

## **Effects of Transcranial Direct Current Stimulation during Balance Training on Balance and Ankle Function in Patients with Chronic Ankle Instability**

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### **ABSTRACT**

Patients with chronic ankle instability (CAI) often experience impaired postural control associated with alterations in the central nervous system, which suggests a new therapeutic approach. Transcranial direct current stimulation (tDCS) is an emerging brain stimulation method that can selectively modulate brain activity. Recent research has shown synergistic effects of tDCS and balance training (BT) for postural control in musculoskeletal patients, but it has not yet been explored in CAI patients. **PURPOSE:** A pilot randomized-controlled study was employed to explore the effects of tDCS with BT in comparison with sham tDCS with BT for patients with CAI. **METHODS:** Nineteen patients with CAI were randomly assigned to receive anodal tDCS with 2 mA intensity over the primary motor cortex (n=10) or sham tDCS (n=9) 3 times a week for 4 weeks during BT. BT consisted of single-leg balance and wobble-board exercises on the CAI-involved side. Static and dynamic balance, as well as self-reported function, were assessed before intervention, then 2- and 4-weeks post-intervention. Center of pressure (COP) velocity (cm<sup>2</sup>) was assessed on a force plate during bipedal and unipedal stance with eyes open and closed conditions for the static postural control while a normalized composite score (%) was assessed during a modified star excursion balance test (SEBT) for the dynamic postural control. The self-reported function was evaluated using the Foot and Ankle Ability Measures (FAAM). Separate 2×3 ANOVAs with repeated measures were performed to compare two groups and three times for each of the outcomes. The alpha level was set at p< 0.05. **RESULTS:** There were no group-by-time interactions for all outcomes (p>0.05). However, there were significant time main effects for bipedal balance with eyes closed condition (p=0.024), composite score on SEBT (p<0.001) and FAAM (activity of daily living: p=0.027; sport: p<0.001), showing significant improvement in static bipedal balance after 4 weeks, dynamic balance after 2- and 4 weeks, and self-reported function after 4 weeks of BT compared to the baseline, regardless of tDCS condition. **CONCLUSION:** The current preliminary findings showed no additive benefit of tDCS during BT in comparison with sham tDCS for improving postural control and self-reported function in patients with CAI.