ABSTRACT

Radiotherapy is one of the main treatment modalities for cervical cancer. In radiotherapy planning using a Treatment Planning System (TPS), calculation grid size plays an important role in determining the spatial resolution of dose calculation, which may affect dosimetric accuracy and computation time. This study aimed to evaluate the effect of grid size variation on dose distribution quality in the Planning Target Volume (PTV), organ at risk (OAR) dose, and computation time in cervical cancer radiotherapy planning using the 3D-CRT technique based on the Anisotropic Analytical Algorithm (AAA). This study employed a quantitative experimental in-silico design using ten cervical cancer treatment plans calculated with grid sizes of 1 mm, 2.5 mm, and 5 mm in the Eclipse TPS. Parameters analyzed included Conformity Index (CI), Homogeneity Index (HI), OAR dose to the rectum and bladder, and computation time. Statistical analysis showed that grid size variation significantly affected CI ($p = 0.038$) and computation time ($p < 0.001$), but did not significantly affect HI ($p = 0.150$). All treatment plans fulfilled the established OAR clinical goals. Smaller grid sizes produced better dose distribution quality but required longer computation times. Based on the balance between dosimetric quality and computational efficiency, the 2.5 mm grid size is recommended as the optimal grid size for routine cervical cancer radiotherapy planning using the 3D-CRT technique based on the AAA algorithm.

Keywords: Radiotherapy, Cervical Cancer, Calculation Grid Size, 3D-CRT.