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Left Dorsolateral Prefrontal Cortex Rtms Impact on Fractional Anisotropy, Depression and Cognition in Relapsing Multiple Sclerosis Patients

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Depression is one of the most common multiple sclerosis (MS) psychiatric comorbidities, having a lifetime prevalence that approaches 50%, which is three times the rate reported in the general population. Despite its negative impact on patients' quality of life (QoL) and their adherence to medications, depression in MS remains an underdiagnosed and undertreated symptom with no existing treatment guidelines. A clear association between depression and cognitive impairment in physically healthy individuals have been previously described, a similar association was also reported in MS patients, but it remains unknown if these impairments are reversible upon depression treatment. The dorsolateral prefrontal (DLPF) area has primarily been associated with executive functions and is considered a key node in attention networks, besides, accumulating evidence also implicates it as an important neural substrate for depression and being the most accessible area for stimulation compared to other regions linked to depression pathophysiology. Repetitive transcranial magnetic stimulation (rTMS) of DLPF cortex is considered a non-invasive alternative or adjunctive treatment for different types of depression disorders, including drug resistant depression. Fractional anisotropy (FA) is a measurement used in Diffusion Tensor Imaging (DTI) and it is most commonly used in the assessment of white matter microstructure. Previous DTI studies have reported altered FA values in patients with depression. According to this background, we conducted this study to evaluate the possible effect of high frequency rTMS (HF-rTMS) versus selective serotonin reuptake inhibitors (SSRI) therapy on DLPF area microstructure using DTI in depressed relapsing remitting multiple sclerosis (RRMS) patients , and to furthurly assess the treatments' impact on patients' cognitive functions and depressionThis was an open label, parallel group, randomized, multicenter study conducted on clinically depressed right handed RRMS patients diagnosed in accordance to the 2010 McDonald's criteria with EDSS scores of ≤ 5, recruited from the Kasr Al-Ainy Multiple Sclerosis Clinic, neurology department, Cairo University hospitals and Agouza Police Hospital, neurology department, Egypt, between October 2015 and September 2017. Only patients who met the Structured Clinical Interview for DSM-IV (SCIDIV) criteria for depression were enrolled.

The study protocol was approved by the Cairo University neurology department review board and conformed to the Helsinki declaration. Written informed consent was obtained from all participants prior to enrolment. Using computer-based randomization, patients who met the inclusion criteria were assigned to 2 groups, one receiving SSRIs and another receiving 3 rTMS sessions per week for 4 consecutive weeks. At baseline and 6 weeks following treatments, DTI for left DLPF area, BDI to quantify depression severity and Paced Auditory Serial Addition Test (PASAT-B) for the assessment of cognitive functions were performed. Left DLPF cortex rTMS was delivered using a" Magstim Rapid® magnetic stimulator (Magstim Co. Ltd, Whitland, Dyfed, UK) at a frequency of 10HZ in 10-second trains at 110% of the estimated motor threshold (MT). Twenty trains were given in each session with a 10 second inter-train interval with 100 stimuli and 80% of MT.

Foot Note: This work is partly presented at Department of Neurology, Agouza Police Hospital, Egypt