Duke University School of Medicine
Doctor of Physical Therapy

The Effects of Body Weight Supported Treadmill Training on Gait Speed and Walking Capacity in Adult Spinal Cord Injury: An Umbrella Review

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Background

- A spinal cord injury (SCI) classified as paraplegia impacts a patient's mobility and ambulation.
- Bodyweight-supported treadmill training (BWSTT) is one form of physical rehabilitation that has been examined for its impact on gait speed and walking capacity in this population.

Purpose

- This umbrella review was conducted to condense current systematic review literature on the benefits of BWSTT as an intervention in the adult paraplegic spinal cord injury population.
- BWSTT was investigated alone and in conjunction with functional electrical stimulation (FES).
- Our variables of concern were gait speed and walking capacity.

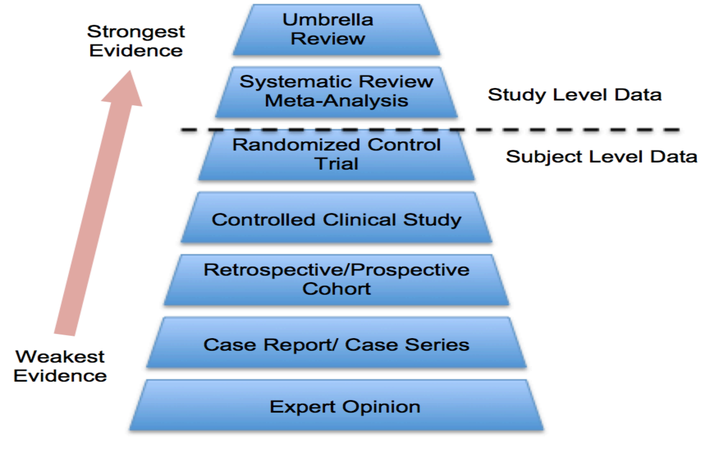
Methods

A comprehensive search was performed on PubMed, Embase and Cochrane from the beginning of each database to November 2015.

Inclusion Criteria:

- Paraplegic adults with SCI population
- Intervention must include BWSTT solely or in conjunction with other interventions
- Outcomes must focus on gait speed and/or walking capacity
- Published systematic reviews
- Studies published in English

Type of Study



	AMSTAR Conduct Rating											
Author	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
Morawietz and Moffat	N	Y	Y	N	N	Y	Y	Y	Y	N	N	**6**
Mehrholz et al.	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	**9**
Wessels et al.	N	Y	Y	N	N	Y	Y	Y	Y	N	N	**6**
Harvey et al.	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	**7**
Lam et al.	Y	Y	N	N	Y	Y	Y	N	N	N	Y	**6**

A study conducted by Sharif et al. determined AMSTAR scores as follows:

9-11 points represents a HIGH quality review
5-8 points represents a MEDIUM quality review
0-4 points represents a LOW quality review

Summary of Gait Speed Findings

Intervention	Author	Number of Included Studies	Results	Statistical Heterogeneity
BWSTT	Morawietz and Moffat	5	Acute and chronic SCI favored BWSTT. No statically significant results	NR
BWSTT	Mehrholz et al.	4	Mixed findings. No statistically significant results	I^2=22%
BWSTT	Wessels et al.	2	No difference in results	NR
BWSTT	Harvey et al.	3	Results inconclusive	NR
BWSTT	Lam et al.	12	No statistically significant results	NR
BWSTT + FES	Morawietz and Moffat	3	Acute and chronic SCI favored BWSTT + FES. No statistically significant results	NR
BWSTT + FES	Mehrholz et al.	2	Favored BWSTT + FES. No statistically significant results	I^2=50%
BWSTT + FES	Harvey et al.	2	Results inconclusive. No statistically significant results	NR
BWSTT + FES	Lam et al.	4	Favored BWSTT + FES. No statistically significant results	NR

Summary of Walking Capacity Findings

Intervention	Author	Number of Included Studies	Results	Statistical Heterogeneity
BWSTT	Mehrholz et al.	3	Favored control group. No statistically significant results	I^2=62%
BWSTT	Wessels et al.	2	Favored overground gait training. No statistically significant results	NR
BWSTT	Harvey et al.	1	No statistically significant results	NR
BWSTT + FES	Mehrholz et al.	2	Favored control group. No statistically significant results	NR

Results

- The systematic reviews contained no statistical significance (SS) when comparing a control group to the intervention group for improvements in gait speed.
- The systematic reviews were unable to prove that BWSTT alone or BWSTT with FES had a SS effect on walking capacity.
- The reviews were either inconclusive or favored the control group for enhancements in walking capacity.

Conclusions

- There are no significant research findings to denote the use of BWSTT as a primary intervention in the adult SCI population.
- More favorable data, though still not significant, suggest using BWSTT with a co-intervention such as FES to improve gait speed.

Clinical Relevance

- BWSTT alone or in conjunction with other interventions presents to be equally as effective as conventional over-ground training in the adult paraplegic SCI population.
- Due to the lack of sufficient evidence, and considering the added treatment time and necessary resources, we cannot recommend BWSTT as a superior therapy to improve gait speed or walking capacity in this particular population.

An intervention demonstration using a body weight supported treadmill training system to assist with ambulation.

LiteGait Device

Acknowledgements / References

1 Monique Wessels, MSc, Cees Lucas, PhD, Inge Eriks, MD, and Sonja de Groot, PhD. (2010). Body Weight-Supported Gait Training for Restoration of Walking in People with an Incomplete Spinal Cord Injury: A Systematic Review. J Rehabil Med 2010; 42: 513–519.
2 Mehrholz J, Kugler J, Pohl M. (2012) Locomotor training for walking after spinal cord injury. Cochrane Database of Systematic Reviews 2012, Issue 11. Art. No.: CD006676. DOI: 10.1002/14651858.CD006676.pub3.
3 Lee, B. B., et al. (2014). The global map for traumatic spinal cord injury epidemiology: update 2011, global incidence rate. Spinal Cord 52(2): 110-116.
4 Christina Morawietz, MSc, Fiona Moffat, MSc. (2013). Effects of Locomotor Training After Incomplete Spinal Cord Injury: A Systematic Review. Archives of Physical Medicine and Rehabilitation 2013;94:2297-308.