DYNAMIC BALANCE RETRAINING USING GAIT PERTURBATIONS IN INDIVIDUALS WITH MODERATE-TO-SEVERE TRAUMATIC BRAIN INJURY

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Abstract

• Individuals with traumatic brain injury (TBI) often present with balance problems associated with a decrease in their social participation.
• An innovative approach consists in using perturbations on a split-belt treadmill to improve dynamic balance.
• The aim of this study was to quantify the effects of a training program including perturbations on a split-belt treadmill on dynamic balance, walking speed, balance confidence and social participation in individuals with TBI at the social integration rehabilitation phase or at a chronic stage.

Methods

• 8 individuals were recruited between March, 2017 and March, 2018.
• Inclusion criteria were: diagnosis of moderate or severe TBI in social integration rehabilitation phase or chronic stage, subjective and/or objective balance trouble, be able to walk on a treadmill with no technical aid.
• Intervention: 6 training sessions on a 3-week period on a split-belt treadmill with:
  - self-perturbations (head movements, 360° turns, dual cognitive task (Stroop))
  - unexpected perturbations (stop-and-go, predictable and unpredictable slips and trips by increasing or decreasing the speed of one treadmill belt for one step at a time).
• Outcome measures: Mini-BESTest, Community Balance & Mobility Scale (CB&M), comfortable and fast walking speed, Reintegration to Normal Living Index and Activity-Specific Balance Confidence Scale; measured twice before and twice after.
Results

- Results indicated a statistically significant improvement of 2.1(1.5)/28 at the Mini-BESTest and 7.0 (6.9)/96 at the Community Balance and Mobility Scale (CB&M).
- No significant change in speed, balance confidence and social participation were observed despite some variations for in some individuals.
- A learning effect was observed between the two pre-intervention assessments.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Gender (F/M)</th>
<th>DOB</th>
<th>Age at time of TBI</th>
<th>Time since TBI</th>
<th>Type of TBI (M/S)</th>
<th>GCS at admission (1/15)</th>
<th>Change in Mini-BESTest</th>
<th>Change in CB&amp;M</th>
<th>Change in comfortable speed</th>
<th>Change in fast speed</th>
<th>Change in ABC</th>
<th>Change in RNLI</th>
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</table>

Conclusions

• We saw variable effects depending on individuals.

• Minimally clinical important differences (MCID) for the Mini-BESTest (4/28) and for RNLI (7%) as well as minimal detectable change (MDC) for the CB&M (8/96) were reached by 3, 3 and 2 individuals, respectively. The training program thus had an important effect in 6 out of 8 participants.

• Cognitive impairments may have affected results for the two questionnaires (eg: two individuals with clinically important difference in balance and lower scores at the questionnaires).

• Training parameters may be questioned: number of sessions and timeframe of the study and applicability of the protocol in a social integration rehabilitation phase or at a chronic stage. (eg: 20 minutes every week or second week over a 8-12 week-period).

• The project was presented to the physiotherapist team of the Constance-Lethbridge Rehabilitation Center in September 2018. The possibility of a pragmatic study on the use of the modality was proposed for 2019.
References


