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A Comparative Study of the Toxicities and Local Recurrence of Conventional External Beam Radiotherapy versus Hypofractionated Radiotherapy in Breast Cancer Patients

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ABSTRACT

Introduction: Breast cancer is the most common cancer amongst women, which is treated by a multi-modality approach consisting of surgery, chemotherapy, radiotherapy, hormonal therapy, targeted therapy and immunotherapy.

Objective: The aim of the study is to compare the early and late treatment toxicities and the local recurrence following Conventional and Hypofractionated External Beam Radiotherapy in breast cancer patients after surgery.

Methods: A randomized study was conducted for two years including 150 patients. The patients were divided into two arms, with Arm-A receiving a total dose of 50Gy/25# and the Arm-B receiving 40Gy/16#.

Results: Early and late treatment toxicities were comparable in both the arms, except for skin toxicity which was more in the hypofractionated arm (Arm-B). Local Recurrence was observed in Arm-A in 1 patient at Month 17 of follow-up, and in Arm-B at Month 13 in 1 patient and at Month 21 in 1 patient.

Conclusion: Hypofractionated radiotherapy given over a short period of time is comparable to Conventional fractionation radiotherapy without any significant statistical difference in terms of toxicities or local recurrence; with an added advantage of reduced treatment time, reduced duration of hospital stays, better patients' compliance and reduced cost of treatment.

KEYWORDS: Breast cancer, Conventional, Hypofractionated, Radiotherapy, Recurrence

INTRODUCTION

Breast cancer (BC) is the second most common cancer in the world. It is the most common cancer amongst women, with 2.089 million new cases being diagnosed in 2018 according to GLOBOCAN data. Incidence of BC is 11.6% of all new cancer cases in the world.[1] For decades, cervical cancer was the most common cancer amongst women in India, and more deaths in women in India were attributed to cervical cancer than any other cancer.[2] However, over the last 10 years or so, breast cancer has been rising steadily, and for the first time in 2012, BC was the most common cancer amongst women in India.[3]

The breasts are located on the anterior thoracic wall, anterior to the deep fascia and pectoral muscles, separated from them by the retromammary space. The vertical extension of the breast is from the second rib to the sixth rib, and the horizontal extension is from the lateral sternal border to the mid-axillary line. The breast lymphatics drain into one of three major routes: axillary, interpectoral, and internal mammary lymph nodes.[4]

Nulliparous women are at great risk for breast cancer.[5] Early age at menarche and late age at menopause are established modest risk factors for BC.[6] Family history is also a major contributor to increased risk of BC, with woman having both mother and sister affected by breast cancer have 14 times increased risk of having BC.[7] Germline mutations in BRCA1 and BRCA2 and a few other rare variants accounts for 15 – 20% of BC that clusters in families and less than 5% of BC overall.

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High consumption fats, total calories and animal proteins may lead to increased risk of breast cancer.[8] Alcohol consumption, active smoking [9] and passive exposure to cigarette smoke increases the risk of breast cancer.[10] Benign proliferative disease like diffuse papillomatosis and atypical hyperplasia increases the risk of breast cancer. Patients biopsied for benign breast disease who show proliferative changes such as ductal and lobular hyperplasia have relative risk of 1.5-2 and this risk increases up to 11 when associated with family history of breast cancer.[11] Common symptoms of BC include painless breast lump, breast skin abnormalities, persistent thickening or dimpling of the skin, nipple abnormalities like nipple retraction or spontaneous unilateral nipple discharge, breast pain and axillary swelling.[12]

There are three main modalities of treatment available for breast cancer. These include surgery, radiotherapy and chemotherapy. Stage I and Stage II (T0-3, N0-1 and M0) BC patients are primarily managed by surgery followed by adjuvant therapy. The two major operations for invasive breast cancer are breast conservative surgery (BCS) and modified radical mastectomy (MRM). Over the last 2 decades, BCS has become established as a viable alternative to MRM.[13] MRM typically includes removal of both the nipple and areola but the surgery can be performed using skin and nipple sparing technique.[14]

