ABSTRACT

Convensional boluses, such as superflab, and paraffin wax, still had limitations in terms of elasticity and conformity to anatomical contours, which could create air gaps and reduce the effectiveness of irradiation. This study aimed to optimize a silicon rubber-tungsten (SR-WO_3)- based bolus as an alternative material for photon beam radiotherapy using a Linear Accelerator (LINAC). In this study, SR-WO_3 bolus was fabricated by mixing SR RTV-52 with 6 % WO_3 powder, with thickness variations 2, 4, 6, 8, 10 mm. Carried out characterization by measuring density, Relative Electron Density (RED), absorbed dose, and Percentage Depth Dose (PDD) using LINAC photon energies of 6 MV and 10 MV. The results showed that the SR-WO_3 bolus had a homogeneous, flexible, and non-porous structure, with a density range of 1,15-1,127 g/cm and RED values between 1.04 and 1.10, which were similar to those of human soft tissue. Increasing the bolus thickness increased the absorbed dose and shifted the maximum dose point (d_{max}) toward the skin surface, improving dose distribution without altering lateral uniformity. Boluses with thicknesses 6-10 mm produced the mots optimal results. Therefore, considering the SR-WO_3 6% bolus was adequate, flexible, and economical as an alternative bolus to enhance surfece dose and improve the effectiveness of superficial cancer radiotherapy using LINAC photon beams.

Key words: Bolus; Silicon Rubber; Tungsten Trioxide; absorbed dose; RED; PDD; LINAC.