

AKURASI NILAI APPARENT DIFFUSION COEFFICIENT PADA MAGNETIC RESONANCE IMAGING UNTUK MEMBEDAKAN LOW GRADE DAN HIGH GRADE GLIOMA

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INTISARI

Latar Belakang: Glioma merupakan tumor otak primer tersering dengan karakteristik biologis yang bervariasi. Penentuan derajat keganasan glioma sangat penting karena berpengaruh terhadap prognosis dan pilihan terapi. Nilai *Apparent Diffusion Coefficient* (ADC) dari *Magnetic Resonance Imaging* (MRI) difusi berpotensi untuk membedakan glioma *low grade* dan *high grade* secara non-invasif, namun akurasi diagnostiknya masih perlu divalidasi melalui penelitian lebih lanjut.

Tujuan: Mengetahui akurasi nilai ADC pada MRI untuk membedakan *low grade* dan *high grade* glioma.

Metode: Penelitian ini merupakan penelitian diagnostik. Data retrospektif subjek penelitian diperoleh dari 110 pasien terdiagnosis glioma secara histopatologis di RSUP Dr. Sardjito Yogyakarta yang menjalani pemeriksaan MRI kepala. Nilai rerata ADC dihitung pada area padat tumor dengan panduan pencitraan MRI konvensional oleh dokter spesialis radiologi. Performa diagnostic diuji dengan kurva *Receiver Operating Characteristic* (ROC) dan *cut-off* nilai ADC ditentukan menggunakan Youden Index.

Hasil: Penelitian terhadap 110 pasien glioma menunjukkan nilai ADC memiliki akurasi yang baik untuk membedakan *low grade* dan *high grade* glioma (AUC = 0,863). Berdasarkan Youden index, didapatkan bahwa nilai ADC sebesar $0,978 \times 10^{-3} \text{ mm}^2/\text{s}$ merupakan cutoff yang dapat digunakan untuk membedakan *low grade* dan *high grade* glioma dengan sensitivitas sebesar 80,8% dan spesifisitas sebesar 91,7%.

Kesimpulan: Nilai ADC memiliki performa diagnostik yang sangat baik dalam membedakan *low grade* dan *high grade glioma* dengan nilai ADC $\leq 0,978 \times 10^{-3} \text{ mm}^2/\text{s}$ lebih mungkin untuk mengalami *high-grade glioma*.

Kata kunci: *Apparent Diffusion Coefficient*, glioma, MRI, DWI

ACCURACY OF APPARENT DIFFUSION COEFFICIENT VALUES ON MAGNETIC RESONANCE IMAGING IN DIFFERENTIATING LOW-GRADE AND HIGH-GRADE GLIOMAS

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ABSTRACT

Background: Glioma constitutes the most prevalent primary brain tumour, exhibiting diverse biological characteristics. Accurate grading of gliomas is essential, as it significantly impacts both prognosis and therapeutic strategies. The Apparent Diffusion Coefficient (ADC) derived from diffusion-weighted Magnetic Resonance Imaging (DW-MRI) has shown potential as a non-invasive biomarker for differentiating between low-grade and high-grade gliomas. Nevertheless, its diagnostic performance necessitates further validation through rigorous scientific investigation

Objective: This study aims to evaluate the diagnostic accuracy of ADC values obtained from MRI in distinguishing low-grade from high-grade gliomas.

Methods: This study is diagnostic research. Retrospective data were obtained from 110 patients with histo-pathologically confirmed glioma at Dr. Sardjito General Hospital, Yogyakarta, who underwent brain MRI examinations. The mean ADC values were measured in the solid tumour areas, guided by conventional MRI sequences, by board-certified radiologists. Diagnostic performance was evaluated using Receiver Operating Characteristic (ROC) curve analysis, and the optimal ADC cut-off value was determined based on the Youden Index.

Results: A study involving 110 patients with glioma demonstrated that ADC values have good accuracy in differentiating low-grade from high-grade gliomas (AUC = 0.863). Based on the Youden Index, an ADC threshold of $0.978 \times 10^{-3} \text{ mm}^2/\text{s}$ was identified as the optimal cut-off value, yielding a sensitivity of 80.8% and a specificity of 91.7%.

Conclusion: ADC values demonstrate excellent diagnostic performance in distinguishing low-grade from high-grade gliomas, with ADC values $\leq 0.978 \times 10^{-3} \text{ mm}^2/\text{s}$ being more likely associated with high-grade gliomas.

Keywords: *Apparent Diffusion Coefficient*, glioma, MRI, DWI