Acta Scientific CANCER BIOLOGY (ISSN: 2582-4473)

Volume 9 Issue 3 March 2025

Research Article

Clinical and Radiological Features of Post Treated Breast Carcinoma Patients: A Single Centre Descriptive Study

Adhikari Ganga D[1], Seema Guragain[1], Thakur Sudip Kumar[1], Pandit Anil[1], Chaudhary Amardeep[2], Yadav Ajay Kumar[2], Paudel Sangeeta[3], Pandit Aakash[3] and Koirala Melisha[3]

[1]Department of Radio-Diagnosis, Imaging and Nuclear Medicine, BP Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal

[2]Nuclear Medicine and Molecular Imaging Centre, Birat Medical College Teaching Hospital, Tankisinuwari, Morang, Nepal

[3]Department of Dermatology, Chitwan Medical college, Bharatpur, Nepal

***Corresponding Author:** Adhikari Ganga D, Department of Radio-Diagnosis, Imaging and Nuclear Medicine, BP Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal.

Received: August 25, 2025

Published: August 30, 2025

Abstract

Breast carcinoma remains the most frequently diagnosed cancer worldwide and presents a significant public health burden. The treatment of breast cancer typically includes surgery, followed by therapies like chemotherapy, radiation therapy, hormone therapy, targeted drug therapy, and immunotherapy to eliminate cancer cells and prevent recurrence. Aim of our study was to evaluate clinical and radiological features with survival rate of post treated breast cancer patients. Method: A retrospective study was conducted in the Department of Radiodiagnosis, Imaging, and Nuclear Medicine at BP Koirala Memorial Cancer Hospital, Bharatpur, Nepal. The study period spanned from July 9, 2023, to January 16, 2024, during which clinical and radiological data were collected from patient history, medical records and Contrast Enhanced Computed Tomography (CECT) finding during follow-up after complete treatment. The data were analyzed using IBM SPSS statistics version 25.0. Result: Total 258 post-treated breast cancer patients were enrolled in our study in which 255 (98.8%) of participants were female whereas 3 (1.2%) were male patients. The age group of our study was 23 – 83 years where mean age 48.26 years with a standard deviation (SD) ±11.08 years. Among total population, 110 (44.4%) patients showed normal post-treatment findings, followed with pulmonary fibrosis in 26 patients (10.5%), non-neoplastic skin thickening was noted in 20 patients (8.1%), pleural effusion in 14 patients (5.6%), seroma in the axilla and mastectomy bed in 13 patients (5.2%), pulmonary atelectasis in 12 patients (4.8%), patchy opacity in 9 patients (3.6%), ground glass opacification in 8 patients (3.2%), and reactive lymphadenopathy in 6 patients (2.4%). The most commonly used chemotherapy regimen was Adriamycin/Cytoxan/Taxol (AC-T) were 125 (51.4%), which showed a recurrence rate of 17.6% whereas patients treated with Fluorouracil (5-FU), Epirubicin, and Cyclophosphamide (FEC) were 68 (28.0%) had a lower recurrence rate (13.2%) with the longest median survival time was 1570.5 days. Conclusion: CECT imaging provides invaluable information in detecting local recurrences, particularly when mammographic findings were inconclusive. These findings highlight the importance of personalized treatment approaches, integrating advanced imaging techniques and tailored follow-up care to enhance long-term outcomes for breast cancer survivors, particularly in resource-limited settings. This study also accomplished that prognosis of breast cancer patients who were treated on time with proper treatment guidelines were good.

Keywords: Breast Carcinoma; Contrast Enhanced Computed Tomography (CECT); Modified Radical Mastectomy (MRM); Chemotherapy (CT); Radiotherapy (RT); Metastases; Survival Rate

Introduction

Breast cancer is the most prevalent cancer globally, ranking first in incidence and fifth in mortality rates. In Nepal, it is the third most common cancer across the entire population and the second most common among women, with 1,973 new cases reported in 2020 [1]. In 2020, breast cancer emerged as the most frequently diagnosed cancer globally, with over 2.3 million new cases. This disease poses a significant public health challenge, with substantial geographic variation in its impact across different countries and regions. Although the majority of cases are found in transitioned countries, transitioning countries bear a disproportionately high share of breast cancer fatalities. If current trends persist, the incidence of breast cancer is projected to exceed 3 million new cases annually by 2040, accompanied by 1 million deaths each year, driven primarily by population growth and aging [2].

Mammography is the primary imaging test recommended for follow-up in patients who have undergone radical treatment for breast cancer. According to Polish, European, and American guidelines, it should be conducted annually. Additionally, Polish Society of Clinical Oncology (PTOK) advises an initial follow-up mammogram in six months post-surgery for those who had breast conserving therapy. Studies indicate that early detection of asymptomatic local recurrence through mammography enhances overall survival and improves patients' quality of life. It also reduces mortality from second breast cancers by 17-28% when detected by mammography rather than physical examination. With advancements in detection and treatment, the number of breast cancer survivors has increased to approximately 6 million women globally. This growing population of survivors, requiring long-term follow-up, poses a significant challenge to healthcare systems worldwide. Follow-up aims primarily to detect early local or regional recurrences of breast cancer, as screening for distant metastasis in asymptomatic patients is not recommended. Oncological societies, including PTOK (Polish Society of Clinical Oncology) and ESMO (European Society for Medical Oncology), endorse mammography as the sole imaging examination for follow-up, as it improves overall survival by detecting local/regional recurrences or contralateral breast cancer in asymptomatic patients [3]. CECT is really sensitive in the diagnosis of local recurrence of breast cancer, even in nonpalpable lesions, and may be a useful tool in patients with equivocal clinical and/or mammographic findings during follow-up after therapy [4].

