Functional and effective connectivity in EEG alpha and beta bands during intermittent flash stimulation in migraine with and without aura

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Abstract
Objectives: This research was a case-control study to evaluate functional and effective connectivity patterns in ongoing electroencephalography (EEG) under repetitive photic stimulation in the interictal phase of migraine patients with and without aura compared to nonmigraine controls.
Methods: EEG was recorded by six scalp electrodes from 19 migraine without aura patients (MO), 19 migraine with aura patients (MA) and 11 healthy subjects (control group (N)). Flash stimuli were presented at 9–27 Hz frequencies. Phase synchronization after Hilbert transform and Granger causality were evaluated filtering the EEG in alpha and beta bands.
Results: Phase synchronization increased in alpha band in MO, and decreased in beta band in MA, with respect to controls. The intensity of directed interactions in beta band, revealed by Granger causality, increased in MA compared to both MO patients and controls.
Discussion: There were clear differences in ongoing EEG under visual stimulation, which emerged between the two forms of migraine, probably subtended by increased cortical activation in migraine with aura, and compensatory phenomena of reduced connectivity and functional networks segregation, occurring in patients not experiencing aura symptoms. Further investigation may confirm whether the clinical manifestation of aura symptoms is subtended by a peculiar neuronal connectivity pattern.

Keywords
Migraine with and without aura, intermittent flash stimulation, alpha and beta bands, phase synchronization, Granger causality

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