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The Impact of Different tDCS Intensities on Higher Mental Function in the Elderly Population with Cognitive Impairment: A Pilot Study

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ABSTRACT

Introduction: Cognitive decline in the geriatric population significantly impacts higher mental functions, such as memory, executive skills, and decision-making, which are essential for daily life and mental well-being. Transcranial Direct Current Stimulation (tDCS), a non-invasive and low-risk neuromodulation technique, has demonstrated the potential in improving cognitive performance by modulating cortical excitability in the dorsolateral prefrontal cortex. Despite its growing use, the optimal tDCS intensity for enhancing higher mental functions in elderly individuals with cognitive impairment has not been established.

Aim: To evaluate the effects of varying tDCS intensities on higher mental functions in the geriatric population with cognitive impairment.

Materials and Methods: This pilot study recruited participants based on specific inclusion criteria. Subjects were randomised into four groups: Group 1 received 0.5 mA, Group 2 received 1 mA, Group 3 received 1.5 mA, and Group 4 received 2 mA of tDCS targeting the dorsolateral prefrontal cortex. Each session lasted 20 minutes and was conducted five days a week for six consecutive weeks. Cognitive performance was assessed using the Montreal Cognitive Assessment Scale (MoCA) before and after the intervention. Statistical analysis included the Shapiro-Wilk test for normality, with parametric or non-parametric tests applied based on data distribution.

Results: The study observed a dose-dependent improvement in cognitive performance, with Groups 3 (1.5 mA) and 4 (2 mA) showing significant enhancements in MoCA scores compared to Groups 1 (0.5 mA) and 2 (1 mA). Statistical tests confirmed that higher intensities of tDCS resulted in greater improvements in higher mental functions.

Conclusion: This pilot study highlights the effectiveness of higher tDCS intensities (1.5 and 2 mA) in improving higher mental functions in the geriatric population with cognitive impairment. These findings provide a foundation for optimising tDCS protocols in geriatric cognitive rehabilitation and call for further large-scale studies to confirm these results.

Keywords: Dorsolateral prefrontal cortex, Geriatric, Higher mental function.