Breast cancer follow-up involves regular physical exams, annual mammograms on the remaining breast, and monitoring for recurrence or new primary breast cancers, especially within the first 5 years post-treatment. Routine scans like CECTs or ^{18}FDG-PET aren't recommended for asymptomatic patients, but patients are encouraged to report any new or persistent symptoms immediately to their doctor. Aim of our study was to evaluate clinical and radiological characteristics with survival rate of post treated breast cancer patients by taking clinical history and CECT findings.

Methods and Materials

Study Design and Setting: A retrospective cross-sectional study was conducted in the Department of Radiodiagnosis, Imaging, and Nuclear Medicine at BP Koirala Memorial Cancer Hospital, Bharatpur, Nepal. The study period spanned from July 9, 2023, to January 16, 2024, during which data were collected from patient medical records and current follow-up findings.

Study Participants; The study included 258 post-treated breast cancer patients who visited the hospital for routine follow-up and underwent CECT chest/abdomen/pelvis imaging during the study period. Patients were selected based on their history of breast cancer treatment and their current follow-up status.

Data Collection Tool and Technique: Data were collected through a combination of retrospective review of patient medical records and current clinical assessments. The variables collected included:

- **Sociodemographic Information:** Current age, sex, address categorized by district and geographical region of Nepal,
- **Clinical Variables:** Histopathological diagnosis, pTNM staging according to breast cancer staging AJCC Cancer Staging Manual 8th Edition, immunohistochemistry expression of estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor 2 (Her2/neu),
- **Treatment History:** Information on type of chemotherapy regimens, including the number of cycles (total, pre-operative and post-operative), type of surgery (with laterality specified as right or left), and radiation therapy details (completion date and number of fractions),
- **Follow-Up Information:** Post-treatment findings upon follow-up CECT scan and survival days calculated as days elapsed since the date of surgery.
- **Data Analysis:** Data were entered into a secure database and analyzed using IBM SPSS Statistics version 25.0. Descriptive statistics were done for the variables of interest. The data were analyzed using IBM SPSS Statistics version 25.0, and the results were reported using appropriate statistical measures to describe the study population and their outcomes.

Results

The study included a total of 258 participants. Age data were available for 245 participants, with 13 cases having missing information. The mean age of the participants was 48.26 years, with a standard deviation of ±11.08 years. The median age was 47 years, and the interquartile range was 15 years, indicating that the middle 50% of participants fell within this age span. The age distribution ranged from 23 to 83 years. When analyzing the age distribution (Table 1), the majority of participants were between 41 and 60 years old. Specifically, 32.7% of participants were in the 41-50 age group, and 27.8% were in the 51-60 age group. Participants aged 31-40 years constituted 23.7% of the sample. Fewer participants fell into the younger and older age groups: 2.9% were aged 21-30 years, 8.6% were aged 61-70 years, 4.1% were aged 71-80 years, and only 0.4% were older than 80 years. This distribution highlights that the majority of the study population was middle-aged, with fewer participants at the extremes of the age spectrum. Among the 258 participants for whom sex data were available, 98.8% were female (n = 255) and 1.2% were male (n = 3).

Age Group	Frequency	Percentage
23 - 30	7	2.9
31 - 40	58	23.7
41 - 50	80	32.7
51 - 60	68	27.8
61 - 70	21	8.6
71 - 80	10	4.1
81 - 83	1	0.4
Total	245	100.0

Table 1: Frequency distribution of patients with different age group (Total Patients = 245).

Out of the 258 participants, data on province were available for 253 patients. The data reveals that Gandaki Province has the highest frequency of occurrences with 70, making up 27.64% of the total. Lumbini Province follows closely with 65 occurrences, or 25.69%. Madhesh Province has 47 occurrences, accounting for 18.58%, while Bagmati Province has 36 occurrences, representing 14.24%. Koshi Province has a frequency of 22, which constitutes 8.69% of the total. Sudurpashchim Province has 10 occurrences, or 3.95%, and Karnali Province has the fewest with just 3 occurrences, equating to 1.18%. Overall, these numbers sum up to a total of 253 occurrences distributed across the provinces (Table-2). For geographical region data, available for 253 participants, most patients were from the Terai region, comprising 66.8% of the sample (169 patients). The Hilly region followed with 32.8% (83 patients). Only 1 patient (0.4%) was from the Himalayan region.

Province	Frequency	Percentage
Province-1 (Koshi)	22	8.69
Province-2 (Madhesh)	47	18.58
Province-3 (Bagmati)	36	14.24
Province-4 (Gandaki)	70	27.64
Province-5 (Lumbini)	65	25.69
Province-6 (Karnali)	3	1.18
Province-7 (Sudurpashchim)	10	3.95
Total	253	100.0

Table 2: Frequency distribution of patients in difference province of Nepal (Total Patients = 253).

According to the frequency distribution of 246 patients with available histopathological diagnoses, the most common diagnosis is invasive carcinoma NST (No Special Type), affecting 202 patients (82.1%), followed by invasive ductal carcinoma in 26 patients (10.6%). Medullary breast carcinoma was identified in 7 patients (2.8%), while ductal carcinoma in-situ, metastatic breast carcinoma, invasive micropapillary carcinoma, and invasive lobular carcinoma were each diagnosed in 2 patients (0.8%). Additionally, undifferentiated breast carcinoma, metaplastic breast carcinoma, and mucinous breast carcinoma were each found in 1 patient (0.4%) which is tabulated in table 3.

