ABSTRACT

     Thyroid carcinoma accounts for 0.4% of disease prevalence in Indonesia according to the 2018 Riskesdas Report. Nuclear medicine uses I-131 radiopharmaceuticals for thyroid cancer diagnosis and therapy. The use of Single Photon Emission Computed Tomography (SPECT-CT) can provide anatomical and functional information simultaneously. This study aims to analyze the relationship between thyroid lesion volume measured by SPECT-CT and I-131 uptake in patients with various thyroid conditions, and to determine the value of volume and uptake as appropriate predictors for therapy planning. The research was conducted by performing scan simulations using a syringe containing 1 mCi of I-131 with a volume of 3 cc to obtain a correction factor. Measurement of lesion volume and I-131 uptake was performed using Region of Interest (ROI) on each slice of patients' SPECT-CT images. The results showed a very strong correlation (r = 0.988) between lesion volume and I-131 uptake, with a significance value of 0.034 (p<0.05). The increase in lesion volume follows the equation $y = 0.1528x^{1.476}$, along with an increase in I-131 uptake, indicating that the larger the cancer volume, the more active cancer cells absorb I-131. Factors such as cell severity in absorbing iodine, body metabolism, water consumption, and patient preparation before therapy affect the uptake value. This study concludes that volume and uptake values can be used as predictors in determining I-131 activity for radioablation therapy, where low uptake indicates the possibility of increasing the activity dose to optimize therapy effectiveness.

Keywords*: SPECT-CT, thyroid lesion volume, I-131 uptake, radioablation, nuclear medicine.*