

KORELASI VOLUME *WHITE MATTER HYPERINTENSITY* DENGAN INFARK LAKUNAR PADA PEMERIKSAAN MRI KEPALA

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INTISARI

Latar Belakang : *White Matter Hyperintensity* (WMH) merupakan gambaran radiologis yang sering ditemukan pada MRI kepala. WMH dan infark lakunar berhubungan dengan mikroangiopati kronis yang berperan dalam terjadinya gangguan perfusi dan kerusakan pada *white matter*. WMH dapat dinilai secara kuantitatif melalui segmentasi otomatis, sedangkan infark lakunar dapat dinilai jumlah dan ukuran lesinya. Data yang menilai hubungan antara volume WMH dengan infark lakunar pada populasi Indonesia masih terbatas.

Tujuan: Mengetahui korelasi antara volume WMH dengan jumlah dan ukuran infark lakunar pada pemeriksaan MRI kepala.

Metode: Penelitian ini merupakan penelitian observasional analitik dengan desain *cross-sectional*. Sebanyak 42 pasien yang menjalani pemeriksaan MRI kepala di RSUP Dr. Sardjito pada periode Januari–Desember 2024 diikutsertakan dalam penelitian ini. Volume WMH dinilai dengan menggunakan *Lesion Segmentation Tool* pada SPM12. Derajat WMH dinilai dengan menggunakan skala Fazekas. Infark lakunar diidentifikasi secara visual jumlah dan ukurannya. Analisis korelasi dilakukan menggunakan uji Spearman. Analisis multivariat dilakukan dengan menggunakan regresi linear dan regresi logistik ordinal. Usia dikontrol sebagai variabel perancu.

Hasil: Terdapat korelasi yang positif bermakna antara volume WMH dengan jumlah infark lakunar ($r = 0,878$; $p < 0,001$), dan antara derajat WMH dengan jumlah infark lakunar ($r = 0,852$; $p < 0,001$). Volume dan derajat WMH berkorelasi lemah dengan ukuran infark lakunar ($r = 0,302$; $p = 0,026$ dan $r = 0,349$; $p = 0,012$). Pada analisis multivariat, volume WMH berhubungan secara independen dengan jumlah lakuna setelah dikontrol oleh derajat WMH dan usia ($\beta = 0,589$; $p < 0,001$), dan derajat WMH juga berhubungan secara independen dengan jumlah lakuna ($\beta = 0,397$; $p = 0,005$). Sebaliknya, volume dan derajat WMH tidak berhubungan secara independen dengan ukuran lakuna ($p = 0,631$ dan $p = 0,233$).

Kesimpulan: Terdapat korelasi positif dan bermakna antara volume dan derajat WMH dengan jumlah infark lakunar. Jumlah infark lakunar merupakan faktor yang berhubungan secara independen dengan peningkatan WMH setelah dikontrol oleh usia.

Kata kunci: *White Matter Hyperintensity*, Volume WMH, Fazekas, Infark Lakunar, MRI

CORRELATION BETWEEN WHITE MATTER HYPERINTENSITY VOLUME WITH LACUNAR INFARCT ON BRAIN MRI

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ABSTRACT

Background: White matter hyperintensity (WMH) is a common radiological finding on brain MRI. WMH and lacunar infarctions are associated with chronic microangiopathy, which contributes to impaired perfusion and white matter damage. WMH can be assessed quantitatively through automated segmentation, while lacunar infarctions can be assessed by the number and size of lesions. Data assessing the relationship between WMH volume and lacunar infarcts in the Indonesian population is still limited.

Objective: To determine the correlation between WMH volume with the number and size of lacunar infarcts on brain MRI.

Methods: This is an observational analytical study with a cross-sectional design. A total of 42 patients who underwent head MRI at Dr. Sardjito General Hospital between January and December 2024 were enrolled. WMH volume was assessed using the Lesion Segmentation Tool in SPM12. WMH grade was assessed using the Fazekas scale. Lacunar infarcts were visually identified by their number and size. Correlation analysis was performed using the Spearman test. Multivariate analysis was performed using linear regression and ordinal logistic regression. Age was controlled as a confounding variable.

Results: There was a significant positive correlation between WMH volume and the number of lacunar infarcts ($r = 0.878$; $p < 0.001$), and between WMH grade and the number of lacunar infarcts ($r = 0.852$; $p < 0.001$). WMH volume and grade were weakly correlated with lacunar infarct size ($r = 0.302$; $p = 0.026$ and $r = 0.349$; $p = 0.012$, respectively). In multivariate analysis, WMH volume was independently associated with the number of lacunae after controlling for WMH grade and age ($\beta = 0.589$; $p < 0.001$), and WMH grade was also independently associated with the number of lacunae ($\beta = 0.397$; $p = 0.005$). In contrast, WMH volume and grade were not independently associated with lacunae size ($p = 0.631$ and $p = 0.233$).

Conclusion: There was a positive and significant correlation between WMH volume and grade with the number of lacunar infarcts. The number of lacunar infarcts was independently associated with increasing WMH after controlling for age.

Keywords: White Matter Hyperintensity, WMH Volume, Fazekas, Lacunar Infarct, MRI