In patients with early breast cancer after tumour excision or mastectomy, the effective dose of radiation is adjusted to balance the risk of local cancer recurrence against the risk of harmful effects on healthy tissues. Radiotherapy reduces the risk of local relapse by about 70%.[15] The international standard radiotherapy schedule for breast cancer treatment delivers a high total dose of 50Gy in 25 fractions. However, a lower total dose delivered in fewer, larger fractions (hypofractionation) is hypothesised to be at least as safe and effective as the standard treatment.[16]

Radiotherapy to the chest wall in patients with invasive breast cancer who have had a primary mastectomy is recommended when any of the following is present: T3 or T4 disease, or axillary node positivity (absolute indication if ≥4 nodes involved). Post-mastectomy radiation therapy (PMRT) is recommended for patients with more advanced disease and/or with certain high-risk pathologic features. PMRT is directed at the chest wall and often includes the regional lymph nodes that drain the breast.[17] Whole breast radiotherapy is recommended following BCS, and schedules using 15-16 fractions following BCS is widely accepted in parts of Canada and the UK.[18]

Hypofractionated radiotherapy is comparable to conventional radiotherapy without any evidence of higher adverse effects or inferior locoregional tumour control and has an added advantage of increased compliance because of short duration; hence, it can help in accommodating more breast cancer patients in a calendar year, ultimately resulting in decreased waiting list, increased turnover, and reduced cost of treatment.[19]

Breast cancer cases are on the increase in this region of the country and particularly in the state of Manipur. As similar studies have not been conducted in the state of Manipur or North-East India, this study was conducted to compare the early and late treatment toxicity and the local recurrence following Conventional and Hypofractionated External Beam Radiotherapy (EBRT) in breast cancer patients after surgery (BCS).

METHODS

A randomized control study was conducted in the Department of Radiation Oncology, RIMS, Imphal, Manipur for two years from November, 2020 to October, 2022 consisting of 150 patients. The permission of the Research Ethics Board (REB), RIMS, Imphal, Manipur (Ref. No. A/206/REB-Comm (SP)/RIMS/2015/744/86/2020. Dated 8th February, 2021) was obtained before initiating the study. Informed written consent were taken from all patients.

Inclusion criteria included patients between the age of 18-75 years, with histopathologically confirmed carcinoma of unilateral breast without evidence of distant metastasis following breast conservation surgery, stage I to stage III (T1-T3, N0-N2, M0); with a Karnofsky Performance status (KPS) of 80% or more.

Exclusion criteria included pregnant and lactating women, patient not operated or contraindicated for radiotherapy, or any patient with uncontrolled morbidities (e.g., heart disease, hypertension, diabetes mellitus or chronic renal disease) or with severe mental disorder.

The patients were recruited in the two arms (Arm-A & Arm-B) by simple randomization method (Lottery method). Complete history and thorough physical examination were done before the start of the treatment. All patients were subjected to baseline investigations before the start of treatment:

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1. Complete blood count, Blood chemistry including liver function tests, kidney function tests and serum electrolytes, and blood sugar (Fasting and Post prandial).
2. Chest X Ray (PA View), ECG and ECHO.
3. Bilateral breast mammogram after BCS, Ultrasound of whole abdomen and CECT thorax.

After confirmation of the diagnosis and proper workup, all the patients were randomized into two arms. In Conventional arm (Arm-A), patients received a total tumoricidal dose of 50Gy in 25 fractions (2Gy/#), 5 days a week, for 5 weeks to the whole breast. In Hypofractionated arm (Arm-B), patients received a total tumoricidal dose of 40Gy in 16 fractions (2.5Gy/#), 5 days a week, for 3 weeks + 1 days to the whole breast.

