ABSTRACT

Breast cancer is the most prevalent cancer among women in Indonesia. According to the Global Cancer Observatory of the World Health Organization (WHO) in 2022, an estimated 66,271 new cases of breast cancer were reported in Indonesia. One of the major complications of breast cancer is spinal metastasis, with an incidence rate of 50–70%. Bone metastases can be detected using bone scintigraphy through the SPECT-CT modality. This study aims to determine the correlation between the volume and uptake value of metastatic lesions detected using Tc-99m MDP and to analyze their relationship. The research was conducted using retrospective data from six metastatic spine lesion images, with ROI segmentation performed on hybrid and planar images. The fused image adjustment was determined based on the size of the metastatic lesion on CT, while Tc-99m MDP was calibrated using a 1 mCi dose to obtain the conversion correction factor from counts to activity. The results showed that lesion volumes ranged from 0.70 to 11.42 cm³, representing the affected spinal bone area with cancer cell activity. Uptake values ranged from 0.37% to 1.49%, indicating radiopharmaceutical accumulation associated with metabolic activity. The correlation test between lesion volume and uptake value in spinal metastases of breast cancer patients revealed a very strong and statistically significant correlation ($r = 0.8763$; $p = 0.0220$). Thus, this study concludes that larger metastatic lesion volumes are associated with higher Tc-99m MDP uptake values, which may serve as a crucial indicator for assessing cancer cell metabolic activity in breast cancer bone metastases.

Keywords: *Breast cancer, metastatic lesion, bone scintigraphy, lesion volume, Tc-99m MDP, uptake value*