Histopathological Diagnosis	Frequency	Percent
Invasive Carcinoma NST	202	82.1%
Invasive Ductal Carcinoma	26	10.6%
Medullary Breast Carcinoma	7	2.8%
Ductal Carcinoma In-Situ	2	0.8%
Metastatic Breast Carcinoma	2	0.8%
Invasive micropapillary carcinoma	2	0.8%
Invasive Lobular Carcinoma	2	0.8%
Undifferentiated Breast Carcinoma	1	0.4%
Metaplastic Breast Carcinoma	1	0.4%
Mucinous Breast Carcinoma	1	0.4%
Total	246	100%

Table 3: Frequency distribution of patients with different histopathological findings (Total Patients = 246).

Among the 238 participants with available hormonal status data, the distribution of Estrogen Receptor (ER), Progesterone Receptor (PR), and human epidermal growth factor receptor 2 (HER2/neu) statuses are detailed in Table-4. The most common hormonal profile was negative for all three receptors (35.29%, n = 84). This was followed by a positive ER and PR status but negative HER2/neu status (29%, n = 69). Positive statuses for both ER and PR with a negative HER2/neu were observed in 15.12% of cases (n = 36). Additionally, 12.18% of participants had a negative ER and PR with a positive HER2/neu status (n = 29). Other profiles were less frequent. Data on ER receptor status were available for 237 participants. The frequency distribution of ER positive was 117 (49%) while 51% were ER-negative (n = 120). The distribution revealed that 48% of participants were PR positive (n = 113) and 52% were PR-negative (n = 125) Similarly 29% were HER2/neu-positive (n = 69), 71% were HER2/neu-negative (n = 1 69).

Hormonal Status (ER, PR, Her2/neu)			Frequency	Percentage
ER	PR	Her2/neu		
Negative	Negative	Negative	84	35.29%
Positive	Positive	Negative	69	29.00%
Positive	Positive	Positive	36	15.12%
Negative	Negative	Positive	29	12.18%
Positive	Negative	Negative	11	04.62%
Negative	Positive	Negative	05	02.10%
Negative	Positive	Positive	03	01.26%
Positive	Negative	Positive	01	00.42%
Total			238	100%

Table 4: Frequency Distribution of patients with different active hormonal receptor status (Total Patients = 238).

For the 154 patients with available cancer staging data, the distribution of stages according to the eighth edition of the AJCC cancer staging manual is outlined in table 5. The majority of patients were classified as stage IIA, comprising 34% of the sample (n = 52). Stage IIIA followed, with 25% of patients (n = 39). Other stages included Stage IIB (19%, n = 30) and Stage IIIC (8%, n = 12). Stages IA and IV each had 8% (n = 12 and n = 2, respectively), while Stage 0 and Stage IIIB were the least represented, each accounting for 1% of the sample (n = 2 and n = 5, respectively).

Table 6 presents the median survival days calculated as the number of days elapsed since surgery for patients categorized by cancer stage. For all 243 patients, the median survival was 594 days, with an interquartile range (IQR) of 847 days. The median survival varied by cancer stage: Stage IA patients had a median survival of 660 days (IQR: 979.75 days), while Stage IIA patients had a median survival of 662 days (IQR: 1167.25 days). For Stage IIB patients, the median survival was 550.5 days (IQR: 988.75 days). Stage IIIA patients had a median survival of 641 days (IQR: 714

Metastasis Location		Number of Patients (f)		Percentage (f/N*100%) (N=54)	
Lymph Node	Axillary LN	32	22	59.26%	40.74%
	Mediastinal LN		15		27.78%
	Abdominal LN		2		3.70%
Bone		16		29.63%	
Lung		11		20.37%	
Liver		10		18.52%	
Contralateral Breast		7		12.96%	
Mastectomy Bed		5		9.26%	
Chest Wall Muscle		3		5.56%	
Omentum		2		3.70%	
Retroperitoneum		1		1.85%	
Endometrium		1		1.85%	
Vaginal Vault		1		1.85%	

Table 5: Frequency distribution of patients with different location of metastasis/recurrence (Total N = 54).

Metastasis Location		Number of Patients (f)		Percentage (f/N*100%) (N=54)	
Lymph Node	Axillary LN	32	22	59.26%	40.74%
	Mediastinal LN		15		27.78%
	Abdominal LN		2		3.70%
Bone		16		29.63%	
Lung		11		20.37%	
Liver		10		18.52%	
Contralateral Breast		7		12.96%	
Mastectomy Bed		5		9.26%	
Chest Wall Muscle		3		5.56%	
Omentum		2		3.70%	
Retroperitoneum		1		1.85%	
Endometrium		1		1.85%	
Vaginal Vault		1		1.85%	

Table 6: Frequency distribution of patients with different location of metastasis/recurrence (Total N = 54).

days), and Stage IIIB patients had a median survival of 452 days (IQR: 684 days). Stage IIIC patients showed a median survival of 668.5 days (IQR: 941.5 days). Patients with Stage IV had a median survival of 569 days (IQR: 180 days), while those at Stage 0 had a median survival of 288.5 days (IQR: 46.5 days).

Out of 248 patients with available data, 54 (21.8%) experienced metastasis or recurrence of breast cancer, while 194 patients (78.2%) did not. The distribution of metastasis locations among these 54 patients is detailed in table 7. The most common site of metastasis was the lymph nodes, affecting 32 patients (59.26%),

Regimen	Frequency	Percent
AC-T	125	51.4%
FEC	68	28.0%
AC	13	5.3%
DC	12	4.9%
FEC-T	8	3.3%
TC	7	2.9%
AC-T-GC	1	0.4%
AC-T-GTX-TC	1	0.4%
CMF-TC-FEC-GC	1	0.4%
DC-TC	1	0.4%
FEC-GC	1	0.4%
GC	1	0.4%
GC-TC	1	0.4%
PPF-AC-T-CC-GC	1	0.4%
TC-FEC	1	0.4%
TC-GC	1	0.4%
Total	243	100%

Table 7: Frequency Distribution patients received different chemotherapeutic regimen: Total N = 243).

