

Comparison of Two Transcranial Magnetic Stimulation Protocols on Spasticity in Multiple Sclerosis - Pilot Study of a Randomized and Blind Cross-over Clinical Trial

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Abstract : Objective: To compare two protocols of Transcranial Magnetic Stimulation (TMS) on quadriceps muscle spasticity in individuals diagnosed with Multiple Sclerosis (MS). Method: Clinical, crossover study, in which six adult individuals diagnosed with MS and spasticity in the lower limbs were randomized to receive one session of high-frequency ($\geq 5\text{Hz}$) and low-frequency ($\leq 1\text{Hz}$) TMS on motor cortex (M1) hotspot for quadriceps muscle, with a one-week interval between the sessions. To assess the spasticity was applied the Ashworth scale and were analyzed the latency time (ms) of the motor evoked potential (MEP) and the central motor conduction time (CMCT) of the bilateral quadriceps muscle. Assessments were performed before and after each intervention. The difference between groups was analyzed using the Friedman test, with a significance level of 0.05 adopted. Results: All statistical analyzes were performed using the SPSS Statistic version 26 programs, with a significance level established for the analyzes at $p < 0.05$. Shapiro Wilk normality test. Parametric data were represented as mean and standard deviation for non-parametric variables, median and interquartile range, and frequency and percentage for categorical variables. There was no clinical change in quadriceps spasticity assessed using the Ashworth scale for the 1 Hz ($p = 0.813$) and 5 Hz ($p = 0.232$) protocols for both limbs. Motor Evoked Potential latency time: in the 5hz protocol, there was no significant change for the contralateral side from pre to post-treatment ($p > 0.05$), and for the ipsilateral side, there was a decrease in latency time of 0.07 seconds ($p < 0.05$); for the 1Hz protocol there was an increase of 0.04 seconds in the latency time ($p < 0.05$) for the contralateral side to the stimulus, and for the ipsilateral side there was a decrease in the latency time of 0.04 seconds ($p < 0.05$), with a significant difference between the contralateral ($p = 0.007$) and ipsilateral ($p = 0.014$) groups. Central motor conduction time in the 1Hz protocol, there was no change for the contralateral side ($p > 0.05$) and for the ipsilateral side ($p > 0.05$). In the 5Hz protocol for the contralateral side, there was a small decrease in latency time ($p < 0.05$) and for the ipsilateral side, there was a decrease of 0.6 seconds in the latency time ($p < 0.05$) with a significant difference between groups ($p = 0.019$). Conclusion: A high or low-frequency session does not change spasticity, but it is observed that when the low-frequency protocol was performed, there was an increase in latency time on the stimulated side, and a decrease in latency time on the non-stimulated side, considering then that inhibiting the motor cortex increases cortical excitability on the opposite side.

Keywords : multiple sclerosis, spasticity, motor evoked potential, transcranial magnetic stimulation

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