Treatment planning was done by 2D conventional method. EBRT was delivered by using Cobalt-60 teletherapy unit (Theratron-780C) with a source to skin distance (SSD) of 80 cm. Both the conventional and hypofractionated tangential plan included two opposing half beams covering the whole breast after BCS. Regional nodes irradiation i.e., Axillary nodes was done if any node positive, extracapsular extension, inadequate axillary dissection, high risk features with no dissection, and 1 or 2 Sentinel Lymph Node positive with no axillary dissection. Supraclavicular irradiation was done where 4 or more axillary lymph nodes were positive, N2 or N3 disease, 1-3 nodes with high-risk features, inadequate axillary dissection, and high-risk features with no axillary dissection. Tumour bed boost of 10-16Gy at 2-2.5Gy per fraction was delivered to lumpectomy cavity with 1.5-2cm additional margin. Boosting to a total tumour bed dose greater than 60Gy was considered in patients with positive margins. Treatment planning was done by taking the organ at risk (OAR) i.e., the heart and lung into consideration. For lungs $V_{20} \leq 20\%$ was taken as the accepted tolerance dose and for the heart $V_{25} < 10\%$ was considered as the tolerance dose.

During treatment all the patients enrolled in the study were assessed weekly for radiation therapy related side-effects and toxicities, and symptom relief, with complete blood count, liver function tests, kidney function tests, and serum electrolytes.

Post treatment evaluation:

1. The local recurrence was assessed at 3 months after the completion of treatment and every 2 months till the end of the study period in accordance with physical and radiological imaging examination.
2. Early radiation toxicity was assessed weekly during the treatment (RTOG criteria).
3. Late radiation toxicity was assessed at 3 months after the completion of treatment and every 2 months till the end of the study period (RTOG criteria).
4. Patients were worked up with complete history, thorough physical and systemic examination, complete blood count, LFT, KFT, serum electrolytes, chest X-ray (PA view), mammography or ultrasound of breast, CECT thorax, USG whole abdomen.

Data was collected by using structured proforma in hard and soft copy, and the collected data was entered in Microsoft Excel File for further analysis. Data analysis was done by using IBM SPSS statistics version 22 (IBM Corp, 1995, 2012). (P value <0.05 was considered as statistically significant).

RESULTS

A total of 150 patients were accrued into the two arms, 75 each in both the arms. It was observed that majority of the patients, 32(42.7%) in Arm-A and 28(37.3%) in Arm-B had tumour in the right upper outer quadrant (RUOQ) of the breast, followed by 17(22.6%) in Arm-A and 18(24%) in Arm-B having tumour in the right lower outer quadrant (RLOQ), while only few patients 3(4%) in Arm-A and 2(2.7%) in Arm-B had tumour at nipple areolar region. Characteristics features of the patient and disease are shown in Table 1 and 2 respectively.

Table 1: Patient characteristics (N=150)

Variables	Sub variables	Arm-A(n=75) (%)	Arm-B(n=75) (%)
Mean age in years		46.76 ± 7.36 years	
Median age in years		45 years	
Breastfeeding	**Yes**	61 (81.3%)	58 (77.3%)
	No	14 (18.7%)	17 (22.7%)
KPS	**>90%**	11 (14.7%)	8 (10.7%)
	80-90%	64 (85.3%)	67 (89.3%)

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Risk factors	**Smoking**	4 (5.3%)	6 (8%)
	Alcohol	15 (20%)	12 (16%)
	Betel nut chewing	54 (72%)	51 (68%)

Table 2: Disease characteristics (N=150)

Variables	**Sub variables**	**Arm-A(n=75) (%)**	**Arm-B(n=75) (%)**
Clinical presentation	**Breast lump**	75 (100%)	75 (100%)
	Axillary swelling	15 (20%)	17 (22.7%)
	Breast pain	5 (6.7%)	7 (9.3%)
HPE	**Infiltrating ductal carcinoma**	68 (90.7%)	71 (94.7%)
	Invasive lobular carcinoma	7 (9.3%)	4 (5.3%)
Tumour stage	**T1a**	13 (17.3%)	11 (14.7%)
	T1c	4 (5.3%)	5 (6.6%)
	T2	55 (73.4%)	55 (73.4%)
	T3	3 (4%)	4 (5.3%)
Nodal stage	**N0**	28 (37.3%)	25 (33.3%)
	N1	47 (62.7%)	50 (66.7%)

