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Comparison Effects of Anodal Versus Cathodal Trans-Cranial Direct Current Stimulation Over Primary Motor Cortex on Lower Limb Muscles' Spasticity: A Randomized Clinical Trial Study

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Affiliations Collapse

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Abstract

Spasticity often results from maladaptive neuroplastic changes in both the affected and nonaffected primary motor cortex (M1) that are accompanied by downstream effects on descending motor pathways. The aim of this study was to compare the effects of anodal transcranial direct current stimulation (a-tDCS) over the affected M1 and cathodal tDCS (c-tDCS) over the unaffected M1 in patients with stroke. Thirty-nine patients were divided into the following three groups with a block randomization method: (I) affected M1 a-tDCS, (II) unaffected M1 c-tDCS, and (III) sham tDCS. Additionally, all groups received routine physiotherapy (PT). Electromyographic activity of the lateral gastrocnemius (LG)

and tibialis anterior (TA) muscles during passive and active dorsiflexion/plantarflexion (DF/PF), as well as the modified Ashworth scale (MAS) and the World Health Organization Quality of Life Questionnaire (WHOQOL), were assessed before, immediately, and 7 weeks after the interventions. The results indicated that TA activity during active DF increased immediately following the intervention in the affected MI a-tDCS group compared to the other groups ($p < .001$). LG activity during both active and passive DF decreased, MAS and WHOQOL scores increased immediately and 7 weeks after the intervention in the a-tDCS group ($p < .001$). These findings highlight the immediate and short-term efficacies of affected MI a-tDCS combined with PT in improving muscle spasticity and function, QOL in these patients. Trial Registration: IRCT17023018057088N1.

Keywords: brain electrical stimulation; modified Ashworth scale; muscle activity; primary motor cortex; spasticity; stroke.

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