DOUBLE-DOSED NON-INVASIVE BRAIN STIMULATION: IS MORE BETTER?

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Since the FDA-approved once-daily intermittent theta-burst stimulation (iTBS) treatment for depression rapidly extends to six weeks, patients and caregivers face a considerable logistic burden. Therefore, twice-daily stimulation has gained popularity as a therapeutic tool for stress-related psychiatric disorders. However, the neuro-endocrinological effect of one or two (double-dosed) iTBS sessions remains unclear. Considering that the most frequently stimulated target of non-invasive brain stimulation in psychiatry, the dorsolateral prefrontal cortex (DLPFC), is involved in regulating the hypothalamic-pituitary-adrenal (HPA) system, stress regulation responses, such as cortisol secretion, are of interest. Using a two-period cross-over design, this study looked at the effect of double-dosed iTBS over the left DLPFC on salivary cortisol in 38 healthy volunteers after being stressed with the Trier Social Stress Test (TSST). After the first active iTBS session, no differential effects on salivary output were observed as contrasted to sham. However, after the second active session, there was a significantly smaller decrease in salivary cortisol concentrations in the active iTBS condition than in the sham condition. Our results suggest that double-dosed iTBS after being stressed might affect stress recovery differently than a single session of iTBS.

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BRAIN DERIVED NEUROTROPHIC FACTOR NEGATIVELY RESPONDED TO TRANSCRANIAL DIRECT CURRENT STIMULATION: RANDOMIZED CONTROLLED TRIAL

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Background: Brain-derived neurotrophic factor (BDNF) levels could objectively indicate the synaptic plasticity; it has also been suggested that modulation of the (BDNF) might be a part of the mechanisms involved in transcranial direct current stimulation tDCS effects on synaptic connectivity. The aim of this study is to investigate associated change within BDNF level in response to brain stimulation in subacute stroke patients. The trial registration in the clinical trial ID is NCT04770363.

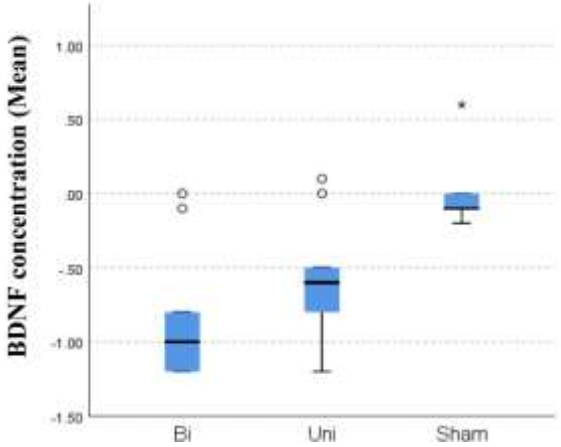

Figure 1. Mean negative change in BDNF concentration between unihemispheric, bihemispheric, and sham groups, as represented in the Box-plot of the Kruskal-Wallis rank-sum test

Methods: 36 sub-acute ischemic stroke survivors participated in the study, randomly assigned to one of three groups receiving (tDCS), bihemispheric (Anodal over affected M1, and cathodal over healthy M1) or unihemispheric (Anodal over affected M1, and cathodal stimulation over the supraorbital bone of the healthy side) or sham (No current). ActivaDose tDCS (USA) used, consisted of 20 minutes of 2 mA intensity; in each session for 12 sessions three sessions per week. A 3ml blood sample was withdrawn from one of the arm veins. The first sample was withdrawn in the first session and the second sample after the end of the tDCS sessions after four weeks of the treatment. Serum levels of BDNF were determined using commercially available ELISA kits (SunRed Biotechnology Company).

Results: There was a statistically significant difference (Negative change) within the groups for bihemispheric (P-value = 0.011), and unihemispheric stimulation (P-value = 0.003). For the sham group, no significant difference (P-value = 0.492) as presented in figure 1. There was significant difference between groups (P-value = 0.005). Running post-hoc test by pairwise revealed both bihemispheric and unihemispheric stimulation significantly decreased BDNF levels more than sham (P=0.001), (P=0.021), respectively and with no significant difference between both experimental groups (P=0.217).

Conclusion: BDNF has showed significant decrease after tDCS application in ischemic stroke patients, even the motor measures have been positively improved.

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LONG-TERM HOME-BASED FRONTO-CEREBELLAR TRANSCRANIAL DIRECT CURRENT STIMULATION FOR AUTISM SPECTRUM DISORDER: A CASE SERIES

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Introduction: In a previous study, we reported that right cerebellar/left frontal transcranial direct current stimulation (tDCS) is feasible, safe and potentially effective for improving Autism Spectrum Disorder (ASD) symptoms among children (D'Urso 2021).

Considering the cumulative neurophysiological effect of repeated sessions of tDCS and the potential decay of the obtained clinical improvements after discontinuation, longer-term treatments show great promise to increase the clinical outcomes. Home-based tDCS is a suitable option for ensuring a long-lasting compliance to the treatment, especially in ASD patients, who are very susceptible to routine changes and environmental stressors.

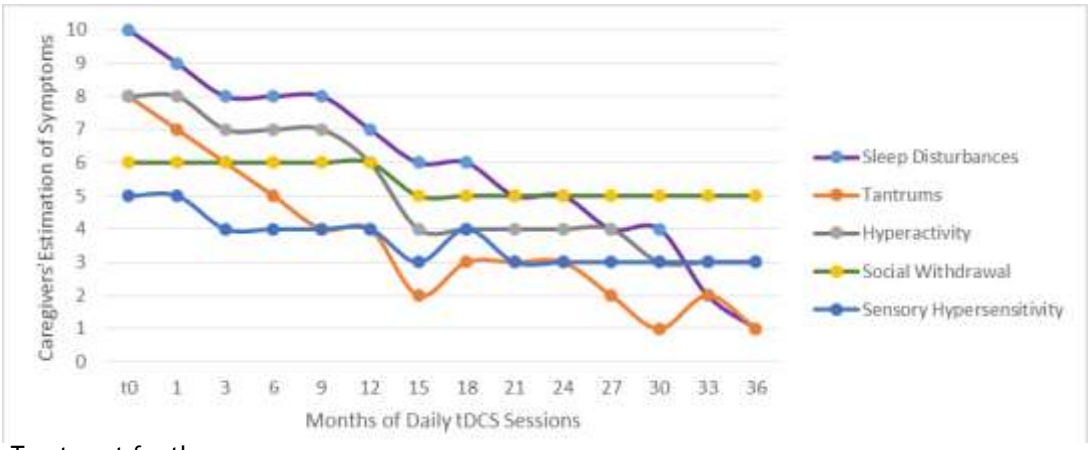

Figure 1. Treatment for three years

Methods:

- 6 patients (4M, 2F) with ASD, aged 7 to 37 years (mean 15.2);
- Continuous daily 20-minute tDCS sessions with current intensity ranging from 1 to 2 mA;
- The anode was placed over the dorsolateral prefrontal cortex (DLPFC) and the cathode over the right cerebellum;