



Gait Speed Changes with Balance-Based-Torso-Weighting in Persons with Neurological Conditions

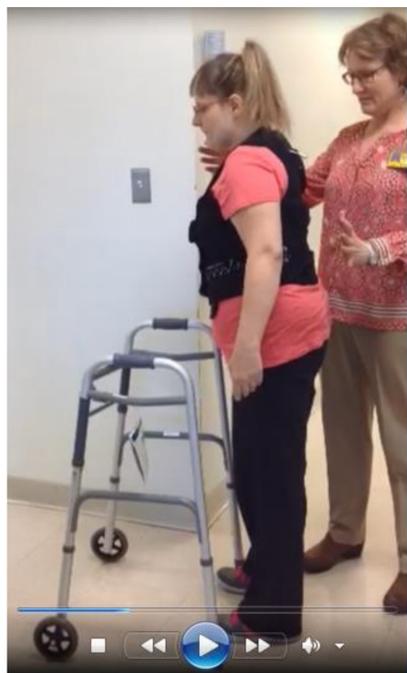
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BACKGROUND & PURPOSE

People with neurological conditions frequently have mobility impairments that lead to reduced gait speed.¹ These impairments are not always ameliorated with physical therapy interventions.² Balance-based torso-weighting (BBTW), a system of strategically placing light weights on the torso to improve response to balance perturbations, has resulted in immediate small improvements in clinical measures, including gait speed in persons with Multiple Sclerosis (MS), but has not been studied in individuals with other neurological conditions.³⁻⁶

The purpose of this study was to evaluate the impact of BBTW on gait speed in persons with neurological conditions.



NUMBER OF SUBJECTS

This study included 45 individuals with a primary neurological diagnosis referred to physical therapy for a BBTW evaluation.

MATERIALS & METHODS

Data was collected via a retrospective chart review of the medical records of 64 individuals who presented to a University based Neurology Clinic for a BBTW evaluation by a certified practitioner. During this evaluation preferred gait speed was measured via the 25-foot walk test prior and post strategic placement of light weights (.125, .25, .5 lb) according to the BBTW protocol.⁶

As part of the assessment, additional demographic data including age, gender, and relevant medical diagnoses (including presence of scoliosis) were collected. SPSS v 22 was used for statistical analysis of data collected.



Figure 1. An example of the BBTW[®] vest with the various weights.

RESULTS

Of the 64 medical charts reviewed, 45 met the inclusion criteria of at least one diagnosed neurological condition. Of the 45 subjects (mean age = 51 years), 30 were female. Sixteen subjects has a primary diagnosis of Parkinson's disease, Ataxia, Brain Injury or Stroke and the remainder had a primary diagnosis of MS. The average gait speed, regardless of diagnosis increased by .39 ft/sec with the addition of torso weighting using the BBTW protocol. This translated into an overall improvement in gait speed of 26%.

Persons with dual diagnosis of MS and Scoliosis (n=7) had the greatest average gait speed change (28%). Comparison of pre-BBTW and post-BBTW mean gait speed with Student's paired t-test (2 tailed) support the clinical significance of these results, [t(44) = 6.37, p < .05]. The small sample size limits the generalizability of these findings for individuals with a neurological diagnosis other than MS.

Table 1. Mean Percentage Change in Gait Speed Based on Patient Diagnosis

Condition	n	Mean % Change in Gait Speed
Multiple Sclerosis	29	24%
Other Neurological Diagnosis	16	24.5%
Scoliosis	14	20.8%
MS+Scoliosis	7	28%

Table 2. Paired Samples T-Test Comparing Means of Gait Speed Pre-weighting and During BBTW use

T-Test	Mean (ft/sec)	SD	t	df	Sig. (2-tailed)
	.39	.426	6.37	44	<.05

CONCLUSIONS

The results of this small study indicate that BBTW use has an immediate significant effect on gait speed for persons with a neurological diagnosis. Individuals with MS and scoliosis demonstrated the greatest increase in gait speed. Further research, using a larger sample, should evaluate gait speed over a longer distance to evaluate the impact of BBTW on gait endurance for individuals with various neurological conditions.

CLINICAL RELEVANCE

BBTW can result in immediate gait speed improvements in persons with neurological conditions other than MS.

REFERENCES

- ¹Turcato, A. M., Godi M., Giardini M., Schieppati M., & Nardone, A. Subtle abnormalities in gait of patients with Parkinson's disease walking linearly at the same speed of healthy subjects show up during curved walking. *Gait & Posture*. 2016;49:55
- ²Clark DJ, Patten C. Eccentric versus concentric resistance training to enhance neuromuscular activation and walking speed post stroke. *Neurorehabil Neural Repair*. 2013;27(4):335-44.
- ³Hunt CM, Widener G, Allen DD. Variability in postural control with and without balance-based torso weighting in people with multiple sclerosis and healthy controls. *Phys. Ther*. 2014;94(10):1489-98.
- ⁴Gorgas AM, Widener GL, Gibson-Horn C, Allen DD. Gait changes with balance-based torso weighting in people with Multiple Sclerosis. *Physiother. Res. Inter*. 2015;20(1):45-53.
- ⁵Widener GL, Allen DD, Gibson-Horn C. Randomized clinical trial of balance-based torso-weighting for improving upright mobility in people with multiple sclerosis. *Neurorehabil Neural Repair*. 2009;23:784-791.
- ⁶Gibson-Horn C. Balance-based torso-weighting in a person with ataxia and multiple sclerosis: A case report. *J Neurol Phys Ther*. 2008;32:139-146.