

# Does combining body weight support treadmill training with Thera-Band® improve hemiparetic gait?

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Novel Physiotherapies Conference August 2015



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# Stroke Statistics

- Approximately 780,000 Americans experience stroke each year.
- Third leading cause of death and the leading cause of disability in the United States.
- Pay over \$65.5 billion per year.
- 25% of all people with stroke are under age 65.
- National Stroke Association: Stroke Facts

# BWSTT



- Persons with hemiparesis are able to walk with more normal gait kinematics, EMG timing and improved symmetry during BWSTT.
- Manual assistance sometimes necessary.
- Problematic: more than one person, difficult to consistently and adequately control joints, exhausting, and can place PT in a non-ergonomic position



# Thera-Band® and over-ground gait



2004 Thera-Band®  
Most Creative Use Contest  
First Place Winner

Exercise Name: **"Thera-Band® Assist with Swing Phase of Gait"**

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# Thera-Band<sup>®</sup> and BWSTT



# Feasibility Study



- University Research Lab
- Subject: 54yo female 10 s/p embolic stroke with right hemiparesis, (I) gait with LBQC and AFO household amb, (A) elevations, w/c for community amb
- Purpose: To determine if Thera-Band® could replace the need for manual assistance with BWSTT.
- Study outcomes and limitations

[See comment in PubMed Commons below Top Stroke Rehabil.](#) 2011 Jul-Aug;18(4):402-16. doi: 10.1310/tsr1804-402.

Combining the treatment modalities of body weight support treadmill training and Thera-Band: a case study of an individual with hemiparetic gait.

# Purpose of the next case study

- To determine whether the combined interventions of Thera-Band® and BWSTT could be transferred to the clinical setting.
- To assess the outcome measures of gait speed, gait endurance, symmetry and temporal-spatial parameters, and strength of ankle eversion.

# Subject Profile

62 yo male s/p cardio-embolic stroke 9 months prior with residual right hemiparesis affecting the UE more than the LE

## Pre-study evaluation/inclusion criteria

- Independent with ADL's and community ambulation using an AFO (~700' at a time)
- MMT 4+/5 of anterior tibialis muscle
- Score of 26/30 MMSE: no cognitive impairment
- Completed PT services at least 3 mo. prior to study; supervised fitness program 4-5x/wk
- Presented with no co-morbidities that would interfere with training



# Training Protocol

## Treadmill Training

3x/week for 10 weeks

(3)10 min. intervals, 5 min.  
seated rest periods

Self-selected speed

BWS% reduced per protocol

Resting and Exercise Vitals

## Outcome Measures

Weeks 1, 5, 10, 16

- 10 Meter Walk Test (10 MWT)
- 6 Minute Walk Test ( 6 MWT)
- Hand-held dynamometry (HHD): ankle eversion
- GAITRite

# Results



- All 90 trials were completed
- BWS: 30% → 20% (#53) → 15% (#77) and 10% (#85)
- Treadmill speed: 0.85m/s at 20% and 0.67m/s at 10%

# 10 Meter Walk Test

	Week			
	1 (baseline)	5	10	16 (follow-up)
Speed (m/s)	.625	.766	1.08	1.09
% ↑ speed wk 1	-----	23%	73%	74%

# 6 Minute Walk Test

	Week			
	1 (baseline)	5	10	16 (follow-up)
Distance (m)	191	238	327	367
% increase from week 1	-----	25%	71%	92%