*AC-T: Adriamycin/Cytoxan/Taxol; FEC: Fluorouracil/Epirubicin/Cyclophosphamide; AC: Adriamycin: doxorubicin) and Cyclophosphamide; DC: docetaxel-cisplatin; FEC-T: 5-Fluorouracil, Epirubicin, Cyclophosphamide - Docetaxel; TC: Docetaxel/Cyclophosphamide) GC: Gemcitabine/Cisplatin; CMF: Cyclophosphamide/Methotrexate/Fluorouracil; GTX: Gemcitabine/Tdocetaxel/Xcapecitabine; PPF: paclitaxel/cisplatin/5-fluorouracil).

with axillary lymph nodes being the most frequently involved (40.74%). Mediastinal lymph nodes were affected in 27.78% of cases, and abdominal lymph nodes in 3.70%. Bone metastasis was observed in 16 patients (29.63%), while lung metastasis was found in 11 patients (20.37%). Liver metastasis was present in 10 patients (18.52%). Other sites included contralateral breast (12.96%, n = 7), mastectomy bed (9.26%, n = 5), chest wall muscle (5.56%, n = 3), and omentum (3.70%, n = 2). Rare locations included retroperitoneum, endometrium, and vaginal vault, each accounting for 1.85% of cases.

Table 8 summarizes the frequency distribution of chemotherapy regimens used among 243 patients for whom the data was available. The most common regimen was Adriamycin/Cytoxan/Taxol (AC-T) administered to 125 patients (51.4%). The Fluorouracil (5-FU), Epirubicin, and Cyclophosphamide *(*FEC) regimen followed, with 68 patients (28.0%) receiving it. Other regimens included Adriamycin (doxorubicin) and Cyclophosphamide (AC) 5.3% (n = 13), docetaxel-cisplatin combination (DC) 4.9% (n = 12), and 5-Fluorouracil, Epirubicin, Cyclophosphamide – Docetaxel (FEC-T) 3.3% (n = 8). Less frequently used regimens included docetaxel (Taxotere) and cyclophosphamide (Cytoxan) (TC-regiment) 2.9% (n = 7), with several patients receiving various combinations or less common regimens such as Adriamycin/Cytoxan/Taxol combination with Gemcitabine/Cisplatin AC-T-GC 0.4% (n = 1) and Cyclophosphamide/Methotrexate/Fluorouracil with Docetaxel/Cyclophosphamide with Fluorouracil/Epirubicin/Cyclophosphamide combination with Gemcitabine/Cisplatin (CMF-TC-FEC-GC) 0.4% (n = 1). The median number of days between surgery and chemotherapy completion was 149, with an interquartile range (IQR) of 89.75 days.

Regimen	Total No. Of Chemotherapy Cycles		No. Of Pre-Operative Chemotherapy Cycles		No. Of Post-Operative Chemotherapy Cycles		Number of Recurrence (%)	Survival days since surgery	
	Median	IQR	Median	IQR	Median	IQR		Median	IQR
AC-T (N = 125)	8	0	0	4	6	4	22 (17.6%)	393.5	436.8
FEC (N = 68)	6	0	0	0	6	1	9 (13.2%)	1570.5	1789.8
AC (N = 13)	8	2	0	3	6	4	2 (15.4%)	312.5	452
DC (N = 12)	6	1	0	3	6	2	4 (33.3%)	825	596
FEC-T (N = 8)	7	2	3	3	4	2	2 (25%)	945	794.5
TC (N = 7)	6	2	0	4	4	2	2 (28.6%)	695	207.8
AC-T-GC (N = 1)	6	0	3	0	3	0	1 (100%)	343	0
AC-T-GTX-TC (N = 1)	9	0	6	0	3	0	1 (100%)	NA	NA
CMF-TC-FEC-GC (N = 1)	18	0	0	0	18	0	1 (100%)	1048	0
DC-TC (N = 1)	8	0	8	0	0	0	0 (0%)	182	0
FEC-GC (N = 1)	12	0	6	0	6	0	0 (0%)	3107	0
GC (N = 1)	14	0	0	0	14	0	1 (100%)	1492	0
GC-TC (N = 1)	20	0	7	0	13	0	0 (0%)	604	0
PPF-ACT-CC-GC (N = 1)	10	0	0	0	10	0	0 (0%)	955	0
TC-FEC (N = 1)	6	0	2	0	4	0	1 (100%)	5915	0
TC-GC (N = 1)	12	0	6	0	6	0	1 (100%)	410	0
All (N = 243)	8	2	0	4	6	4	47 (37.6%)	629	935

Table 8: Summary of patients who received different chemotherapy Regimens, Total and Pre-/Post-Operative Cycles, Recurrence Rates, and Median Survival Days Since Surgery.

Type of Surgery	Number of Patient	Number of Recurrence	Median Survival Days	IQR
BCS	17	4 (23.6%)	430	372
BCS+MRM	2	0 (0%)	138.5	117.5
MRM	215	43 (20%)	636	962.25
Total	234	47 (20.1%)	602	948.5

Table 9: Distribution of patients with different surgical Types, recurrence Rates, and Median Survival Days (calculated as days elapsed since surgery).

The study evaluated the frequency distribution of various chemotherapeutic regimens among 243 post-treated breast cancer patients who underwent follow-up CT Breast imaging. The regimens assessed included AC-T, FEC, AC, DC, FEC-T, TC, AC-T-GC, AC-T-GTX-TC, CMF-TC-FEC-GC, DC-TC, FEC-GC, GC, GC-TC, PPF-ACT-CC-GC, TC-FEC, and TC-GC. For each regimen, the total number of chemotherapy cycles, as well as the number of pre-operative and post-operative cycles, were recorded. Additionally, the study analyzed recurrence rates and survival days since surgery (Table 9).

