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Neutrophil-to-Lymphocyte ratio as a simple marker to differentiate glioblastoma from brain metastasis

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Abstract

Background: Glioblastoma and brain metastasis pose significant challenges in global healthcare due to their high rates of morbidity and mortality. Differentiating between these two tumor types can be challenging because they often exhibit similar clinical manifestations and radiological characteristics. This study aimed to assess how inflammatory markers, including the neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-monocyte ratio (LMR), and platelet-to-lymphocyte ratio (PLR), can help distinguish glioblastoma from brain metastases.

Methods: This retrospective, cross-sectional study utilized medical records from six hospitals in Yogyakarta, Indonesia, between 2016 and 2021. Patients diagnosed with glioblastoma and brain metastasis were included in this study. Laboratory data were collected at the time of initial admission. The diagnoses of glioblastoma and brain metastasis were confirmed by histopathological examination.

Results: A total of 393 subjects were included in this study. The glioblastoma and brain metastasis groups comprised 121 and 272 subjects, respectively. The glioblastoma group exhibited a significantly higher NLR (7.55 (8.08) vs. 5.9 (6.58), $p = 0.006$) than the brain metastasis group. However, the LMR (2.33 (1.69) vs. 2.14 (1.84), $p = 0.640$) and PLR (203.57 (157.47) vs. 206.44 (206.14), $p = 0.885$) did not differ significantly between the two groups. Receiver operating characteristic analysis revealed that the area under the curve was 0.587 (0.528-0.647, $p = 0.006$). An NLR value ≥ 7.14 has 55.4 % sensitivity and 62.5 % specificity for predicting glioblastoma.

Conclusions: This study demonstrated that the NLR in patients with glioblastoma was significantly higher than that in patients with brain metastasis, indicating more severe systemic inflammation in patients with glioblastoma than in those with brain metastasis. The NLR may serve as a useful diagnostic tool for distinguishing glioblastoma from brain metastasis.

Keywords: Brain metastasis; Glioblastoma; Lymphocyte-to-monocyte ratio; Neutrophil-to-lymphocyte ratio; Platelet-to-lymphocyte ratio.