In this study, 13(17.3%) patients in Arm-A and 15(20%) in Arm-B were Estrogen receptor (ER), Progesterone receptor (PR) and HER2/neu receptor positive or Triple Positive. Also 42(56%) patients in Arm-A and 40(53.3%) in Arm-B were ER positive, and 33(44%) patients in Arm-A and 35(46.7%) in Arm-B were ER negative. In Arm-A, 39(52%) patients and 41(54.7%) in Arm-B were PR positive; and 36(48%) patients in Arm-A and 34(45.3%) in Arm-B were PR negative. In both the Arms, 36(48%) patients each were HER2/neu positive, and 39(52%) patients each in both Arms were HER2/neu negative. It was also found that 15(20%) patients in Arm-A and 17(22.7%) in Arm-B were negative for all the three receptors or Triple negative breast cancer (TNBC).

Grade 1 Acute lung toxicity was observed in both the Arms in the 2^{nd},3^{rd} and 4^{th} week of treatment, but was statistically insignificant. Grade 1 Acute cardiac toxicity findings of mild ECG changes were seen in four patients, two in each Arm, in Arm-A at 4^{th} week and in Arm-B at 5^{th} week of treatment. All patients were asymptomatic and treatment was continued after cardiology consultation.

Grade 1 anaemia was observed earlier in 1^{st} week of treatment in Arm-B. Grade 1 and 2 anaemia was observed in more patients in both Arms at the end of 2^{nd},3^{rd} and 4^{th} week of treatment, but was statistically insignificant. Grade 1 thrombocytopenia and leukopenia was observed in both the arms at 2^{nd},3^{rd} and 4^{th} week of treatment, but was statistically insignificant. Only Grade 1 Late skin toxicity was observed in both the arms and was seen up to Month 11 on follow up.

No grade 4 skin toxicity was seen in both the arms.

Table 3: Comparison of Acute skin toxicity between the two Arms (N=150)

Duration	**RTOG grade**	**Arm-A(n=75)**	**Arm-B(n=75)**	**p-value**
Week 1	**1**	0	2 (2.7%)	0.157
Week 2	**1**	4 (5.3%)	12 (16%)	0.122
	2	4 (5.3%)	6 (8%)	
Week 3	**1**	12 (16%)	18 (24%)	0.074
	2	6 (8%)	6 (8%)	
Week 4	**1**	8 (10.7%)	20 (20.7%)	0.005
	2	2 (2.7%)	2 (2.7%)	
	3	0	2 (2.7%)	

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Week 5	**1**	4 (5.3%)	-	-
	2	2 (2.7%)	-	
	3	2 (2.7%)	-	

Table 4: Comparison of Late skin toxicity between the two Arms (N=150)

Duration	RTOG grade	Arm-A(n=75)	Arm-B(n=75)	p-value
Month 3	**1**	1 (1.3%)	0	0.162
Month 5	**1**	2 (2.7%)	2 (2.7%)	1.000
Month 7	**1**	6 (8%)	8 (10.7%)	0.086
Month 9	**1**	1 (1.3%)	2 (2.7%)	0.854
Month 11	**1**	1 (1.3%)	2 (2.7%)	0.854

Grade 1 lung toxicity was observed in Arm-A at Month 7 in 2(2.7%) patients, at Month 9 in 2(2.7%) patients and at Month 11 in 1(1.3%) patient. In Arm-B, Grade 1 lung toxicity was observed at Month 5 in 2(2.7%) patients, at Month 7 in 4(5.3%) patients, at Month 9 in 2(2.7%) patients, at Month 11 in 1(1.3%) patient, and at Month 13 in 1(1.3%) patient.

It was observed that Grade 1 cardiotoxicity was seen in Arm-A at Month 5 in 2(2.7%) patients, at Month 7 in 2(2.7%) patients and at Month 11 in 1(1.3%) patient. In Arm-B, Grade 1 cardiotoxicity was observed at Month 5 in 2(2.7%) patients, at Month 7 in 4(5.3%) patients, at Month 9 in 1(1.3%) patient, and at Month 13 in 1(1.3%) patient without any statistical significance.

