

EEG markers for early detection and characterization of vascular dementia during working memory tasks

ABSTRACT

The aim of this study was to reveal markers using spectral entropy (SpecEn), sample entropy (SampEn) and Hurst Exponent (H) from the electroencephalography (EEG) background activity of 5 vascular dementia (VaD) patients, 15 stroke-related patients with mild cognitive impairment (MCI) and 15 control healthy subjects during a working memory (WM) task. EEG artifacts were removed using independent component analysis technique and wavelet technique. With ANOVA ($p < 0.05$), SpecEn was used to test the hypothesis of slowing the EEG signal down in both VaD and MCI compared to control subjects, whereas the SampEn and H features were used to test the hypothesis that the irregularity and complexity in both VaD and MCI were reduced in comparison with control subjects. SampEn and H results in reducing the complexity in VaD and MCI patients. Therefore, SampEn could be the EEG marker that associated with VaD detection whereas H could be the marker for stroke-related MCI identification. EEG could be as a valuable marker for inspecting the background activity in the identification of patients with VaD and stroke-related MCI.

Keyword: Electroencephalography; Hurst exponent; ICA-WT; mild cognitive impairment; Sample entropy; Spectral entropy; Vascular dementia