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# Effectiveness of Transcranial Direct Current Stimulation along with Body Weight Supported Overground Gait Training on Central Pattern Generator of Locomotion in Individual with Incomplete Spinal Cord Injury: A Case Report

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## ABSTRACT

Spinal cord injury (SCI) results from disruption of neural elements of the spinal cord, leading to loss of motor and sensory function below the level of injury. Walking and functional independence remain pivotal goals for individuals with SCI. Central pattern generators (CPGs) are specialized neural circuits within the spinal cord that generate rhythmic, instinctive, and repetitive motor patterns autonomously, independent of continuous sensory inputs or supra-spinal inputs allowing for coordinated movement. The combination of tDCS and body weight-supported overground training is a cutting-edge approach being researched for enhancing motor recovery in individuals with spinal cord injury (SCI). To evaluate the effectiveness of trans-cranial direct current stimulation and body weight supported overground gait training on CPG of locomotion in individual with incomplete spinal cord injury. A 37-year-old male was diagnosed with traumatic incomplete spinal cord injury (D12-L1) with ASIA B in August 2023. On neurological examination, the bilateral lower limb had sensory and motor impairment. The participant was not able to walk with assistive devices and was wheelchair dependent. The participant was intervened with tDCS (anode over the M1 region corresponding to the dominant leg, cathode over the contralateral supraorbital region, intensity= 2mA,20 minutes) with body weight supported overground gait training along with conventional rehabilitation for 5 days per week for the duration of 4 weeks. Pre-intervention and post-intervention assessment was done on Day 0 and Day 30 respectively. ASIA Impairment Score, Walking Index for spinal cord injury-II and Spinal cord independence measure-III were selected as desired outcome measures. There was significant improvement in the motor scores of ASIA-Score (1/50 to 3/50), sensory scores of ASIA-Score (LT= 72/112, PP=72/112 to LT=80/112, PP=80/112), the scores of WISCI-II (0/20 to 6/20) AND SCIM-III (42/100 to 54/100). Significant improvement was shown in all outcome measures, and the participant was able to initiate a walk with KAFO and assistive devices. tDCS, a non-invasive brain stimulation technique, has emerged as a potential therapeutic intervention that can promote neuroplasticity and enhance motor spinal connectivity thereby activating the CPG of Locomotion in spinal cord injury survivors.

**Keywords:** ASIA-Score, WISCI-II, CPG, tDCS, iSCI