عنوان مقاله:

Reaction Time and Non-invasive Brain Stimulation

محل انتشار:

هشتمین کنگره علوم اعصاب و پایه و بالینی (سال: 1398)

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خلاصه مقاله:

Background and Aim : Temporal processing is essential for precise movement execution. Precise motor timing engages a number of cortical brain areas such as parietal, frontal, primary motor and premotor areas. Noninvasive brain stimulation technique can be used for modulation of cortical excitability and therefore, influence the outcomes of a motor behavior such as the time required to respond to a motor stimulus (reaction time). The aim of this study was to investigate whether reaction time during a sequential visual isometric pinch task (SVIPT) can be affected by a single-session anodal transcranial direct current stimulation (a-tDCS) over the fronto-parietal network (FPN) sites such as dorsolateral prefrontal cortex (DLPFC), primary motor cortex (M1) or posterior parietal cortex (PPC).Methods : A total of 48 right-handed healthy participants were randomly assigned to one of the four stimulation groups: 1) a-tDCS of left M1, 2) left DLPFC, 3) left PPC and 4) sham. A-tDCS was applied during SVIPT in which participants precisely control their forces to reach seven different target forces from 10 to 40% of maximum voluntary contraction (MVC) presenting on a computer screen. The ratio of reaction times were measured in both the trained and untrained hands.Results : There were significant differences between a-tDCS groups on ratio of reaction times at target forces of 15% MVC in both the trained and untrained ($p = .012$) hands. M1 showed significant elongation in reaction time compared to other two groups (PPC and Sham) in the right trained hand. Whereas, the DLPFC a-tDCS group compared to the M1 group, revealed considerable reduction in reaction time for the target force of 15% MVC in the left untrained hand ($F 3, 44) = 3.6$, $p = .02$). No significant differences were found in other target forces.Conclusion : Our findings suggest that different sites of the FPN (DLPFC, M1 or PPC) were differentially affected by a single session of a-tDCS at some target forces during SVIPT. It seems the left PPC is more involved in temporal processing compared to the left M1 for control of the right trained hand. Left DLPFC is more engaged in the left-hand (untrained) time processing in a number of target forces in SVIPT. Further research is needed to better understand fundamental aspects of these areas on sequence learning in a precision control task such as SVIPT.

کلمات کلیدی:
Anodal transcranial direct current stimulation, a-tDCS, Reaction time, Primary motor cortex, Dorsolateral prefrontal cortex and Posterior parietal cortex