

## ABSTRACT

**Background:** Gliomas are malignant brain tumors originating from glial cells, which are supportive cells in the brain and spinal cord. They account for 77% of malignant primary brain tumors, with a high incidence and mortality rate. The diagnosis of glioma traditionally relies on histopathological examination, which is invasive and can alter tumor appearance. Magnetic Resonance Imaging (MRI) offers a non-invasive alternative, with the Visually Accessible Rembrandt Images (VASARI) system providing a standardized method to assess tumor features. Molecular markers such as IDH mutation status, MGMT methylation, and Ki-67 proliferation index are crucial for prognosis and treatment planning. This study aims to explore the association between MRI-based lesion distribution using VASARI features and these molecular markers in glioma patients

**Objective:** The primary objective of this study is to determine the association between the distribution of brain glioma lesions as assessed by head MRI using VASARI features and the molecular markers IDH mutation status, MGMT methylation, and Ki-67 proliferation index in glioma patients at RSUP Dr. Sardjito Yogyakarta from 2017 to 2022.

**Research method:** This study is an observational cross-sectional analysis using retrospective data from medical records and MRI images of glioma patients. The study population includes glioma patients at RSUP Dr. Sardjito Yogyakarta from 2017 to 2022. Inclusion criteria were patients with pre-surgical MRI scans and biopsy results for IDH mutation status, MGMT methylation, and Ki-67 proliferation index. Exclusion criteria included patients who had undergone prior surgical therapy, chemotherapy, or radiotherapy before MRI. The VASARI features analyzed included tumor location (F1), side of the lesion (F2), eloquent brain involvement (F3), T1/FLAIR ratio (F10), and satellites (F24). Statistical analysis involved descriptive statistics, chi-square tests, t-tests, and ANOVA to assess the association between VASARI features and molecular markers. The study also considered glioma grade as a confounding variable.

**Result:** The study included 107 glioma patients, with an average age of 45.9 years. The majority of patients were male (56%), and high-grade gliomas (grade IV) were the most common (74%). The results showed significant associations between certain VASARI features and molecular markers: IDH Mutation Status: Significant associations were found with tumor location (F1,  $p < 0.001$ ) and T1/FLAIR ratio (F10,  $p = 0.012$ ). Tumors in the frontal lobe and those with an infiltrative T1/FLAIR ratio were more likely to be IDH wild-type. Ki-67 Proliferation Index: A significant association was found with the T1/FLAIR ratio (F10,  $p = 0.009$ ), indicating that infiltrative tumors had higher Ki-67 proliferation indices. MGMT Methylation Status: No significant associations were found with any VASARI features. Additionally, the study found that high-grade gliomas were more common in patients with IDH wild-type status and higher Ki-67 proliferation indices. The frontal lobe was the most common tumor location, and infiltrative tumors were the most prevalent.



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**ASSOCIATION OF BRAIN GLIOMALESION DISTRIBUTION FROM HEAD MRI TO IDH MUTATION STATUS, MGMT METHYLATION, AND KI-67 PROLIFERATION INDEX IN BRAIN GLIOMAPATIENTS AT RSUP DR. SARDJITO YOGYAKARTA  
2017- 2022**

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Universitas Gadjah Mada, 2025 | Diunduh dari <http://etd.repository.ugm.ac.id/>

**Conclusion:** There is a significant association between 2 VASARI features and IDH mutation status, and 1 VASARI feature with the Ki-67 proliferation index, and there is no significant result in VASARI features with MGMT methylation status.

**Keywords:** Glioma, MRI, VASARI, IDH mutation, MGMT methylation, Ki-67 Proliferation Index.