In the study, Brachial Plexopathy was observed only in 1(1.3%) patient in Arm-B at Month 17 of follow-up, with no Brachial Plexopathy seen in Arm-A. Local Recurrence was observed in Arm-A in 1(1.3%) patient at Month 17 of follow-up; and in Arm-B at Month 13 in 1(1.3%) patient and at Month 21 in 1(1.3%) patient.

DISCUSSION

Breast cancer (BC) is the commonest malignancy among women globally. Treatment of BC needs a multi-modality approach which includes surgery, chemotherapy, radiotherapy, hormonal therapy, targeted therapy and immunotherapy depending on the stage of the disease, patient's age, general physical condition, receptor status, etc. Radiation therapy following lumpectomy is a standard part of Breast Conserving Therapy (BCT) for invasive breast cancer. Whole breast irradiation is done in BCT. Radiotherapy to the breast is given either by conventional fractionation (i.e., 50Gy in 25#) or by hypofractionation in which higher dose per fraction is given in comparison to conventional fractionation and in a shorter treatment duration.

In this study, patients who have undergone BCS were treated either with 50Gy/25# (Arm-A) or with 40Gy/16# (Arm-B). Patients were observed for early toxicities during radiotherapy treatment on a weekly basis till the end of the treatment; and for late toxicities and local recurrence at 3 months after completion of treatment and every 2 months thereafter till the end of the study period.

In this study, all of the patients were females. The median age of the patients was 45 years. The mean age of the patients in the Arm-A was 46.87 ± 7.36 and in Arm-B was 46.67 ± 7.42. These findings are similar to the age group distribution findings found in the study done by Agarwal G et al. [20]

In this study, it was also observed that 5.3% patients in Arm-A and 8% patients in Arm-B, smoked tobacco which is less in comparison to tobacco smoking which was reported in 20-74% patients by Gupta A et al.[21] 72% patients in Arm-A and 68% patients in Arm-B had history of betel nut chewing which is higher to the findings conducted by Kaushal M et al.[22] 20% patients in Arm-A and 16% patients in Arm-B had history of alcohol consumption, which was similar to the study conducted by Schatzkin A et al.[23]

In this study, all the 150 patients gave history of presence breast lump before undergoing surgery, which was either detected accidentally by themselves or during clinical breast examination, and this finding is higher as compared to the study done by Sandhu DS et al [23]. Also, in this study 6.7% patients in Arm-A and 9.3% patients in Arm-B complained of breast pain which is relatively less in comparison to the study by Kumar A et al [25] where 32.7% patient complained of breast pain.

In this study, most of the patients had a KPS score of 80-90% (85.3% patients in Arm-A and 89.3% patients in Arm-B). These findings are similar to the study conducted by Ferreira KA et al. [26]

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It was observed that majority of the patients 42.7% in Arm-A and 37.3% in Arm-B had tumour in the RUOQ of the breast, followed by 22.7% in Arm-A and 24% patients in Arm-B with tumour in the RLOQ, while only few patients 4% in Arm-A and 2.7% in Arm-B had tumour at the nipple areolar region. These findings are similar to the study conducted by Seth Rummel et al [27], where it was observed that tumour location was highest in the UOQ (50-58%).

In this study, 73.4% patients in both the arms had T2 tumour stage. 17.3% patients in Arm-A and 14.7% in Arm-B had T1a tumour stage, 5.3% patients in Arm-A and 6.7% in Arm-B had T1c tumour stage, whereas 4% patients in Arm-A and 5.3% in Arm-B had T3 stage. There was no statistical significance between the two arms in terms of tumour stage, and these findings were similar to the study done by Raina V et al. [28]

In this study, 17.3% patients in Arm-A and 20% in Arm-B were Triple Positive. Also 56% patients in Arm-A and 53.3% in Arm-B were ER positive; and 44% patients in Arm-A and 46.7% in Arm-B were found to be ER negative. In Arm-A 52% and in Arm-B 54.7% patients were PR positive, and 48% in Arm-A and 45.3% patients in Arm-B were PR negative. It was also found that 20% patients in Arm-A and 22.7% in Arm-B were cases of TNBC. This distribution is similar to the findings seen in the study done by Desai SB et al. [29]