Regimen	Total No. Of Chemotherapy Cycles		No. Of Pre-Operative Chemotherapy Cycles		No. Of Post-Operative Chemotherapy Cycles		Number of Recurrence (%)	Survival days since surgery	
	Median	IQR	Median	IQR	Median	IQR		Median	IQR
AC-T (N = 125)	8	0	0	4	6	4	22 (17.6%)	393.5	436.8
FEC (N = 68)	6	0	0	0	6	1	9 (13.2%)	1570.5	1789.8
AC (N = 13)	8	2	0	3	6	4	2 (15.4%)	312.5	452
DC (N = 12)	6	1	0	3	6	2	4 (33.3%)	825	596
FEC-T (N = 8)	7	2	3	3	4	2	2 (25%)	945	794.5
TC (N = 7)	6	2	0	4	4	2	2 (28.6%)	695	207.8
AC-T-GC (N = 1)	6	0	3	0	3	0	1 (100%)	343	0
AC-T-GTX-TC (N = 1)	9	0	6	0	3	0	1 (100%)	NA	NA
CMF-TC-FEC-GC (N = 1)	18	0	0	0	18	0	1 (100%)	1048	0
DC-TC (N = 1)	8	0	8	0	0	0	0 (0%)	182	0
FEC-GC (N = 1)	12	0	6	0	6	0	0 (0%)	3107	0
GC (N = 1)	14	0	0	0	14	0	1 (100%)	1492	0
GC-TC (N = 1)	20	0	7	0	13	0	0 (0%)	604	0
PPF-ACT-CC-GC (N = 1)	10	0	0	0	10	0	0 (0%)	955	0
TC-FEC (N = 1)	6	0	2	0	4	0	1 (100%)	5915	0
TC-GC (N = 1)	12	0	6	0	6	0	1 (100%)	410	0
All (N = 243)	8	2	0	4	6	4	47 (37.6%)	629	935

Table 10: Summary of patients who received different chemotherapy Regimens, Total and Pre-/Post-Operative Cycles, Recurrence Rates, and Median Survival Days Since Surgery.

The AC-T regimen, administered to 125 patients, had a median of 8 total chemotherapy cycles with no interquartile range (IQR). The median number of pre-operative cycles was 0, and the post-operative cycles had a median of 6 with an IQR of 4. This regimen showed a recurrence rate of 17.6%, with 22 patients experiencing recurrence. The median survival days since surgery for patients on the AC-T regimen was 393.5 days, with an IQR of 436.8 days, indicating a wide range of survival outcomes. The Shapiro-Wilk test indicated non-normality with a p-value of 3.16×10^{-12}. The One-Sample Wilcoxon Signed-Rank Test yielded a *p*-value of 0.078.

Patients who received the FEC regimen, totaling 68 individuals, had a median of 6 chemotherapy cycles, with no IQR, reflecting uniformity in the total number of cycles. Both pre-operative and post-operative cycles had a median of 0, suggesting no cycles were administered in the pre-operative period, and a median of 6 cycles were administered post-operatively, with a minimal IQR of 1. The recurrence rate in this group was 13.2%, with 9 cases recorded. Notably, the median survival days since surgery for patients treated with FEC was significantly higher at 1,570.5 days, with an IQR of 1,789.8 days, compared to the AC-T group. The Shapiro-Wilk test returned a p-value of approximately 0.0005, indicating non-normality. The Wilcoxon Signed-Rank Test resulted in a *p*-value of 0.742. In comparing recurrence rates between the AC-T and FEC regimens, Fisher's Exact Test produced a *p*-value of 0.54.

The AC regimen, used in 13 patients, had a median of 8 total cycles with an IQR of 2. The pre-operative median cycle count was 0, while the post-operative cycles had a median of 6 with an IQR of 4. A recurrence rate of 15.4% was noted in this group, with 2 patients experiencing recurrence. The median survival days since surgery for the AC regimen was 312.5 days, with an IQR of 452 days, suggesting variability in patient outcomes. For the DC regimen, administered to 12 patients, the total median number of cycles was 6 with an IQR of 1. The median number of pre-operative cycles was 0, and post-operative cycles had a median of 6 with an IQR of 2. The recurrence rate in this group was the highest among the regimens at 33.3%, with 4 patients experiencing recurrence. The median survival days since surgery for the DC regimen was 825 days, with an IQR of 596 days, reflecting considerable variation in survival times. Smaller cohorts received other regimens, including FEC-T, TC, and various combination regimens.

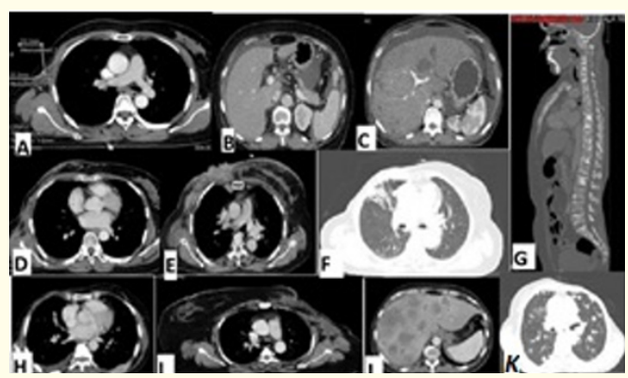

Figure 1: Showing (A) Minimal Seroma in Right Axilla, (B)Moderate Ascites, (C) Multiple Liver Metastasis, (D) Skin Thickening in Right Mastectomy Bed (E) Recurrence in Right Mastectomy Bed, (F) Pulmonary Fibrosis in Anterior Segment of Right Upper lobe, (G) Multiple Sclerotic Bone Metastasis, (H) Minimal Pleural Effusion on Right Side, (I) Seroma in Left Axilla and Skin Thickening in Left Mastectomy Bed, (J) Multiple Liver Metastases, (K) Multiple Lung Metastases.

