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Electrophysiological Underpinnings of Functional Connectivity in Episodic and Chronic Migraine

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Objective: Preliminary studies have reported electrophysiological differences between episodic and chronic migraine (EM, CM). We aimed to assess differences in brain connectivity to elucidate neural underpinnings in migraine.
Methods: We included 126 subjects: 87 patients (45 EM and 42 CM) and 39 matched control participants. All performed a 10-min resting-state electroencephalographic (EEG) recording using Brain Vision® equipment. Patients were free from migrainous pain on the day of the recording. Once the EEG signals were obtained, functional connectivity between brain regions were estimated using phase-related measures (phase-locking value). Afterwards, graph analysis was performed to summarize the behavior of the brain network into 5 parameters that assessed the segregation, integration, global connectivity, complexity and regularity of the network. For that purpose, clustering coefficient, path length, connectivity strength, Shannon graph complexity and Shannon graph entropy were computed from the functional connectivity brain network. All this procedure was separately carried out for each of the conventional EEG frequency bands. In addition, connectivity parameters were also computed in a particular band of interest (from 23.4 Hz to 29.1 Hz), previously identified in a former study.
Results: No differences were found between EM and CM for the conventional frequency bands in the graph parameters under study. However, the analysis of the band of interest (from 23.4 Hz to 29.1 Hz) showed differences ($p < 0.05$, Mann-Whitney *U*-test) for segregation and global synchronization characteristics. In particular, clustering coefficient as well as the connectivity strength showed significant higher values in CM than in EM.
Conclusion: Our functional connectivity analyses exhibited an increase in segregation and global connectivity in CM as compared with EM. These novel findings could suggest a relationship between migraine chronicity and an increase in hyperexcitability, which would translate into the EEG as a widespread increase in connectivity along with an increase in the overall segregation of the network.

Disclosure of Interest: None Declared