# Strength Ankle Eversion

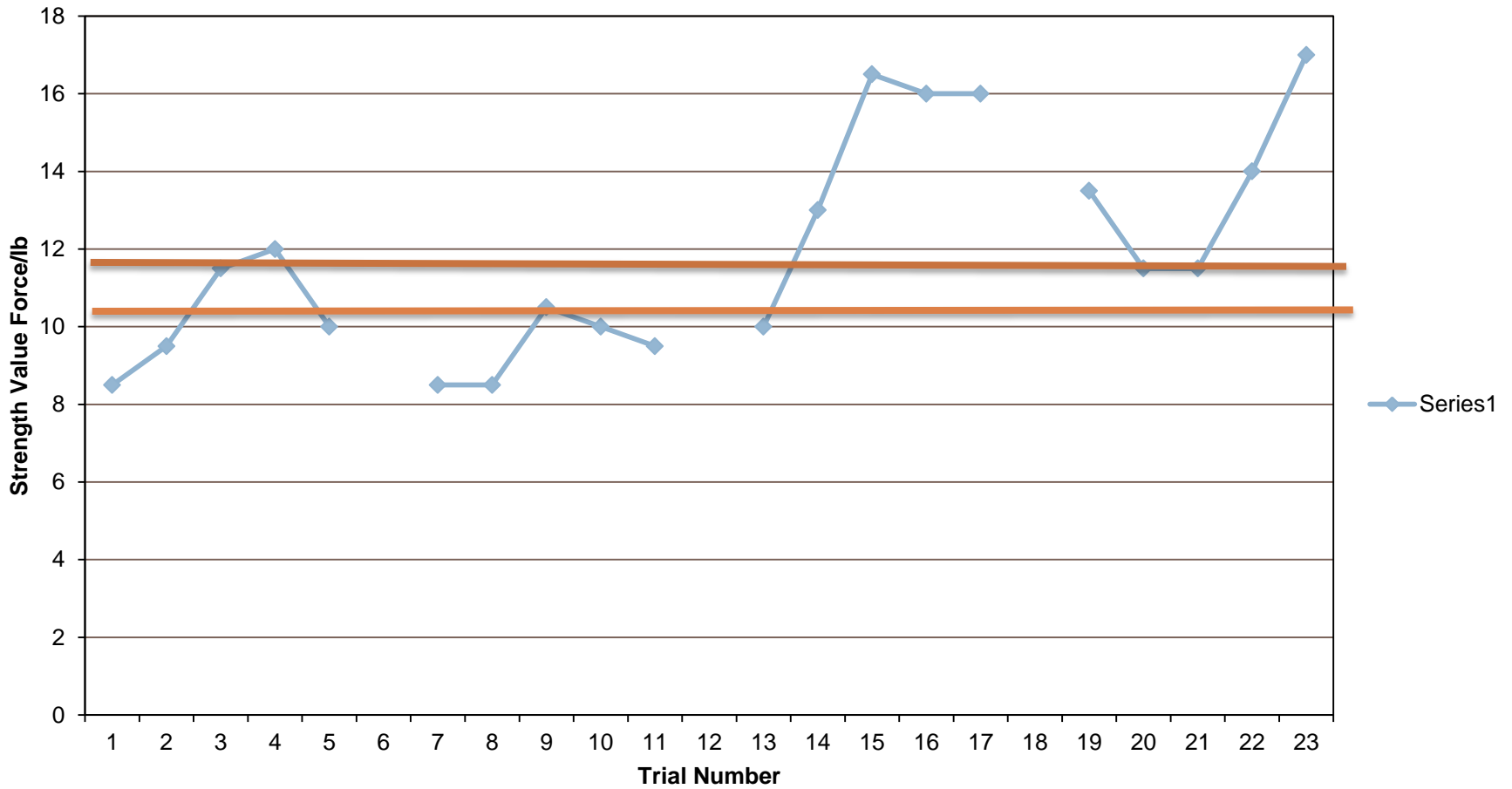


Week				
	Week 1 (baseline)	Week 5	Week 10	Week 16 (Follow-up)
Strength (Force/Kg)	10.3	9.3	15	13
% increase from week 1	-	-10%	46%	27%

# Dynamometry



## Ankle Eversion



# GAITRite

Gait Variable	Baseline Week 1	Week 10	Week 16	% Mean Change from Week 1 to 10	% Mean Change from Week 1 to 16
Paretic Step Length (cm)	44.0	51.3	59.9	16%	36%
Non-Paretic Step Length (cm)	62.7	59.3	67.8	-5%	8%
Paretic Stride Length (cm)	118	111	128	-6%	8%
Non-Paretic Stride Length (cm)	115	111	128	4%	10%
Velocity (cm/sec)	62.6	104	124	67%	98%

# Comparing results with estimates of MDC and MCID



Outcome Measure	MDC	% Change this study	MCID	Change this study
10 MWT	16%#	76%	0.1m/s*	0.475m/s
6 MWT	36.58m or 13%#	92%	50m*	175.8m

# Flansbjerg et al 2005, \*Perera et al 2006



# Discussion



- Improvement in fast gait speed is similar to the results of other studies: Miller et al (2002), Flom-Meland et al (2005), Sullivan et al (2006), Mudge et al (2003) and Lindquist et al (2007).
- Treadmill speed doubled – Thera-Band®?
- BWSTT and e-stim, other interventions?

# Limitations

- No specific progression protocol for speed or %BWS
- Subject's fluctuation with blood pressure limited his willingness to increase his gait speed and reduce % BWS
- Use of handrail
- Subject was highly motivated
- No measure of moment arm during HHD
- Can not determine extent to which each intervention contributed to the results
- Case report included only one participant

# Future Research



- Increase “n”
- Acute CVA
- Development of the protocol
- Cross-over design
- Kinematic analysis and surface EMG

# Conclusions



The combined interventions of BWSTT and Thera-Band® could improve gait speed, endurance, gait symmetry, temporal-spatial gait parameters and strength of ankle eversion.

# Acknowledgements

- Mount Sinai Rehabilitation Hospital (St. Francis)
  - Carrie Schmedding, IRB Coordinator
- Gaylord Specialty Care
  - Andrea Oberlander, MPT
- Student Research Group University of Hartford
  - Mike Kuo, SPT
  - Janell Mancini, SPT
  - Orianna Parunak, SPT
  - Jay Waller, SPT