The major pathological type of tumour in this study was Infiltrating ductal carcinoma 90.6% in Arm-A and 94.7% in Arm-B, while as Invasive lobular carcinoma was 9.4% in Arm-A and 5.3% in Arm-B. These findings were similar to the study conducted by Kakarala M et al. [30]

Radiotherapy (RT) to the breast region is associated with significant side effects during and after the completion of therapy. Skin reaction is the most common side effect during breast cancer radiation treatment. About 90% of women who receive radiotherapy for BC will develop some skin changes during their course of treatment.[31] Skin toxicity is graded according to the RTOG acute radiation morbidity scoring criteria. In this study, Grade 1 skin toxicity was observed earlier in the 1st week of treatment in Arm-B. Grade 1 toxicity was observed in 37.3% patients in Arm-A and 69.3% patients in Arm-B. These findings are opposite to the finding seen in the study done by Schmeel L C et al. [32] Grade 2 skin toxicity was observed in 18.7% patients in each arm and Grade 3 toxicity was seen in 2.7% patients in each Arm. These findings are similar to the study conducted by Tortorelli G et al. [33] Overall the incidence of acute skin toxicity was observed higher in Arm-B as compared to Arm-A which is opposite to the findings done by Karasawa K et al. [30] No Grade 4 skin toxicity was observed in either of the arms.

Acute radiation lung toxicity was also observed in patients undergoing radiotherapy. Mild symptoms like dry cough and dyspnoea on exertion are the less severe acute effects whereas persistent or severe cough, dyspnoea at rest, pneumonitis and severe respiratory insufficiency are the more severe acute effects of radiotherapy. In this study, Grade 1 Acute Lung Toxicity was observed in both the arms, in the 2^{nd},3^{rd} and 4^{th} week of treatment.

Radiation to the breast in patients with left-sided breast cancers may deliver significant doses of radiation to the heart. Cardiotoxicity is seen most commonly in the pericardium. The parietal pericardium develops variable degrees of fibrosis that replaces the outer adipose tissue.[34] Cardiac toxicity is observed by ECG changes, ECHO, radiological and symptomatic findings during the treatment period. Toxicity grading is done according to RTOG criteria. In this study, Acute Cardiac toxicity was seen in both the Arms at the end of 4^{th} and 5^{th} week of treatment without any statistical significance. The patients were asymptomatic with minor ECG changes without any evidence of other heart problems, and radiotherapy was continued after cardiology consultation. Out of 4 patients observed to have acute heart toxicity, 3 had left side breast carcinoma and 1 had right sided breast carcinoma which is comparable to the finding in the study done by Meattini I et al. [35]

Radiation induced anaemia was also seen during the treatment. Weekly hemogram was done for early detection of any haematological changes. Grade 1 anaemia was seen earlier in 1^{st} week of treatment in Arm-B in 2 patients. Grade 1 and 2 anaemia was seen observed in more patients in both Arms at the end of 2^{nd},3^{rd} and 4^{th} week of treatment. Patients were given PRBC transfusion, if haemoglobin was less than 10 gm. In this study, Grade 1 thrombocytopenia and leukopenia was seen in both the arms in the 2^{nd},3^{rd} and 4^{th} week of treatment. Correction of thrombocytopenia and leukopenia was done with platelet transfusion and Inj. Filgrastim (300 microgm) respectively.

In this study, Late toxicity effects were observed at 3 months after completion of treatment and thereafter every 2 months till the completion of the study period.

Late Skin toxicity includes skin atrophy, pigmentation changes, hair loss, moderate to gross telangiectasia or skin ulcerations. Only Grade 1 late skin toxicity was seen in both the arms. In Arm-A, Grade 1 Late Skin Toxicity was seen in 1 patient each at Month 3,9

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and 11; whereas it was seen in 2 patients at Month 5 and 6 patients at Month 7. In Arm-B, Grade 1 Late skin toxicity was seen in 2 patients each at Month 5, 9 and 11; whereas it was seen in 8 patients at Month 7. These findings were similar to the study done by Palumbo I et al. [36] Overall late skin toxicity was found to be higher in Arm-B as compared to Arm-A.

