Evaluasi Diameter Efektif (D_{EFF}) dan *Water Equivalent Diameter* (D_W) sebagai Fungsi Dimensi Anterior-Posterior (AP) dan Lateral (LAT) pada Citra *Axial Computed Tomography* (CT)

Winda Kusuma Dewi (24040118420019)

Abstrak

Tujuan dari penelitian ini adalah untuk menetapkan hubungan antara ukuran pasien dalam parameter diameter efektif (D_{eff}) dan water-equivalent diameter (D_w) sebagai fungsi dimensi lateral (LAT) dan anterior-posterior (AP) sehubungan dengan perkiraan dosis pasien dalam pemeriksaan *computed tomography* (CT) *scan* pada daerah kepala, thoraks, abdomen, dan pelvis. Sebanyak 74 citra kepala, 47 citra thoraks, 79 citra abdomen, dan 50 citra pelvis digunakan dalam penelitian ini. Citra pasien dikumpulkan secara retrospektif dari Rumah Sakit Dr. Kariadi dan Ken Saras, Semarang, Indonesia. *Slices* yang digunakan untuk menghitung diameter pasien dipilih berada di tengah area *scanning*. Penghitungan parameter ukuran – ukuran pasien (LAT, AP, D_{eff}, and D_w) dilakukan secara otomatis menggunakan *sotware* IndoseCT versi 20b. D_{eff}, and D_w diplot sebagai fungsi LAT, AP, dan AP+LAT. Sebagai tambahan, D_w juga diplot sebagai fungsi D_{eff}. Hasil penelitian menunjukkan bahwa terdapat korelasi yang kuat antara D_{eff} dan D_w terhadap LAT, AP, serta AP+LAT. Hubungan D_{eff} dengan LAT, AP, serta AP+LAT lebih kuat daripada D_w (nilai $R^2 > 0,9$ untuk kurva D_{eff} dan $R^2 > 0,8$ untuk kurva D_w). Pada daerah thoraks nilai rata – rata D_{eff} lebih besar dari nilai D_w, pada daerah abdomen nilai rata – rata D_{eff} hampir sama dengan D_w, pada daerah kepala dan pelvis nilai rata – rata D_{eff} lebih kecil dari D_w. Penelitian ini memperluas studi mengenai hubungan antara D_{eff} dan D_w dengan diameter geometris dasar LAT, AP, dan AP + LAT yang sebelumnya dilaporkan oleh AAPM. Berdasarkan hasil penelitian, nilai D_{eff} dan D_w dapat diestimasi menggunakan salah satu dimensi LAT atau AP.

Kata kunci: dimensi anterior-posterior, dimensi lateral, diameter efektif, *water equivalent diameter*, *computed tomography*

Evaluation of Effective Diameter (D_{EFF}) and *Water Equivalent Diameter* (D_W) as a Dimension Function of Anterior-Posterior (AP) and Lateral (LAT) in Axial Images of *Computed Tomography* (CT)

Winda Kusuma Dewi (24040118420019)

Abstract

The aim of this work was to establish the relationships of patient size in terms of effective diameter (D_{eff}) and water-equivalent diameter (D_w) with lateral (LAT) and anterior-posterior (AP) dimensions in order to predict the specific patient dose for head, thoracic, abdominal, and pelvic CT examinations. A total of 74 head images, 47 thoracic images, 79 abdominal images, and 50 pelvic images were analyzed in this study. The patient's images were retrospectively collected from Dr. Kariadi and Kensaras Hospitals, Semarang, Indonesia. The slices measured were taken from the middle of the scan range. The calculations of patient sizes (LAT, AP, D_{eff}, and D_w) were automatically performed by IndoseCT 20b software. D_{eff} and D_w were plotted as functions of LAT, AP, and AP+LAT. In addition, D_w was plotted as a function of D_{eff}. Strong correlations of D_{eff} and D_w with LAT, AP, and AP+LAT were found. Stronger correlations were found in the D_{eff} curves ($R^2 > 0.9$) than in the D_w curves ($R^2 > 0.8$). It was found that the average D_{eff} was higher than the average D_w in the thoracic region, the average values were similar in

the abdominal region, and the average D_{eff} was lower than the average D_w in the pelvic and head region. The current study extended the study of the relationships between D_{eff} and D_w and the basic geometric diameter LAT, AP, and AP+LAT beyond those previously reported by AAPM. We evaluated the relationships for four regions, i.e. thoracic, abdominal, and pelvic regions. Based on our findings, it was possible to estimate D_{eff} and D_w from only the LAT or AP dimension.

Keywords: anterior-posterior dimension, lateral dimension, effective diameter, water-equivalent diameter, computed tomography

Pembimbing Akademik

1. Eko Hidayanto
2. Choirul Anam