

## Abstract

# Slacklining to facilitate rehabilitation in Traumatic Brain Injury 2 years post injury: A case study for lower limb weakness and balance and clonus

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### ABSTRACT

**Background:** Slacklining, a complex neuromechanical composite-chain activity on a tightened band, uses whole-body dynamics to respond to external environmental changes. This enables self-developed response strategies for balance-retention through learning, neuroplastic changes and presynaptic down-regulation of reflexes including Hoffman's reflex. Composite chain activities hasten skill acquisition by providing challenges, uncommon in daily life or rehabilitation.

**Methods:** Case study examination of single and dual slacklining rehabilitation for a 42-year-old female, two years post traumatic brain injury (TBI) with affected balance, clonus, left-sided weakness, and fatigue (physical, cognitive, and psychosocial). Slacklining was introduced for 4-weeks (Figure 1) and effectiveness assessed through functional outcome status.

**Results:** Rehabilitation outcomes (Figure 2) included 2-month inpatient in a brain-injury rehabilitation unit (Pt#1-2, ICU-wards); Outpatient rehabilitation 3-2xweekly over 16 months, followed by independent exercises and hydrotherapy

(Pt#2-3); return to work commenced 1-year post-injury, gradually increasing from 4-18 hours over 12 months, with functional status unchanged (Pt#3-4). Increased work to 24-hours/week decreased hydrotherapy and exercises from fatigue and poor immunological status (Pt#4); remained working 24-hours/week, started slacklining 2-4xweek 10 minutes (Pt#5-baseline measure); after 3-weeks of slacklining function, balance and fatigue improved while clonus reduced (Pt#6). Status progressed with significant improvements in the ARGs, BESS and MFIS (student t-test,  $p < 0.05$ , Table 1).

**Conclusions:** These preliminary data indicate Slacklining has a notable effect on function post TBI. Slacklining as adjunct therapy to existing land/hydrotherapy exercises provides external stimulations that activate global-body responses and facilitate neuroplastic changes including pre-synaptic central down-regulation for some reflexes. This facilitated control, reduced neural fatigue and functional gains were quantifiable. Further research is required to determine therapy frequency and progression rates.

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