The study analyzed the types and sides of surgeries among 234 breast cancer patients, noting missing data for 24 patients. Among the types of surgery, 17 patients underwent Breast-Conserving Surgery (BCS) with a recurrence rate of 23.6% and a median survival of 430 days (IQR: 372), while 2 patients had a combination of BCS and Modified Radical Mastectomy (BCS+MRM) with no recurrence and a median survival of 138.5 days (IQR: 117.5). The majority, 215 patients, underwent Modified Radical Mastectomy (MRM) with a 20% recurrence rate and a median survival of 636 days (IQR: 962.25). Overall, the total recurrence rate was 20.1%, with a median survival of 602 days (IQR: 948.5). Regarding the side of surgery, out of 233 patients, 114 (48.9%) had surgery on the left side, 118 (50.6%) on the right side, and 1 patient (0.4%) underwent bilateral surgery (Table 10).

The study also assessed the use of radiotherapy among 258 breast cancer patients. Radiotherapy was administered to 142 patients (55%), with recurrence in 31 cases. In contrast, 116 patients (45%) did not receive radiotherapy, and 23 of all patients experienced recurrence. The median number of days between surgery and the completion of radiotherapy was 198 days, with an interquartile range (IQR) of 100 days. Among the 137 patients who received radiotherapy, the median number of fractions administered was 15, with an IQR of 1. Overall, 54 patients experienced recurrence.

The study documented various post-treatment changes in 248 breast cancer patients, excluding 10 patients due to unavailability of data. Among the patients, 110 (44.4%) showed normal post-treatment findings. Pulmonary fibrosis was observed in 26 patients (10.5%), while non-neoplastic skin thickening was noted in 20 patients (8.1%). Pleural effusion occurred in 14 patients (5.6%), and seroma in the axilla and mastectomy bed was seen in 13 patients (5.2%). Other post-treatment changes included pulmonary atelectasis in 12 patients (4.8%), patchy opacity in 9 patients (3.6%), ground glass opacification in 8 patients (3.2%), and reactive lymphadenopathy in 6 patients (2.4%). Less common findings included pulmonary consolidation (2.0%), minimal pelvic fluid, ascites, and cholelithiasis, each seen in 3 patients (1.2%). Several other rare post-treatment findings were recorded in 1 or 2 patients, such as pericardial effusion, nipple retraction, pneumonitis, nodular calcification, fatty liver, and pulmonary artery thrombosis (Table 11). Some of the patient from our study with different radiological features are presented in figure 1.

Discussion

Breast cancer continues to be the most frequently diagnosed cancer worldwide, significantly contributing to cancer-related morbidity and mortality [1]. With advancements in diagnostic imaging, such as mammography and CECT scans, early detection and timely intervention have improved overall survival rates and quality of life among breast cancer survivors. The present study was conducted to evaluate the role of CECT in the follow-up of post-treatment breast cancer patients at BP Koirala Memorial Cancer Hospital in Nepal.

The age distribution of the participants ranged from 23 to 83 years, with a median age of 47 years and mean age 48.26 years. The majority of participants were between 41 and 60 years old, comprising 60.5% of the sample (32.7% in the 41-50 age group and 27.8% in the 51-60 age group). This distribution reflects a predominance of middle-aged individuals, with fewer participants at the younger and older extremes. Another study from a tertiary care center in Nepal, published in 2024, reported a mean age of 50.51 ± 2.08 years, with 59.8% of patients in the 40 to 60 age group. This aligns with our findings, where the median age was 47 years, and 60.5% of participants were aged 41 to 60 years. Both studies highlight the predominance of middle-aged individuals among breast cancer patients, with fewer participants at the extremes of the age spectrum. The results from the 2024 study are compatible with our data, reinforcing the trend that the majority of breast cancer cases in Nepal occur in this age range [5].

In our study, which included data from 253 participants, the majority of breast cancer patients (66.8%) were from the Terai region, followed by 32.8% from the Hilly region, and only 0.4% from the Himalayan region. The high representation from Terai could reflect a higher burden of breast cancer in this region or greater accessibility to the specialized cancer treatment services available at BP Koirala Memorial Cancer Hospital. Understanding regional demographics is crucial in tailoring healthcare services to meet the needs of specific populations, and the data suggest a potential area for targeted public health interventions [6].

Our study identified invasive carcinoma of no special type (NST) as the most common histopathological diagnosis, accounting for 82.1% of cases, followed by invasive ductal carcinoma at 10.6%. This aligns with the historical and contemporary literature, which consistently reports NST as the predominant subtype, though the exact proportions can vary. A study from a tertiary care center in

Nepal found an even higher percentage of NST cases (89.22%) and a lower proportion of invasive ductal carcinoma (5.88%), suggesting regional or diagnostic differences. Our study's findings are consistent with the 2010 review, which indicated that NST comprises approximately 70-75% of cases, though our observed rate is slightly higher. This consistency highlights the global predominance of NST, while the lower frequencies of other histologic types, such as medullary or mucinous carcinoma, suggest regional variations. Specifically, the prevalence of medullary carcinoma in our study (2.8%) is higher compared to the less than 5% mentioned in the review, indicating potential local or diagnostic differences. Overall, while NST remains the most common subtype, these findings underscore the need for further research to explore regional disparities and factors influencing breast cancer subtype distribution [5,7].

