Trunk control and gross motor outcomes after body-weight supported treadmill training in young children with severe cerebral palsy: A case series

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Trunk Control and Gross Motor Outcomes after Body-Weight Supported Treadmill Training in Young Children with Severe Cerebral Palsy: A Case Series

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BACKGROUND AND PURPOSE

- Children with cerebral palsy (CP) classified as Gross Motor Function Classification System (GMFCS) level V present with decreased gross motor function & trunk control that impacts their functional activities & participation in family activities. ([Palisano et al 2008])
- Research indicates body-weight supported treadmill training (BWSTT) may improve motor control for children with neuromotor disabilities. ([Damiano & DeJong 2009])
- The toddler years present a window of opportunity for developmental changes.
- Early physical therapy during the toddler years may be a critical time for impacting motor outcomes for children with CP in GMFCS levels IV-V.

The purpose of this case series was to explore the impact of a 6-week BWSTT intervention on postural control & gross motor function in 3 young children with CP in GMFCS levels IV & V.

METHODS

- Total # sessions completed (%)
- Total time standing:
  - Avg time standing per session in min/sec (range)
- Average treadmill speed per mph (range)
- % BW

INTERVENTION

- Attended BWSTT sessions 3 X/ wk for 6 wks.
- Experienced pediatric PT & 3 DPT student assistants facilitated gait of child with treadmill & BWS harness system
- Facilitation was decreased when the child demonstrated improved motor control.

OUTCOME MEASURES

GMFM-66 = Gross Motor Function Measure ([Russell et al 2000])
SATCo = Segmental Assessment of Trunk Control ([Butler et al 2010])

OUTCOMES

<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>GMFM-66</th>
<th>SATCo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score (SE)</td>
<td>95% CI</td>
<td>Total score (Level of control)</td>
</tr>
<tr>
<td>Child 1</td>
<td>Pretest</td>
<td>20.5 (2.2)</td>
</tr>
<tr>
<td>Posttest</td>
<td>26.0 (2.0)</td>
<td>95% CI: 22.1 – 29.9</td>
</tr>
<tr>
<td>Child 2</td>
<td>Pretest</td>
<td>36.8 (1.5)</td>
</tr>
<tr>
<td>Posttest</td>
<td>42.4 (1.1)</td>
<td>95% CI: 40.3 – 44.6</td>
</tr>
<tr>
<td>Child 3</td>
<td>Pretest</td>
<td>31.8 (1.9)</td>
</tr>
<tr>
<td>Posttest</td>
<td>40.9 (1.2)</td>
<td>95% CI: 38.6 – 43.2</td>
</tr>
</tbody>
</table>

DISCUSSION

- The outcomes suggest that gross motor function & trunk control may improve through BWSTT in young children with severe CP.
- The 6 wk time frame was chosen based on previous literature ([Dodd & Foley 2007, Mattern-Baxter 2009]), but a longer time frame may have produced greater results.
- Parents of all 3 children noticed improvements & expressed the desire to continue the intervention.
- Future research is needed to determine if this type of intervention can improve function across a larger population of toddlers with CP in GMFCS levels IV & V.

ACKNOWLEDGMENTS

- Thanks to the DPT Students who trained as research assistants & assisted with this project: Blaise Bourgeois, Jessica Bowens, Ashley Hall, Hannah Huns, Darius Heckard, Lauren Hughes, Sara Malik, Kayce McIver.
- To the families that participated in this project, thank you for consistently bringing your children & trusting us through this process.

CASE DESCRIPTIONS

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age during pretest</th>
<th>Gender</th>
<th>Race/ ethnicity</th>
<th>GMFCS level</th>
<th>CP distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child 1</td>
<td>3.3 yrs</td>
<td>Male</td>
<td>White</td>
<td>V</td>
<td>Spastic quadriplegia</td>
</tr>
<tr>
<td>Child 2</td>
<td>2.1 yrs</td>
<td>Male</td>
<td>Hispanic</td>
<td>IV</td>
<td>Spastic diplegia</td>
</tr>
<tr>
<td>Child 3</td>
<td>3.4 yrs</td>
<td>Female</td>
<td>Asian</td>
<td>IV</td>
<td>Spastic triplegia</td>
</tr>
</tbody>
</table>

Figure: Child 3 during a walking bout (A) & standing rest (B) in typical BWSTT session

- None of the children were able to walk without assistance.
- All 3 children displayed spasticity in bilateral lower extremities.