Symptomatic radiation pneumonitis is uncommon when only the breast is irradiated following breast conserving therapy. It typically starts 2-3 months after the completion of treatment with a clinical syndrome of cough, fever, shortness of breath, and radiologic changes confined to the radiation therapy field.[37] Chest X-ray was done during follow up for detecting late effects to the lungs. In this study, Grade 1 Late lung toxicity was seen in Arm-A, at Month 7 in 2 patients, at Month 9 in 2 patients and at Month 11 in 1 patient. In Arm-B, Grade 1 lung toxicity was seen at Month 5 in 2 patients, at Month 7 in 4 patients, at Month 9 in 2 patients, at Month 11 in 1 patient, at Month 13 in 1 patient. No Grade 2, 3 or 4 Late lung toxicity was seen in both the arms.

In this study, Grade 1 cardiotoxicity was seen in Arm-A at month 5, 7 and 11; and in Arm-B at Month 5, 7, 9 and 13. No Grade 2, 3 or 4 Late cardiac toxicity was seen. Brachial plexopathy after radiotherapy to the breast is uncommon and typically seen only when regional nodal irradiation has been delivered. The clinical symptom generally involves paraesthesia, which is associated with pain and/or weakness in the ipsilateral arm. [38] The onset of symptoms can be seen within 6 months of treatment. In this study, Brachial Plexopathy was seen in only 1 patient in Arm B at Month 17 of follow-up.

In this study, Local Recurrence was seen in Arm-A in 1 patient at Month 17 of follow-up; and in Arm-B at Month 13 in 1 patient and at month 21 in 1 patient. These findings are similar to the study done by Recht A et al. [39]

CONCLUSION

The management of breast cancer requires a multi-disciplinary approach, and it is a challenge if all the modalities are not available under a single roof as it affects the overall treatment of the patient. The Department of Radiation Oncology at RIMS, Imphal is the only government owned centre with radiotherapy facility in the whole of Manipur and caters to the needs of patients not only from Manipur but also from neighbouring states like Nagaland, Mizoram and Assam and also receives patients from Myanmar.

In the present study, 150 patients with early breast cancer following BCS were included and randomised into two Arms. Arm-A receiving Conventional Radiotherapy(50Gy/25#) and Arm-B receiving Hypofractionation Radiotherapy(40Gy/16#). The radiotherapy was delivered with Cobalt-60 teletherapy machine by 2D conventional planning. The patients were assessed for acute toxicity every week during the period of treatment and for late toxicity and local recurrence at 3 months after completion of treatment, and then every 2 months thereafter till the end of the study period.

From this study, it can be concluded that hypofractionated radiotherapy given over a short period of time is comparable to conventional fractionation radiotherapy without any significant statistical difference in terms of toxicities or local recurrence; with an added advantage of reduced treatment time and decreased duration of hospital stays. Hypofractionated radiotherapy, due to its short duration of treatment, has an added advantage of increased patients' compliance; hence, it can help in accommodating more breast cancer patients in a calendar year, ultimately resulting in decreased waiting list, increased turnover, and reduced cost of treatment. It is of utmost importance in a resource limited country like ours that is seeing an ever-increasing number of cancer patients.

Hence, hypofractionated radiotherapy can be offered as a safe and effective alternative to conventional radiotherapy for breast cancer patients in adjuvant settings. Further studies are needed on a multicentre level with a longer duration of follow-up to add more evidence to the available literatures. The limitations of the study included short duration of patient follow up; the patients were treated with Cobalt-60 teletherapy machine which is a 2D machine, but they should be ideally treated with IMRT with electron boost; and the Covid-19 pandemic has affected the follow up and treatment of patients due to lock downs and in certain cases patients delaying treatment due to Covid infection.

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