In comparing our study's cancer staging results with those from a 2010 study conducted in multiple tertiary care centers in Nepal, distinct differences emerge. Our study, utilizing the Eighth Edition of the AJCC Cancer Staging Manual, shows that Stage II (combining IIA and IIB) constitutes 53% of cases, while Stage III (including IIIA, IIIB, and IIIC) accounts for 36%. In contrast, the 2010 study, based on the Fifth Edition, reported Stage II at 42.1% and Stage III at 46.5%. Our study also found Stage I (including IA and 0) to be 8% and Stage IV to be 1%. The higher proportion of advanced stages (Stage III) in the 2010 study compared to our study suggests improvements in early detection and treatment over time. These findings highlight the evolving landscape of cancer staging and the potential impact of advancements in diagnostic and therapeutic practices [8].

The hormonal receptor status (ER, PR, HER2/neu) is a vital determinant of breast cancer prognosis and therapeutic approaches. In this cohort, 32.8% of patients presented with triple-negative breast cancer (TNBC), known for its aggressive behavior and limited treatment options. The study found that a significant proportion of patients were diagnosed at Stage IIA (34%), indicating that a considerable number of cases were detected early, which is associated with better prognosis [9]. These findings underscore the importance of early detection and the need for continued focus on improving diagnostic strategies.

The treatment regimens varied among the study participants, with AC-T (Adriamycin, Cyclophosphamide, followed by Taxane) being the most frequently administered chemotherapy regimen. This aligns with standard treatment protocols that recommend anthracycline and taxane-based regimens for breast cancer, especially for HER2-positive and triple-negative subtypes [10,11]. The diversity in chemotherapeutic regimens underscores the personalized approach to breast cancer treatment based on tumor biology, receptor status, and patient factors.

The study found that 21.8% of patients experienced metastasis or recurrence, with lymph nodes, bones, lungs, and liver being the most common sites which is consistent with existing literature however the frequency distribution of the sites was not totally consistent [12]. Axillary lymph nodes were the most frequently involved site of metastasis, followed by the mediastinal nodes. This pattern is consistent with the typical metastatic spread of breast cancer, where regional lymph nodes are often the first sites of recurrence or metastasis. The relatively lower rates of distant metastases highlight the importance of local and regional control in the management of breast cancer patients [12].

In metastases and survival rate of breast carcinoma patients also depends on age at diagnosis on metastatic breast cancer. The literature revealed that in stage IV patients, elder patients were more likely to have lung metastasis ($p < 0.001$) and less likely to have only distant lymphatic spread ($p < 0.004$). Higher proportion of younger (34.9%) and middle-aged (36.2%) patients had multiple metastatic sites than elder patients (28.3%) ($p < 0.001$). In survival analysis, younger patients presented the best prognosis, while elder patients had the worst both in overall survival ($\chi2 = 121.9$, $p < 0.001$) and breast cancer-specific survival ($\chi2 = 69.8$, $p < 0.001$). Age at diagnosis was an independent prognostic factor for metastatic breast cancer patients. Moreover, patients with bone metastasis only had superior survival compared to other metastatic patients ($p < 0.001$). Brain metastasis only group and multiple sites metastasis group had the poorest prognosis ($p < 0.05$) [13].

Median survival days since surgery varied significantly across different cancer stages, with early-stage patients (Stage I and II) demonstrating longer survival compared to those with advanced stages (Stage III and IV). This finding emphasizes the critical need for early detection and treatment, as earlier stages correlate with significantly better outcomes. The data also suggest that despite the availability of advanced imaging and treatment options, the prognosis for advanced-stage breast cancer remains guarded. The results for both the AC-T and FEC regimens suggest no significant difference between the observed median survival days since surgery and the overall distribution within their respective groups.

The Shapiro-Wilk test confirmed non-normality in the data, leading to the use of the Wilcoxon Signed-Rank Test. For the AC-T regimen, the *p*-value of 0.078, while not statistically significant, is lower than the *p*-value of 0.742 for the FEC regimen. Conventionally, a *p*-value between 0.05 and 0.1 is considered weak evidence against the null hypothesis, while a *p*-value greater than 0.1 provides little to no evidence against it. The null hypothesis in this case states that the observed median survival days since surgery are equal to the true median of the population. Thus, while neither regimen shows a significant deviation from the observed medians, the AC-T group demonstrates weaker evidence supporting the null hypothesis compared to FEC.

Regarding recurrence rates, Fisher's Exact Test yielded a *p*-value of 0.54, indicating no strong evidence to reject the null hypothesis, which posits that there is no difference in recurrence rates between the AC-T and FEC regimens. Therefore, both treatments appear equally effective in preventing recurrence. Given these results, treatment decisions should factor in patient-specific characteristics or potential side effects, as neither regimen showed a statistically significant advantage in terms of survival or recurrence rates.

The results of this research project, which found no significant difference in survival outcomes and recurrence rates between the AC-T and FEC regimens, align with findings from the Hellenic Oncology Research Group (HORG) study that compared the FEC regimen with a sequential docetaxel, epirubicin, and cyclophosphamide (D/EC) regimen. Both studies reveal minimal differences in efficacy among treatment arms, further emphasizing the importance of individualized treatment selection based on patient tolerance and side effects. While AC-T and D/EC share similar drugs, the key difference lies in their sequencing AC-T administers doxorubicin and cyclophosphamide first, followed by paclitaxel, whereas D/EC starts with docetaxel followed by epirubicin and cyclophosphamide potentially influencing toxicity profiles and patient responses [14].

