P139

Phase Locking Value as a tool to evaluate brain connectivity in Parkinson's disease

Pasquale Maria Pecoraro[1,2], L. Ricci[1,2], M. L. Caminiti[1,2], S. P. Carbone[1,2], V. Di Lazzaro[1,2], L. di Biase[1,2,3]

[1]Research Unit of Neurology, Neurophysiology and Neurobiology, Department of Medicine and Surgery, University Campus Bio-Medico of Rome, Rome, Italy
[2]Operative Research Unit of Neurology, Fondazione Policlinico Universitario Campus Bio-Medico, Rome, Italy
[3]Brain Innovations Lab, University Campus Bio-Medico of Rome, Rome, Italy

Introduction: Among neurophysiological techniques electroencephalogram (EEG) is one of the most versatile and wide available technique, these features combined with its good balance between temporal and spatial resolution, lead this technology to be explored in several studies for PD biomarkers research. Phase Locking Value (PLV) is a non-linear measure of pairwise functional connectivity used to quantify the phase coupling between two EEG signals.

Objective: The present study explores the discrimination ability of PLV, in differentiating Parkins's disease (PD) patients from Healthy Controls (HC), during rest and a motor task of lower limbs.

Methods: High-density EEG data from 26 PD patients and 13 HC were analyzed. EEG signals were recorded both during a motor task of lower limbs and at rest. PLV was calculated for each group during the two conditions for the following frequency bands: 2-4 Hz (delta); 5-7 Hz (theta); 8-12 Hz (alpha); 13-29 Hz (beta); 30-60 Hz (gamma). The diagnostic performance of PLV for the binomial discrimination of PD vs HC discrimination was evaluated for both conditions.

Results: During the resting state no significant differences in PLV connectivity between the two groups was showed. Conversely, during the motor task in HC compared to PD patients results showed a higher PLV connectivity in delta band. Furthermore, diagnostic performance analysis, showed a sensitivity of 100%, a negative predictive value (NPV) of 100% and an area under the ROC (AUC) of 0.75.

Conclusions: HC demonstrated higher ability in modulating neuronal synchronization in delta band during motor tasks respect to PD patients, highlighting the influence of movement on connectivity. This neurophysiology analysis could be explored as a potential screening biomarker for PD patients in future studies.