

ABSTRACT

Brain cancer represents one of the cancers with significant mortality rates in Indonesia. Intensity Modulated Radiation Therapy (IMRT) technique utilizes Multileaf Collimator (MLC) to deliver optimal doses to the tumor while minimizing exposure to healthy tissue. This study aimed to analyze the effect of segment number variations (30, 40, and 50) on dose distribution, Conformity Index (CI), Homogeneity Index (HI), Organ at Risk (OAR) dose, total Monitor Unit (MU), and Delivery Time in brain cancer patients at the Radiotherapy Installation of RSUP Dr. Sardjito using ten secondary data sets from patients who underwent IMRT therapy. Radiotherapy planning was performed using Monaco 6 Treatment Planning System (TPS) with Monte-Carlo algorithm, followed by segment number variations for each patient. Results showed that Planning Target Volume (PTV) dose distribution met ICRU Report 83 criteria, with CI values ranging from 0.965-0.999 and HI values ranging from 0.032-0.112, indicating good conformity and homogeneity. OAR analysis showed that most critical organs received doses within RTOG tolerance limits, although violations occurred in certain patients due to anatomical complexity and tumor proximity to critical organs. Total MU ranged from 477.09-891.44 with no significant difference between segment variations, while delivery time increased significantly ranging from 246.72-430.68 seconds. It can be concluded that segment number variation significantly affects delivery time but does not significantly influence total MU, while PTV and OAR dose distribution are more influenced by individual patient anatomical complexity rather than segment number.

Keywords: *IMRT, brain cancer, segment number, dose distribution, Conformity Index, Homogeneity Index*