
Treadmill training with partial body-weight support in children with cerebral palsy: a systematic review

Mutlu A, Krosschell K, Gaebler Spira D

CRD summary

The authors could not conclude that partial body-weight supported treadmill training resulted in improvements for children with cerebral palsy. In view of the limited heterogeneous evidence provided from small relatively low-quality studies, the authors' cautious conclusions are likely to be reliable.

Authors' objectives

To evaluate the effectiveness of partial body-weight supported treadmill training on functional outcomes and ability to walk in children with cerebral palsy.

Searching

MEDLINE, EMBASE, PEDro, BIOSIS Previews, the Cochrane Database of Systematic Reviews, CINAHL, the APTA Hooked on Evidence database, and the Galter Health Sciences Library were searched, and the Internet was searched using Google, using dates from 1950 to July 2007, for publications in English. The search terms were reported and abstracts and review articles were excluded. The bibliographies of relevant articles and reviews were handsearched.

Study selection

Studies with any research design were eligible for inclusion if they were of the effectiveness of partial body-weight supported treadmill training in children, who were under 18 years old and had cerebral palsy, and they measured functional outcome. The included interventions varied in the equipment they used (mostly motor-driven commercial treadmills), the percentage of body-weight support (with a variety of harnesses used), the number and length of sessions, the total intervention period (two weeks to five months), and the concurrent interventions used. Participant ages ranged from 1.7 to 18 years, with a range of levels of impairment. The outcomes in the included studies were varied, but the main ones were the Gross Motor Function Measure (GMFM) score, the Pediatric Evaluation of Disability Inventory (PEDI) score, and measures of ambulatory status.

One researcher selected relevant articles, which were checked by a second reviewer, and disagreements were resolved by discussion.

Assessment of study quality

Two reviewers independently carried out the validity assessment using American Academy for Cerebral Palsy and Developmental Medicine (AACPD) methodology, with disagreements resolved by discussion.

The research design of studies was determined using the Guidelines for Critical Review Form - Quantitative Studies, which describes seven types. Methodological quality was evaluated using AACPD guidelines to give a maximum score of 15. The 15 criteria included: loss to follow-up reported, appropriate methods of analysis, and valid outcomes measured.

Data extraction

Summary characteristics were extracted by one reviewer and checked by a second reviewer, with disagreements resolved by discussion. Effect sizes, with 95% confidence intervals, were extracted, where the relevant data were available.

Methods of synthesis

A narrative synthesis was conducted, since the variation in the equipment used, concurrent interventions, and time scales, and the heterogeneity of the participants, precluded a meta-analysis.

Results of the review

Seven relevant studies were identified (41 participants, range one to 14), with quality scores ranging from 10 to 13, including one clinical concurrent-controlled trial, case studies, open non-randomised trials, and case series with or without comparison participants.

GMFM scores (five studies): Improvements associated with the interventions occurred in all five studies but the only significant results were for the standing and walking scores of GMFM in two studies.

PEDI scores (two studies): Improvements were found, but were only significant in one study, with improvements for mobility, social function, self-care, and caregiver assistance in three out five participants.

Ambulatory measures: Status measured using gait parameters (three studies) showed significant increases in stride or step length in two studies, improvement in hip and ankle movement patterns in one study, and a decrease in double limb support in one study. Three studies measured walking speed and all found a significant increase in walking speed over 10m, but no significant benefit for endurance (distance covered in either six or 10 minutes). One study investigated balance and found the intervention had no significant effect.

No side effect was reported in any study.

Authors' conclusions

This review could not conclude that partial body-weight supported treadmill training resulted in improvement for children with cerebral palsy because of the limited evidence, despite reported improvements in gross motor function, functional status, walking performance, and gait parameters in some of the included studies. Additional studies were needed to demonstrate the benefits and efficacy of the intervention before its continued use could be supported in the clinical setting.

CRD commentary

The review addressed a well-defined question in terms of participants, interventions, study design, and outcomes. Relevant databases were searched for fully published studies in English only and therefore some relevant studies may have been missed. It was not possible to assess publication bias since a narrative synthesis was provided. Study quality was assessed using suitable criteria and the level of the evidence provided was relatively low. Efforts were made to reduce error and bias in the study selection, data extraction, and validity assessment. Relevant study details were reported, but the results in the online appendices were not clear. A narrative synthesis was provided due to heterogeneity in the interventions, participants (by age and level of impairment), and concurrent interventions in the included studies.

In view of the very limited evidence provided from very small studies of relatively low quality, the authors' cautious conclusions are likely to be reliable.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors identified a need for additional research to separate the effect of partial body-weight supported treadmill training from any concomitant treatment and to identify the most effective type of intervention. Future studies should also consider the effect of intelligence quotient on performance and compare treadmill training with overground walking. Research should include high-quality placebo-controlled randomised controlled trials in well-defined populations with long-term follow-up, and the authors specified a range of functional and other outcomes. Physiotherapists would require training and monitoring for involvement in this type of research and the cost-benefit ratio should be considered.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.