ABSTRACT

Absorbed dose to water is a fundamental parameter in radiotherapy reference dosimetry that determines the accuracy of radiation dose delivery to patients. This study aimed to compare the absorbed dose to water values of a medical linear accelerator (Linac) photon beam determined using two reference dosimetry protocols, namely the International Atomic Energy Agency (IAEA) Technical Reports Series No. 398 (TRS-398) and the American Association of Physicists in Medicine (AAPM) Task Group-51 (TG-51). The study was conducted using an IBA water phantom, an FC65-G ionization chamber, and an IBA Dose-X electrometer under reference conditions of a 6 MV photon beam with a 10 × 10 cm² field size and a source-to-surface distance (SSD) of 100 cm. Data analysis included beam quality determination, calculation of environmental correction factors, polarity correction factors, ion recombination correction factors, beam quality correction factors, and absorbed dose to water calibration factors according to each protocol. The absorbed dose to water values were then calculated and compared using percentage deviation. The results showed that the absorbed dose to water at the depth of maximum dose obtained using the TRS-398 and TG-51 protocols were 9,81 × 10^{-3} Gy/MU and 9,85 × 10^{-3} Gy/MU, respectively. The difference between the absorbed dose values obtained from the two protocols was 0,3869%. This difference was influenced by variations in the determination of the absorbed dose to water calibration factor ($N_{D,w}$), beam quality correction factor (k_Q), and the formulation of charge-reading correction factors used in each protocol. The findings indicate that both protocols provide consistent dosimetric results for absorbed dose to water measurements in a 6 MV Linac photon beam.

***Kata Kunci** : AAPM TG-51, absorbed dose to water, IAEA TRS-398, photon Linac.*