ABSTRACT

In radiation protection paradigms, patients are categorized under medical exposure, which is explicitly exempted from Dose Limits. The absence of these limits positions the Diagnostic Reference Level (DRL) as a vital instrument to control dose variation and ensure optimization, particularly in hybrid PET/CT modalities that impose a high radiation burden. However, the establishment of a single-value DRL often becomes biased as it fails to account for the Automatic Exposure Control (AEC) response to variations in patient body size. Furthermore, there is a lack of local reference data specifically for the CT component in PET/CT procedures in Indonesia. This study aims to establish Local Diagnostic Reference Levels (LDRLs) for whole-body ^{18}F-FDG PET/CT examinations at Dr. Hasan Sadikin General Hospital Bandung, and to propose specific DRLs based on Body Mass Index (BMI) stratification. This retrospective descriptive study analyzed data from 254 adult patients. The collected parameters included injected activity (MBq), CT Dose Index Volume (CTDIvol, mGy), and Dose Length Product (DLP, mGy·cm). DRL values were determined based on the 75th percentile of the dose distribution. The established local DRLs were 281.47 MBq for injected activity, 7.55 mGy for CTDIvol, and 1042.19 mGy·cm for DLP. Analysis demonstrated a strong positive correlation between BMI and radiation dose. BMI-based DRL stratification yielded a wide and specific range of DLP values, ranging from 661.15 mGy·cm for underweight patients to 1298.3 mGy·cm for obese patients. The estimated median effective dose for the population was 17.94 mSv. This study provides a novel contribution as the first in Indonesia to establish specific local Diagnostic Reference Levels (DRLs) for CT parameters in PET/CT procedures. Furthermore, it proposes DRLs based on BMI stratification to accommodate the Automatic Exposure Control (AEC) feature, recommending this approach as a new standard for radiation protection optimization programs in clinical facilities.

Keywords: ^{18}F-FDG, Body Mass Index (BMI), Diagnostic Reference Level (DRL), Dose Optimization, Effective Dose, PET/CT, Radiation Protection.