

Inter-hemispheric EEG coherence analysis in Parkinson's disease: Assessing brain activity during emotion processing

Abstract

Parkinson's disease (PD) is not only characterized by its prominent motor symptoms but also associated with disturbances in cognitive and emotional functioning. The objective of the present study was to investigate the influence of emotion processing on inter-hemispheric electroencephalography (EEG) coherence in PD. Multimodal emotional stimuli (happiness, sadness, fear, anger, surprise, and disgust) were presented to 20 PD patients and 30 age-, education level-, and gender-matched healthy controls (HC) while EEG was recorded. Inter-hemispheric coherence was computed from seven homologous EEG electrode pairs (AF3-AF4, F7-F8, F3-F4, FC5-FC6, T7-T8, P7-P8, and O1-O2) for delta, theta, alpha, beta, and gamma frequency bands. In addition, subjective ratings were obtained for a representative of emotional stimuli. Inter-hemispherically, PD patients showed significantly lower coherence in theta, alpha, beta, and gamma frequency bands than HC during emotion processing. No significant changes were found in the delta frequency band coherence. We also found that PD patients were more impaired in recognizing negative emotions (sadness, fear, anger, and disgust) than relatively positive emotions (happiness and surprise). Behaviorally, PD patients did not show impairment in emotion recognition as measured by subjective ratings. These findings suggest that PD patients may have an impairment of inter-hemispheric functional connectivity (i.e., a decline in cortical connectivity) during emotion processing. This study may increase the awareness of EEG emotional response studies in clinical practice to uncover potential neurophysiologic abnormalities.

Keywords

Electroencephalography; Emotion; Inter-hemispheric coherence; Parkinson's disease