

ABSTRACT

Linear Accelerator (Linac) is one of the primary modalities used in radiotherapy. An important parameter in dose calculation is the output factor, defined as the ratio of the dose delivered at a specific field size to that at the reference field size of $10 \times 10 \text{ cm}^2$. Variations in field size affect photon scatter from the collimator and medium, resulting in changes in the delivered dose. Inaccurate output factor determination may lead to dose delivery errors, reducing tumor control and increasing the risk of toxicity to healthy tissues. This study aimed to analyze the output factor values for open fields and fields using 15° , 30° , 45° , and 60° wedges with 6 MV photon beams on a Varian Clinac IX linear accelerator. Measurements were performed using a Varian Clinac IX, an IBA CC13 ionization chamber, an IBA electrometer, and a Blue Phantom IBA. Relative and absolute dose measurements were conducted to verify the Linac output before data acquisition. Output factor measurements were obtained at a source-to-surface distance (SSD) of 100 cm, a depth of 10 cm, and field sizes ranging from $2 \times 2 \text{ cm}^2$ to $40 \times 40 \text{ cm}^2$ for both open and wedged fields. The resulting data were analyzed and presented in tables and graphs. The results showed that output factor values increased with increasing field size for both open and wedged fields. Values were less than 1 for square and equivalent rectangular fields smaller than $10 \times 10 \text{ cm}^2$ and greater than 1 for fields larger than $10 \times 10 \text{ cm}^2$. An anomaly was observed at the $20 \times 7 \text{ cm}^2$ field size for both open fields and fields using 15° , 30° , and 45° wedges, indicating a distinctive characteristic of the investigated linear accelerator.

Keywords : *Linear Accelerator (Linac), output factor, wedge, radiotherapy, Varian Clinac IX, 6 MV photon beam*