

## ESTIMATION OF SURFACE AND BUILD-UP REGION DOSE FOR COBALT-60 TELE-THERAPY UNITS

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In radiotherapy, the amount of dose absorbed at the surface and the build-up region is important to assess the skin damage, decide on the use of bolus and design the treatment technique. In this study, percentage surface dose and percentage depth dose were measured using a calibrated PTW 31014 cylindrical type ionization chamber. Irradiation was done using a Theratron 780E <sup>60</sup>Co tele-therapy machine, and all the measurements were taken in a water phantom. Surface dose was measured by placing the chamber on the water surface and increasing the field size from 5×5 cm<sup>2</sup> up to 30×30 cm<sup>2</sup>. When irradiated, some extra number of electrons is produced due to the scattering from the portion of chamber that is above the water surface. As expected, the measured percentage surface dose was higher than the published values. Increment in percentage surface dose with the field size was fitted using a linear model for both measured and published data. Comparing these two linear fits, correction for the percentage surface dose measurements was identified as  $0.53x - 45.47$  for any field size  $x$ . Field size was fixed to 10×10 cm<sup>2</sup>, and depth doses were measured by immersing the chamber in water phantom until 12 mm depth. Measured depth doses were lower than the published depth doses in the depth region 1 - 4 mm. This is due to the higher attenuation of radiation in the region by the relatively thick wall of the cylindrical chamber. Below 4 mm depth, the PTW 31014 chamber reads the accurate dose. In 1 - 4 mm region, variation in percentage depth dose with the depth was fitted using a polynomial of degree two for both measured and published data. Comparing the two second order fits, correction for the measured percentage depth dose was identified as  $-8.94z^2 + 44.28z - 33.96$  for some depth  $z$ .

**Keywords:** Absorbed dose, Build-up region, Depth dose, Surface dose