9	+21.7	+20.5	0.386

* Among sexually active participants.
† Completed by participants with alopecia.

Table 4. Chemotherapy-Induced Adverse Effects

Adverse Effect	Any grade n (%)	Grade 3–4 n (%)
Nausea/vomiting	46 (70.8)	9 (13.8)
Fatigue	51 (78.5)	11 (16.9)
Neutropenia	28 (43.1)	12 (18.5)
Febrile neutropenia	9 (13.8)	5 (7.7)
Mucositis	24 (36.9)	6 (9.2)
Peripheral neuropathy	29 (44.6)	7 (10.8)
Diarrhea	18 (27.7)	3 (4.6)
Hand-foot syndrome (Capecitabine group)	5 (7.7)	1 (1.5)
Cardiotoxicity (HER2+ on TCH)	2 (3.1)	0
Alopecia (grade 2 hair loss)	61 (93.8)	—

3.5. Chemotherapy-Induced Adverse Effects

Chemotherapy-related adverse events (AEs) were frequent and clinically significant. The most common toxicities were alopecia (93.8%), fatigue (78.5%), and nausea/vomiting (70.8%). Severe (grade 3–4) events were observed in neutropenia (18.5%), fatigue (16.9%), and febrile neutropenia (7.7%). Peripheral neuropathy was reported in half of patients, particularly in those receiving taxane-based regimens, while trastuzumab-related cardiotoxicity was uncommon (3.1%). Table 7 summarizes the overall toxicity profile.

4. Discussion

This prospective interventional study evaluated changes in quality of life (QoL) among breast cancer patients before and after six months of chemotherapy using the EORTC QLQ-BR23 instrument. The findings demonstrated a significant decline in global QoL scores following chemotherapy, particularly in the domains of systemic side effects, body image, and future perspective. These results are consistent with prior evidence that systemic cytotoxic therapy, while effective in improving survival, is frequently associated with deterioration in patient-reported outcomes[1–3].

The decline in body image and future perspective scores aligns with previously reported psychosocial challenges faced by breast cancer patients during chemotherapy. Fear of recurrence, uncertainty regarding prognosis, and distress over physical changes, particularly alopecia, have been shown to negatively impact psychological well-being[4,5]. In our cohort, alopecia was nearly universal (93.8%), which contributed to the increased distress observed in the hair loss and body image subscales.

Systemic therapy side effects demonstrated the greatest deterioration, reflecting the high burden of chemotherapy-induced adverse events (AEs). Fatigue (78.5%), nausea and vomiting (70.8%), and peripheral neuropathy (44.6%) were highly prevalent, consistent with prior reports from anthracycline- and taxane-based regimens[6–8]. Severe toxicities, such as neutropenia (18.5%) and febrile neutropenia (7.7%), were less common but significantly affected functioning and hospital admissions. These observations highlight the direct relationship between treatment-related toxicities and diminished QoL, corroborating the hypothesis that symptom burden is a key mediator of patient-reported outcomes[9].

Chemotherapy regimen–specific patterns were also evident. Taxane-containing regimens (AC→T, TCH) were associated with higher rates of neuropathy, whereas trastuzumab-containing regimens contributed to cardiotoxicity, albeit at a low frequency (3.1%). These findings reinforce the importance of tailoring supportive care strategies to the specific toxicity profile of each regimen, a recommendation echoed by prior multicenter studies[10-12].

From a clinical perspective, these results emphasize the need for integrating supportive care interventions such as antiemetic prophylaxis, fatigue management, neuropathy prevention, and psychological counseling into routine practice. Moreover, interventions addressing body image, such as scalp cooling systems, and psycho-oncology services could mitigate the psychosocial impact of treatment[13-15].

Our study has limitations. The single-center design and modest sample size (N=70, with 65 completing follow-up) may restrict generalizability. Additionally, follow-up was limited to six months, and long-term QoL trajectories, particularly in survivorship, were not assessed. Nevertheless, the use of a validated instrument (EORTC QLQ-BR23), a prospective design, and incorporation of chemotherapy regimen strengthen the robustness of the findings.

5. Conclusion

Chemotherapy significantly impairs multiple QoL domains in breast cancer patients, driven by treatment-related toxicities and psychosocial distress. Alopecia and fatigue were particularly burdensome. Advanced-stage patients and postmenopausal women experienced more pronounced declines. Regimen-specific toxicities shaped adverse outcome patterns.

Integrating supportive care interventions—such as scalp cooling, neuropathy management, sexual health counselling, and psychological support—may mitigate

chemotherapy's negative impact. Future multicenter studies with larger cohorts and extended follow-up are needed to evaluate long-term survivorship outcomes and refine patient-centered treatment strategies.

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Conflicts of Interest

The authors declare no conflicts of interest.

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