ABSTRACT

This study aimed to evaluate the agreement between the dose calculated by the Treatment Planning System (TPS) and the dose measured using an Electronic Portal Imaging Device (EPID) in brain cancer (Ca Brain) radiotherapy through Patient-Specific Quality Assurance (PSQA). Dose verification was performed using the True Composite (TC) method, and the results were assessed using gamma index analysis with dose difference (DD) and distance-to-agreement (DTA) criteria of 3%/3 mm, 3%/2 mm, 2%/2 mm, and 1%/1 mm. The study included data from ten patients treated with Intensity-Modulated Radiation Therapy (IMRT) on a Halcyon linear accelerator (LINAC). Treatment planning was conducted using the Eclipse Treatment Planning System, while dose verification analysis was performed with Portal Dosimetry version 16.1. The results demonstrated Gamma Passing Rates (GPRs) of 100% for both the 3%/3 mm and 3%/2 mm criteria. For the more stringent criteria, the average GPRs were 99.99% for 2%/2 mm and 99.35% for 1%/1 mm, all of which exceeded the acceptance threshold recommended by AAPM TG-218 (≥95%). Furthermore, the gamma passing rate values decreased as the evaluation criteria became more restrictive, indicating increased sensitivity to deviations in dose distribution. The observed dose differences were also minimal (≤0.03 calibrated units, CU), demonstrating excellent agreement between the planned and measured dose distributions. These findings indicate that EPID-based PSQA using the TC method on the Halcyon LINAC provides highly accurate dose verification and is suitable for routine clinical implementation in radiotherapy practice.

Keywords : *PSQA, EPID, Gamma Index*