



ErgoTrainer

Body-weight-supported
rehabilitation

Evidence for body-weight-supported treadmill training (BWSTT) after stroke

By Jørgen Jørgensen,
Physiotherapist at Center for Rehabilitation of Brain Injury, Copenhagen

Evidence for body-weight-supported treadmill training (BWSTT) after stroke

Consequences of stroke

Consequences of stroke can be limitation or loss of movement, mobility, and functional ability. Low levels of physical activity are common soon after stroke and in community-dwelling stroke patients. Cardiorespiratory fitness ranges from 26 % to 87 % of the value expected in age and gender-matched healthy people. Muscle strength and muscle power are also impaired with bilateral deficits, which suggest the influence of physical inactivity. Limitation or loss of functional abilities after stroke (e.g. walking, stair climbing, chair rising) are associated with low cardiorespiratory fitness levels, muscle strength, and muscle power.

Recommendations and research

In a Cochrane review from 2016 the conclusion was, that cardiorespiratory training and mixed training (strength and cardiovascular training), during or after usual stroke care is effective in increasing walking speed and walking capacity in stroke survivors. It is likely that improvements in fitness, mobility, and physical function outcomes are associated with 'task related' training¹. The most relevant task related training activity is often walking, since improving walking is one of the main goals of rehabilitation. There is increasing evidence, that high-intensive, repetitive, task-related training results in better gait rehabilitation² and is recommended in international guidelines for adult stroke rehabilitation, latest from the American guidelines from 2016³.

Intensive training with body-weight-support and progression of the speed

Cardiovascular training in a relevant task (functional cardiovascular training), has an effect on the cardiovascular system and at the same time on the skill required to do the task. Body weight supported treadmill training (BWSTT) is a potentially intensive, repetitive, task-specific gait training intervention and an obvious intervention for functional cardiovascular training. A prerequisite for an effect is an adequate dose of training, a walking speed above the habitual and a continuously progression of the speed.

An example of this approach is a study by Pohl and Merholz, that compared the effects of structured speed-dependent treadmill training (STT) with limited progressive treadmill training (LTT) and conventional gait training (CGT)⁴. They found that STT resulted in far better walking abilities (speed, stride length and cadence) than LTT and CGT.

Dose-equivalent BWSTT

Another example is a study by Mackay-Lyons where they compared the effectiveness of BWSTT to dose-equivalent usual care (UC) in improving cardiovascular fitness and walking early after stroke. They found that BWSTT elicits greater improvements in cardiovascular fitness and walking endurance than UC in the subacute post stroke period and the gains were largely sustained for 1 year⁵.

The many different interacting symptoms after stroke, calls for interventions with several elements, in order to give the best possible effect. In research, this provides a problem, because it is not possible to determine which element is most important and isolate the crucial elements from the whole package. Consequently, research is usually investigating one single element and not on a combination, and thereby not reflecting rehabilitation in a clinical setting.

Intervention with different elements

In a study from the Center for Rehabilitation of Brain Injury (CRBI) in Denmark, the effects of the gait rehabilitation program for people with chronic stroke were investigated⁶. The intervention consisted of bodyweight supported progressive functional cardiovascular training on treadmill and stairmaster, strength training, outdoor and indoor walking. The dosage was high 7,5 hours a week for 12 weeks, with the highest possible intensity. Even though the average chronicity was 24 months, a substantial effect was found on gait parameters (table 1). The effect can partly be explained by dose and intensity, but also because the intervention contained several elements.



Conclusion

The effectiveness of gait rehabilitation is dependent on many parameters. Most importantly the intervention has to be individualized, high-intensive, repetitive and task-related. BWSTT is an intervention with evidence for effect, especially when prioritizing progression of speed and functional cardiovascular training. BWSTT is one relevant element in gait rehabilitation, and should be combined with other relevant elements, e.g. strength training and walking in different contexts.

Tabel 1
Improvement in walking capacity during the 6 Minute Walk Test

	Cardiovascular training	Mixed training	Rehabilitation at CRBI
6 Minute Walk Test (MD)	30,9 meters	41,6 meters	130 meters
	Cochrane review ¹		Research report ⁶

The table shows the improvement in walking capacity after three different interventions.

