Prefrontal functions in Multiple Sclerosis patients without cognitive impairment: a neuropsychophysiological approach.

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INTRODUCTION

Emotional processing and executive systems are functions depending by the prefrontal cortex areas. Some behavioural and neuroimaging evidences show that Multiple Sclerosis (MS) can influence emotion perception. These studies investigate emotional processing using only facial emotion (1-2). Moreover, impaired executive functioning can be present since early stages of MS; this pattern was correlated with changes in fronto-subcortical fiber tracts (3). A specific method for assessing executive functions is the task-switching paradigm, that examines the processes to shift between one task to another.

OBJECTIVE

Given the small number studies available concerning the primary impairment of prefrontal functions in MS patients without cognitive impairment, the aim of this study is to explore the prefrontal cognitive functioning by means of a task-switching and psychophysiology emotion paradigm.

MATERIALS & METHODS

Twenty-four patients with diagnosis of MS and 25 Healthy Control (HC, paired for age, sex and education) were enrolled. We considered MS patients without cognitive impairment, avoiding possible effect on emotional/executive processing. In the first study we investigated the impact of MS on the emotional rating (in terms of pleasantness and arousal) and neurophysiological responses (Event-Related Potentials–ERP’s and Skin Conductance Response–SCR) using a set of affective visual stimuli selected from the International Affective Picture System (IAPS). In the second study, participants were asked to complete two different tasks in rapid and random succession, so that the task may change from one trial to the subsequent (switch trial), or may be repeated (repetition trial) using a task-switching paradigm.

RESULTS

First Study: MS patients present a higher and more intense emotional/sympathetic response to emotional complex stimuli (F1,135=4,785; p=0.03) (Figure 1). Moreover, considering neurophysiological activity (P200 component assessed on Cz), we observed a significant difference between groups (F1,135=4,102; p=0.04) (Figure 2) indicating an increased latency in the neurophysiological response to an emotional trigger in MS patients. No differences were observed in relation to behavioural responses. Second Study: analyses on switch and repetition trials showed that the MS patients performed significantly worse just in switch trials (F1, 47=4,62; p=0,04) (Figure 3). Moreover, a significant increase in Reaction Times (RT) in MS groups to shift between one task to the other was observed (F1,47=10,2; CFI; p= 0,002) (Figure 4). No differences were observed in RT related to the disengagement from the previously executed task.

CONCLUSIONS

Our findings suggest a specific impairment of the psychophysiological processing of emotional complex stimuli and a primary engagement of executive functions in MS patients without cognitive impairment, probably depending by the functional integrity of the prefrontal cortex. Detecting early executive dysfunctions with specific cognitive testing could be useful for a prompt enrolment of MS patients into adequate rehabilitation protocols.

REFERENCE