ABSTRACT

The use of ionizing radiation in medical imaging continues to expand and provides increasingly significant diagnostic benefits. However, this also leads to increased exposure to ionizing radiation, making radiation protection essential. Exposure control is based on dose limits for radiation workers and the general public, but not for patients. Because patient radiation doses can vary substantially, the ICRP introduced *Diagnostic reference level*s (DRLs) to evaluate the appropriateness of patient doses. This study aimed to establish Local *Diagnostic reference level*s (L-DRLs) for SPECT/CT examinations using Tc-99m MIBI (MPI-stress/rest), Tc-99m MDP (bone scan), and Tc-99m pertechnetate (thyroid scan) at Hasan Sadikin General Hospital, Bandung, and to compare them with the national reference levels (I-DRL). This retrospective study included 222 patients. DRL values were determined from the 75th percentile of the distributions of radiopharmaceutical activity and CT dose parameters (CTDIvol and DLP) for each scanned region. Effective doses for both the SPECT and CT components were calculated using conversion factors from ICRP Publication 128 and AAPM Report 96, respectively. Radiopharmaceutical activities were corrected for radioactive decay and post-injection activity to obtain the actual administered activity received by the patients. The results showed that administered activities differed among the radiopharmaceuticals. The highest activity was observed for Tc-99m MIBI (1776 MBq), while the lowest was for Tc-99m pertechnetate (40 MBq). The highest CTDIvol and DLP values were found in the head–neck region, whereas the lowest values were observed in the chest region. A similar pattern was observed for the effective dose. The estimated radiation doses in SPECT/CT examinations demonstrated considerable variation, influenced by the type of radiopharmaceutical, CT protocol, and the scanned anatomical region. When compared with the I-DRL established by BAPETEN, the L-DRLs were higher, but still lower than the DRLs reported in several other countries.

Keywords: SPECT/CT, effective dose, DRL, radiopharmaceutical, CTDIvol, DLP