Litterature

1. Saunders DH, Sanderson M, Hayes S, Kilrane M, Greig CA, Brazzelli M, et al. Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews*. 2016(3).
2. Mehrholz J, Pohl M, Elsner B. Treadmill training and body weight support for walking after stroke. *Cochrane Database of Systematic Reviews*. 2014(1).
3. Winstein CJ, Stein J, Arena R, Bates B, Cherney LR, Cramer SC, et al. Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke; a journal of cerebral circulation*. 2016;47(6):e98-e169.
4. Pohl M, Mehrholz J, Ritschel C, Rückriem S. Speed-Dependent Treadmill Training in Ambulatory Hemiparetic Stroke Patients. *A Randomized Controlled Trial*. 2002;33(2):553-8.
5. Mackay-Lyons M, McDonald A, Matheson J, Eskes G, Klus MA. Dual effects of body-weight supported treadmill training on cardiovascular fitness and walking ability early after stroke: a randomized controlled trial. *Neurorehabilitation and neural repair*. 2013;27(7):644-53.
6. Jorgensen JR, Bech-Pedersen DT, Zeeman P, Sorensen J, Andersen LL, Schonberger M. Effect of intensive outpatient physical training on gait performance and cardiovascular health in people with hemiparesis after stroke. *Phys Ther*. 2010;90(4):527-37.

Intensifies rehabilitation

- and shows significant improvements

By means of the body-weight-supported training (BWST) the patient is partially relieved of his bodyweight, enabling him to begin the rehabilitation process at an early stage, without the risk of physical strain. This increases the patient's mobility and he feels more safe and motivated to complete a more effective and challenging training programme.



Body-weight-supported rehabilitation

The linear body relief system ensures the patient a body-weight support throughout the entire training programme. Approved for patients weighing up to 200 kg (440 lbs) the Ergo Trainer can relieve up to 85kg (187lbs) of the patient's body weight, thus fulfilling most user requirements. Statistics from Center for Rehabilitation of Brain Injury, Denmark, show that body-weight-supported training reduces and sometimes eliminates the user's need for walking aids.



User friendly

Mounting Winncare Nordic's walking sling is quick and easy, and within a few minutes the patient is ready to start the training programme. Only a short introduction is required in order to use the Ergo Trainer. The adjustable weight relief system is controlled by the user friendly hand control.



Safety

An automatic pneumatic brake prevents the risk of serious fall injuries. Furthermore, the safety system reduces work related injuries to therapists or care workers that can occur when trying to prevent a patient from falling. When the patient's safety is no longer a concern, the therapist can introduce a more effective and challenging training programme, which also improves patient's confidence.



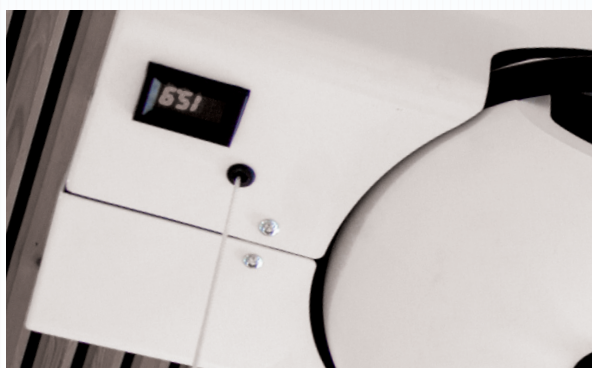
Repetition of movement

When used over a treadmill it is possible for patients with impaired walking ability to train the correct physiological gait. Documented results show that a progressive training regime of repetition of movement, combined with controlled speed and elevation adjustment of the treadmill, are key factors to successful and lasting patient rehabilitation.



Mobility

Using the Ergo Trainer, the patient's arms are able to move freely so users capable of moving their arms are able to train a natural gait pattern.



The amount of body weight support is individually adjusted on the hand control: 0 – 85 kg / 0 – 187 lbs.



As the patient's condition progresses, both the fall distance and the body weight support figures can be readjusted in order to challenge the patient to exercise more.



For more information about Ergo Trainer,
please contact: export@ergolet.dk or call +45 70 27 37 20

WINNOCARE
N o r d i c

Winnocare Nordic is a global enterprise dedicated to provide safe and comfortable transfer for the mobility impaired. Founded in 1973. Winnocare Nordic changed strategy in 1988 to focus on the production of assistive technical aids. Winnocare Nordics products are characterized by: Safety, comfort, functionality,