



Brain volumetry by voxel-based-morphometry in migraineurs: comparison between groups and clinical correlations

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Background

Migraine was previously interpreted as “benign” disease since the major part of patients were asymptomatic between attacks and brain lesions are absent in primary headaches. Advances in structural neuroimaging have changed this point of view. Voxel-based-morphometry is an accurate technique to evaluate objectively structural brain damage. Our hypothesis was that some clinical features of migraine, as aura and attack frequencies, are more related to volumetric changes in migraineurs brains.

Objectives

To compare brain lobes volumetry between migraine patients (episodic migraine, with and without aura, chronic migraine) and healthy controls. To evaluate the correlations of brain volumetric variables with clinical variables.

Methods

This is a cross-sectional study performed with 60 female volunteers, aged between 18 and 55 years old, equally allocated into four groups: episodic migraine without aura, episodic migraine with aura, chronic migraine and controls. The sample was clinically characterized by the following variables: age, number of days with headache in the last month, number of days with aura in the last month, average pain intensity in the last month, disease duration calculated in number of years from the migraine diagnosis to the MRI performance, and the use of prophylactic drugs for migraine. Volunteers underwent brain MRI, and Free Surfer software was used to perform volumetric studies. Statistical analyses included Mann-Whitney test, Kruskal-Wallis test, Dunn test and Spearmann correlations.

Results

No statistically relevant differences were found in cerebral lobe volumes and supratentorial white matter in the comparison between groups. Regarding to clinical correlations, age influenced the brain lobes volumetric reduction, as expected, except for the parietal lobe, for which the correlation was not important. The disease duration was correlated with the reduction of the frontal ($p < 0.001/r = -0.531$), temporal ($p = 0.003/r = -0.433$), parietal ($p = 0.004/r = -0.431$) lobes; when adjusted by age, correlations were maintained for the frontal ($p = 0.013/r = -0.376$) and temporal ($p = 0.017/r = -0.362$) lobes. No significant correlations were found between cerebral lobe volumes and attack frequency, aura frequency, headache intensity and use of migraine prophylactics.

Conclusion

There are no difference between migraine types and control groups regarding brain volumes. Disease duration, adjusted by age, was negatively correlated with frontal and temporal lobes volume, and no other correlations were found between cerebral brain volume and clinical variables. New studies that correlate structural and functional neuroimaging, as well as long-term follow-up cohorts are needed to better understand whether migraine influence brain structure.

Keywords: Migraine, Magnetic resonance, Volumetry, Voxel-based-morphometry.