

Could Thalamic Biochemical Changes Correlate to Cognitive Impairment in Idiopathic Generalized Epilepsy?

Abstract

Background The thalamus is crucial in the development of idiopathic generalized epilepsy (IGE), which could lead to cognitive dysfunctions, according to data from neuropsychology and advanced neuroimaging investigations. This research aimed to measure the metabolic changes in the thalamus and to assess if could be contributed to cognitive impairment in IGE patients. Thirty IGE patients and thirty healthy volunteers with matched ages, genders, and educational levels participated in this cross-sectional case–control research. The IGE patients and controls were evaluated neuropsychologically using Intelligence Quotient (IQ) to assess general cognitive ability, Digit span for attention, Wechsler memory scale (WMS) for verbal memory, cube drawing test for visuospatial memory, Trail making test for executive functions, and Controlled Oral Word Association test (COWAT) for verbal fluency and quantitative multivoxel MR spectroscopy (MRS) measurements of N-acetyl aspartate (NAA), choline (Cho), creatine (Cr), NAA/Cr, NAA/Cho and Cho/Cr ratios at 1.5 T scanner. The voxels were located over the right and left thalamus.

Results The IGE patients showed worse cognitive performance in IQ, attention, executive function, and verbal and visuospatial memory domains compared to the controls. The IGE patients exhibited a significantly decrease NAA in the right thalamus ($p=0.004$) and a lower NAA/Cr ratio in the left thalamus ($p=0.01$). the mean thalamus NAA level exhibited a positive correlation with CDT ($r=0.45$, $p=0.01$), and WMS-R ($r=0.39$, $p=0.03$) and a negative correlation with trail-making A test ($r=0.42$, $P=0.01$).

Conclusions it was concluded that IGE patients exhibited poor cognition which could be attributed to thalamic neurometabolic changes due to impaired thalamic cortical circuits.