ABSTRACT

One method for calibrating high-energy photon beams is to perform the calibration in a water medium under reference conditions. This study aimed to measure the absorbed dose (absolute dose) of a Linear Accelerator (LINAC) using the Source-to-Skin Distance (SSD) and Source-Axis Distance (SAD) Setups to obtain a calibration value of 1 cGy/MU for a 6 MV photon beam. Furthermore, a dose audit was conducted to evaluate the accuracy of patient dose calculation in the Treatment Planning System (TPS) for three-dimensional conformal radiotherapy (3DCRT) in cervical cancer (Ca Cervix), using a slab phantom and a Farmer-type detector. The results of absolute dose measurements showed deviations of -0.019 % with the SSD Setup and 2.991 % with the SAD Setup. Meanwhile, the patient dose audit showed deviations of 0.039 % for the SSD Setup and -3.082 % for the SAD Setup. Subsequently, an adjustment was made to the LINAC during measurement using the SAD Setup to obtain a calibration value of 1 cGy/MU. The TPS calculation for the LINAC calibrated using the SAD Setup was then rescaled by increasing the Monitor Unit (MU) value to account for the deviation between the absolute dose measurements obtained from the SSD and SAD Setups. This step was performed to determine whether TPS calculations could still be applied after the LINAC was calibrated using the SAD Setup method. After rescaling, the patient dose audit showed a deviation of -0.117 %. Based on these results, dose-planning calculations in the TPS can be applied to the LINAC for both SSD and SAD Setup measurements, with a dose agreement of less than 2 %. This study demonstrates that both SSD and SAD Setup methods can be used for LINAC calibration and clinical dose verification, provided that appropriate MU adjustments are performed.

Keywords: *Absolute Absorbed Dose, LINAC, SSD Setup, SAD Setup, TPS, 3DCRT, Ca Cervix.*