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*abstract*

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## **A Comparative Study of Clinical Response and Acute Toxicity between 3D-CRT and IMRT as Neoadjuvant Concurrent Chemoradiation for Locally Advanced Rectal Cancer**

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**Introduction:** Rectal cancer accounts for about 3.9% of all new cancer cases globally. Adenocarcinoma is the most common histologic subtype. Neoadjuvant concurrent chemoradiotherapy (CRT) improves resectability and decreases local recurrence for locally advanced rectal cancer (LARC) patients. Both Three-Dimensional Conformal Radiotherapy (3D-CRT) and Intensity-Modulated Radiotherapy (IMRT) are standard CRT techniques, though IMRT may provide improved dose conformity and reduced toxicity. This study compared clinical response and acute toxicity outcomes between 3D-CRT and IMRT in a group of LARC patients treated with curative intent.

**Methodology:** A quasi-experimental study was carried out on 60 patients with histologically confirmed LARC who were treated from November 2021 to October 2022. Patients were equally divided

into two arms by purposive sampling: Arm A patients received 3D-CRT, and Arm B patients received IMRT, both with concurrent oral capecitabine. Clinical response assessment was done four weeks after completion of CRT, and acute toxicities were graded according to CTCAE v5.0. All patients underwent surgery within 6–12 weeks following CRT.

**Results:** At four weeks post-treatment, complete response (CR) was achieved in 4 patients (13.3%) in the 3D-CRT arm and 6 patients (20%) in the IMRT arm. Partial response (PR) occurred in 12 (40%) and 13 (43.3%) patients, respectively. The overall response did not differ significantly between the two arms ( $p>0.05$ ). However, grade  $\geq 2$  diarrhea and proctitis were significantly more frequent in the 3D-CRT arm ( $p<0.05$ ). Other toxicities, including hematologic, upper gastrointestinal, and genitourinary events, were comparable.

**Conclusion:** Both IMRT and 3D-CRT yielded similar tumor response rates in LARC patients undergoing neoadjuvant concurrent CRT. IMRT significantly reduced lower gastrointestinal toxicities with better tolerance and comfort for the patients. However, the 3D-CRT technique is still effective and practical, especially for facilities with limited resources where IMRT may not be readily available. These findings highlight the importance of balancing technological advancement with accessibility in global radiotherapy practice.

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