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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.

CASE DESCRIPTIONS

Participant	Age during pretest	Gender	Race/ethnicity	GMFCS level	CP distribution
Child 1	3.3 yrs	Male	White	V	Spastic quadriplegia
Child 2	2.1 yrs	Male	Hispanic	IV	Spastic diplegia
Child 3	3.4 yrs	Female	Asian	IV	Spastic triplegia

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

METHODS

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.

	Total # sessions completed (%)	Avg total time LT per session in min:sec (range)	Avg treadmill speed in mph (range)	Avg % BWS	Avg time standing per session in min:sec (range)
Child 1	17 (94.44%)	18:54 (11:18 – 25:54)	1.52 (0.7 – 1.9)	35%	9:41 (4:25 – 16:56)
Child 2	18 (100%)	21:00 (10:32 – 26:24)	0.97 (0.6 – 1.2)	46%	7:16 (3:01 – 12:43)
Child 3	16 (88.89%)	20:18 (4:26 – 27:00)	0.94 (0.4 – 1.2)	44%	8:26 (5:56 – 18:06)

OUTCOME MEASURES

GMFM-66 = Gross Motor Function Measure (Russell et al 2000)

SATCo = Segmental Assessment of Trunk Control (Butler et al 2010)

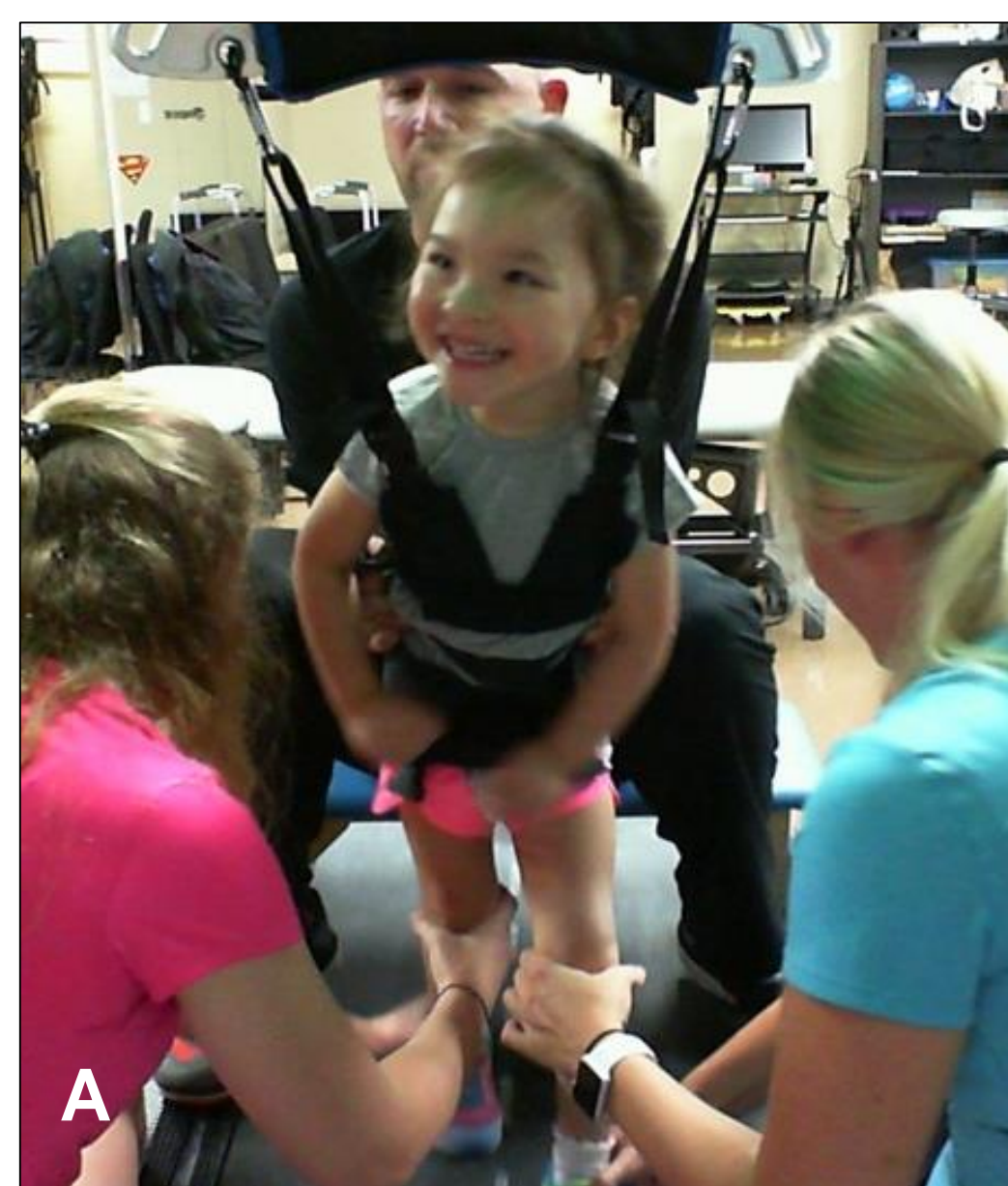


Figure: Child 3 during a walking bout (A) & standing rest (B) in typical BWSTT session

OUTCOMES

		GMFM-66	SATCo
		Score (SE) 95% CI	Total score (Level of control)
Child 1	Pretest	20.5 (2.2) 95% CI: 16.3 – 24.8	1/20 (Level 0)
	Posttest	26.0 (2.0) 95% CI: 22.1 – 29.9	2/20 (Level 1)
Child 2	Pretest	36.8 (1.5) 95% CI: 33.9 – 39.7	6/20 (Level 2)
	Posttest	42.4 (1.1) 95% CI: 40.3 – 44.6	11/20 (Level 3)
Child 3	Pretest	31.8 (1.9) 95% CI: 28.1 – 35.5	7/20 (Level 2)
	Posttest	40.9 (1.2) 95% CI: 38.6 – 43.2	13/20 (Level 4)

	Actual GMFM-66 change after BWSTT	Expected GMFM-66 change with natural progression	Gross Motor Function Evolution Ratio*
Child 1	5.5	0	Unable to calculate
Child 2	5.6	1.3	3.85
Child 3	9.1	0.33	27.27

* As predicted by Marios et al 2016

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.

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- Trunk control and gross motor outcomes after body weight supported treadmill training in young children with severe cerebral palsy: a non-experimental case series, *Developmental Neurorehabilitation* <https://www.tandfonline.com/doi/full/10.1080/17518423.2018.1527862>