A Systematic Review of the Effects of High Intensity Treadmill Training on Balance and Mobility in Adults with Parkinson's Disease

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INTRODUCTION

Parkinson's disease is a relatively common neurological disorder that has profound impacts on an individual's balance and mobility. Currently, treadmill parameters that have the most beneficial effect on gait disturbances have yet to be conclusively established.

PURPOSE

The purpose of this systematic review was to determine the effects of high intensity treadmill training (HITT) on balance and mobility in adults with Parkinson's disease (PD).

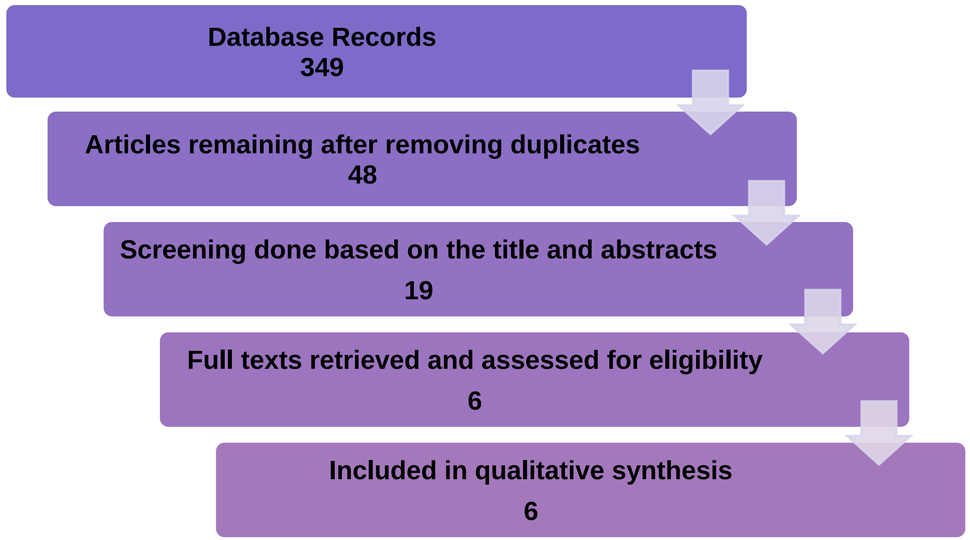
METHODS

A literature search of PEDro, ProQuest, Science Direct, CINHAL and PubMed using search terms: Parkinson AND treadmill training AND (high intensity OR speed dependent). Inclusion criteria: English, RCTs, subjects at least age18 with PD, and use of HITT with either speed dependent (SDTT; defined by short intervals of fast or maximum speed) or progressive speed protocols (using systematic speed and/or incline increases with a target heart rate of 70-80% of AAPMHR). Studies were excluded if robotic training was used. Two reviewers independently assessed each study for methodological quality and came to consensus based on PEDro guidelines.

RESULTS

A total of 349 articles were screened for eligibility. Following detailed appraisals, 6 RCTs fulfilled the criteria. Samples ranged from 17 to 67 subjects (286 total) with mild-moderate PD (H&Y Stages I-III). HITT was performed 1-3 days per week (30-45 min/session) averaging 8.6 weeks duration (range 1-24 wks). Primary outcomes included temporal-distance gait parameters, endurance, balance, ADLs and quality of life. No adverse events were reported. There were statistically significant within-group improvements noted in gait/stepping following HITT in 5 studies, with descriptive gains in gait and sit to stand symmetry reported in 1 study. There were no significant between-group differences when comparing HITT to groups of Rhythmic Auditory Cued over ground walking (RAC using music), low intensity treadmill training (LITT) and controls in 5 of 6 studies. One study found statistically significant improvements for SDTT vs. controls for balance and gait. Another study found statistically significant gains for LITT over HITT for gait distance (6MWT), but equal benefits for cardiovascular fitness (VO2). None of the 3 studies that examined QOL and/or ADLs found significant changes (PDQ-39, UPDRS). One study found dose-dependent benefits for HITT which normalized corticomotor excitability in early PD indicating activity-dependent neuroplasticity.

Databases: **PEDro, ProQuest, Science Direct, CINHAL and PubMed**
Search Terms: (Parkinson AND treadmill training) AND (high intensity OR speed dependent)
Limits: English, RCT's, human studies



PEDro Criteria	Cakit et al	Fisher et al	Harro et al	Nadeau et al	Pohl et al	Shulman et al
Eligibility criteria were specified	Y	Y	Y	Y	Y	Y
Subjects were randomly allocated to groups	Y	Y	Y	Y	Y	Y
Allocation was concealed	N	N	N	Y	N	N
Groups similar at baseline	Y	Y	Y	Y	Y	Y
Blinding of subjects	N	Y	N	Y	N	N
Blinding of therapists administering therapy	N	N	N	N	N	N
Blinding of assessors for at least one key outcome	Y	N	Y	Y	Y	Y
Measured at least one key outcome for 85% of initial subjects	N	N	Y	N	N	N
Intention to treat if not treated	N	N	Y	N	N	N
Between group statistical comparison for one key outcome	Y	Y	Y	Y	Y	Y
Point measures and measures of variability for one key outcome	Y	Y	Y	Y	Y	Y
PEDro score	5/10	5/10	7/10	7/10	5/10	5/10

* Eligibility criteria does not contribute to score

CONCLUSIONS

There is moderate evidence in support of HITT to improve gait and balance in patients with PD. HITT using SDTT protocols did not have an advantage over RAC over ground gait training. Limitations included small samples, varied outcome measures and a lack of long-term follow up. Future RCTs should focus on determining the optimal mode and parameters for externally cued gait training.

CLINICAL RELEVANCE

Clinical Relevance : The outcomes for HITT were comparable to other types of externally cued gait training (i.e., LITT, RAC). Effective HITT protocols used SDTT for 3 5-minute intervals of max walking speed for 30 minutes, 2 times/wk for 8 weeks. All of the externally cued gait training programs were safe and feasible methods for improving balance and mobility in patients with mild-moderate PD.

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