ABSTRACT

The automation method to calculate D_{eff}^{corr} has been successfully developed. The automated D_{eff}^{corr} was performed with several steps. First, we segmented patient border automatically and converted the piksel values outside the patient to 0. After that, we detected the presence of lung and bone. The lung was detected with threshold -500 HU and the bone was detected with threshold +100 HU. The piksel values lower than -500 HU were converted to 1, the piksel values in range -500 HU ≤ x ≤ +100 HU were converted to 2, and the piksel values greater than +100 HU were converted to 3. Afterwards, we determined the center position of the patient and determined diameters in anterior-posterior (AP) and lateral (LAT) from central image. In the lung tissue (i.e. in piksel value of 1), the AP and LAT diameter was corrected with average relative electron density of lung (ρ_e = 0.3), and in the bone (i.e. in piksel value of 3) corrected with ρ_e of 1.8. The D_{eff}^{corr} was calculated as the square root of these corrected AP and LAT diameters. The approach was implemented on 30 patients who undergone chest CT examination with standard imaging protocol. The results show that the correlation between the automated D_{eff}^{corr} and D_w is R^2= 0.93 with statistically no different (p > 0,05). The value of D_w is 5.29% greater than D_{eff}, 10.48% smaller than $D_{MIL,}$ and 3.06% greater than automated D_{eff}^{corr}, respectively.

Keywords: effective diameter (D_{eff}); water-equivalent diameter (D_w); $CTDI_{vol}$