In the HORG study, a slight improvement in five-year disease-free survival (DFS) was observed in the D/EC arm compared to the FEC arm (72.6% vs. 67.2%, respectively; $p = 0.041$), but overall survival (OS) between the two arms remained statistically similar ($p = 0.533$). The current study's findings, with *p*-values of 0.078 for AC-T and 0.742 for FEC, suggest similar non-significant trends, with the AC-T regimen providing slightly weaker evidence for the null hypothesis. This mirrors the HORG study, where the difference in DFS also did not extend to OS, highlighting that any improvements in survival metrics with alternative regimens may be marginal [14]. Regarding recurrence rates, Fisher's Exact Test in the current study produced a *p*-value of 0.54, supporting the conclusion that both AC-T and FEC are comparably effective in preventing recurrence. This finding is consistent with the HORG study, where recurrence rates between D/EC and FEC were also statistically comparable. While the HORG trial noted increased toxicity in the D/EC group, toxicity data were not analyzed in the present study but could be relevant in guiding future treatment decisions [14].

Overall, the discussion of these findings suggests that while variations in survival or recurrence metrics exist across different regimens, these differences are often not statistically significant. The results call for a nuanced approach to chemotherapy selection, prioritizing patient-specific factors such as tolerance and side effects, as no single regimen shows clear superiority in terms of survival or recurrence prevention.

The study reinforces the importance of a multimodal approach in the follow-up of breast cancer patients, combining mammography with other imaging modalities like CECT to improve diagnostic accuracy. The findings also suggest a need for tailored follow-up protocols, particularly for patients with dense breast tissue or those who have undergone breast-conserving therapy. Additionally, the study underscores the necessity for further research into optimizing follow-up strategies, incorporating newer imaging technologies, and understanding the biological behavior of different breast cancer subtypes to enhance patient outcomes.

Conclusion

This study provides valuable insights into the demographics, clinical characteristics, treatment regimens, and outcomes of post-treated breast cancer patients. The findings highlight that the majority of the study population consisted of middle-aged women, with the most common cancer stages being IIA and IIIA. The study revealed diverse hormonal receptor statuses, with a significant proportion of patients having triple-negative breast cancer. The AC-T chemotherapy regimen was the most commonly used, followed by the FEC regimen, with survival outcomes varying considerably among different treatment groups. Notably, patients on the FEC regimen demonstrated the longest median survival. These findings underscore the complexity of breast cancer management and the need for personalized treatment approaches based on indi-

vidual patient characteristics and disease progression. This study also accomplished that prognosis of breast cancer patients who were treated on time with proper treatment guidelines were good.

Limitations

Only limitation of this study was a single center study

Ethical Considerations

Ethical approval for the study was obtained from the institutional ethics committee of BP Koirala Memorial Cancer Hospital. Informed consent was also obtained from all participants, and confidentiality was maintained by anonymizing personal data and securely storing the collected information.

Acknowledgements

The authors are grateful to the entire staff of department of Radiology at BPKMCH.

Funding Source

No funding was obtained during the study.

Declaration of Competing Interest

The authors declare there is no conflict of interest among themselves.

Bibliography

1. Shrestha R., *et al*. "Breast Cancer among Cancer Patients Visiting the Department of Internal Medicine of a Tertiary Centre". *JNMA Journal of Nepal Medical Association* 62.270 (2024): 64-67.

2. Arnold M., *et al*. "Current and future burden of breast cancer: Global statistics for 2020 and 2040". *Breast* 66 (2022): 15-23.

3. Załuska-Kusz J and Litwiniuk M. "Follow-up after breast cancer treatment". *Reports of Practical Oncology and Radiotherapy* 27.5 (2022): 875-880.

4. Hagay C., *et al*. "Contrast-enhanced CT: value for diagnosing local breast cancer recurrence after conservative treatment". *Radiology* 200.3 (1996): 631-638.

5. Shrestha R., *et al*. "Breast Cancer among Cancer Patients Visiting the Department of Internal Medicine of a Tertiary Centre". *JNMA Journal of Nepal Medical Association* 62.270 (2024): 64-67.

6. Sapkota G., *et al*. "Prevalence of Breast Cancer in different geographical regions: A Retrospective Study from Central Nepal". *Nepalese Journal of Cancer* 6.1 (2022): 101-105.

7. Weigelt B., *et al*. "Histological types of breast cancer: how special are they?" *Molecular Oncology* 4.3 (2010): 192-208.

8. Acharya SC., *et al*. "Clinical Profile of Patients Presenting with Breast Cancer in Nepal". *Kathmandu University Medical Journal* 39.3 (2012): 3-7.

9. El Saghir NS., *et al*. "Improved Survival of Young Patients With Breast Cancer 40 Years and Younger at Diagnosis". *JCO Global Oncology* 9 (2023): e2200354.

10. Shimomura A., *et al*. "Real-world data of HER2-negative early breast cancer patients treated with anthracycline and/or taxane regimens in Japan". *Breast Cancer* 31.4 (2024): 581-592.

11. Petrelli F., *et al*. "Different Chemotherapy Regimens and Pathologic Complete Response in Triple-Negative Breast Cancer: An Updated Network Meta-Analysis of Phase 3 Trials". *Medicina (Kaunas)* 60.2 (2024): 341.

12. Where cancer spreads. National Cancer Institute. U.S. National Institutes of Health (2024).

13. Chen MT., *et al*. "Comparison of patterns and prognosis among distant metastatic breast cancer patients by age groups: a SEER population-based analysis". *Scientific Reports* 7.1 (2017): 9254.

14. Polyzos A., *et al*. "FEC versus sequential docetaxel followed by epirubicin/cyclophosphamide as adjuvant chemotherapy in women with axillary node-positive early breast cancer: a randomized study of the Hellenic Oncology Research Group (HORG)". *Breast Cancer Res Treat* 119.1 (2010): 95-104.