

Effect of Partial Weight–Supported Treadmill Gait Training on Balance in Patients With Parkinson Disease

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Objective: To investigate the role of conventional gait training and partial weight–supported treadmill gait training (PWSTT) in improving the balance of patients with Parkinson disease (PD).

Design: Prospective randomized controlled design.

Setting: National-level university tertiary hospital for mental health and neurosciences.

Patients: Sixty patients with PD fulfilling the United Kingdom Brain Bank PD diagnostic criteria were recruited from the neurology outpatient department and movement disorder clinic.

Methodology: The patients were randomly assigned into 3 equal groups: (1) a control group that only received a stable dosage of dopaminomimetic drugs; (2) a conventional gait training (CGT) group that received a stable dosage of dopaminomimetic drugs and conventional gait training; and (3) a PWSTT group that received a stable dosage of dopaminomimetic drugs and PWSTT with unloading of 20% of body weight. The sessions for the CGT and PWSTT groups were provided for 30 minutes per day, 4 days per week, for 4 weeks (16 sessions).

Outcome measures: The Unified Parkinson Disease Rating Scale (UPDRS) motor score, dynamic posturography, Berg Balance Scale, and Tinetti performance-oriented mobility assessment (POMA) were used as main outcome measures.

Results: A significant interaction effect was observed in the UPDRS motor score, medio-lateral index, Berg Balance Scale, limits of stability (LOS) total score, POMA gait score, and balance score. Post-hoc analysis showed that in comparison with the control group, the PWSTT group had a significantly better UPDRS motor score, balance indices, LOS in 8 directions, POMA gait, and balance score. The CGT group had a significantly better POMA gait score compared with control subjects. Compared with the CGT group, the PWSTT group had a significantly better UPDRS motor score, mediolateral index, POMA gait score, and LOS total score.

Conclusion: PWSTT may be a better interventional choice than CGT for gait and balance rehabilitation in patients with PD.

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INTRODUCTION

Parkinson disease (PD) is characterized by deteriorating motor function due to degeneration of the dopaminergic nigrostriatal pathways. Gait and balance abnormalities observed in persons with PD are important components of the disability [1]. Despite the use of levodopa, mobility deficits related to gait and balance are very difficult to treat [2,3]. Adjuvant physiotherapy has shown promise in addressing this crucial aspect of management of PD. Partial weight–supported treadmill gait training (PWSTT) is a promising therapeutic approach to help retrain patients with PD to walk [4-6]. The authors of a meta-analysis on treadmill training in patients with PD identified 8 trials in which investigators assessed the utility of variants of treadmill training and PWSTT in improving mobility in patients with PD [7]. Only a few studies have addressed the effect of treadmill training on balance in persons with PD [6,8,9]. The Berg Balance Scale (BBS), fall efficacy scale, and step test were used as outcome measures for balance control.

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Only one study has addressed the sensory orientation test with use of dynamic posturography as an outcome measure after PWSTT [6]. A knowledge gap exists with regard to the effect of PWSTT on the limits of stability (LOS) and direction-specific balance components in persons with PD. Visintin et al [10] reported a significant improvement in functional balance, motor recovery, and gait after PWSTT in patients who had a stroke compared with patients undergoing treadmill training alone. PWSTT is considered to be a safer method of training, provides a sense of security regarding falls, and facilitates free leg movements compared with treadmill training alone. In addition, persons with neurologic conditions were able to walk for a longer duration and with minimally increased heart rates when partial weight support was provided [11]. Therefore the current study was planned to assess the effects of PWSTT on the dynamic balance indices, LOS in all directions, and clinical balance measures in persons with PD.

METHODS

This study was a prospective randomized controlled trial. The schematic flow of the research study is depicted in Figure 1. Sixty patients with PD were randomly assigned into 3 equal groups ($n = 20/\text{group}$): (1) a control group that only received a stable dosage of dopaminomimetic drugs; (2) a conventional gait training (CGT) group that received a stable dosage of dopaminomimetic drugs and conventional gait training; and (3) a PWSTT group that received a stable dosage of dopaminomimetic drugs and PWSTT with 20% unloading of weight. Patients were recruited from the neurology outpatient department and movement disorders clinic at the National Institute of Mental Health & Neurosciences. The diagnosis of PD was confirmed by a movement disorders specialist as per the United Kingdom Brain Bank Criteria [12]. The ethics committee at the National Institute of Mental Health and Neurosciences approved the study, and written informed consent was obtained from all

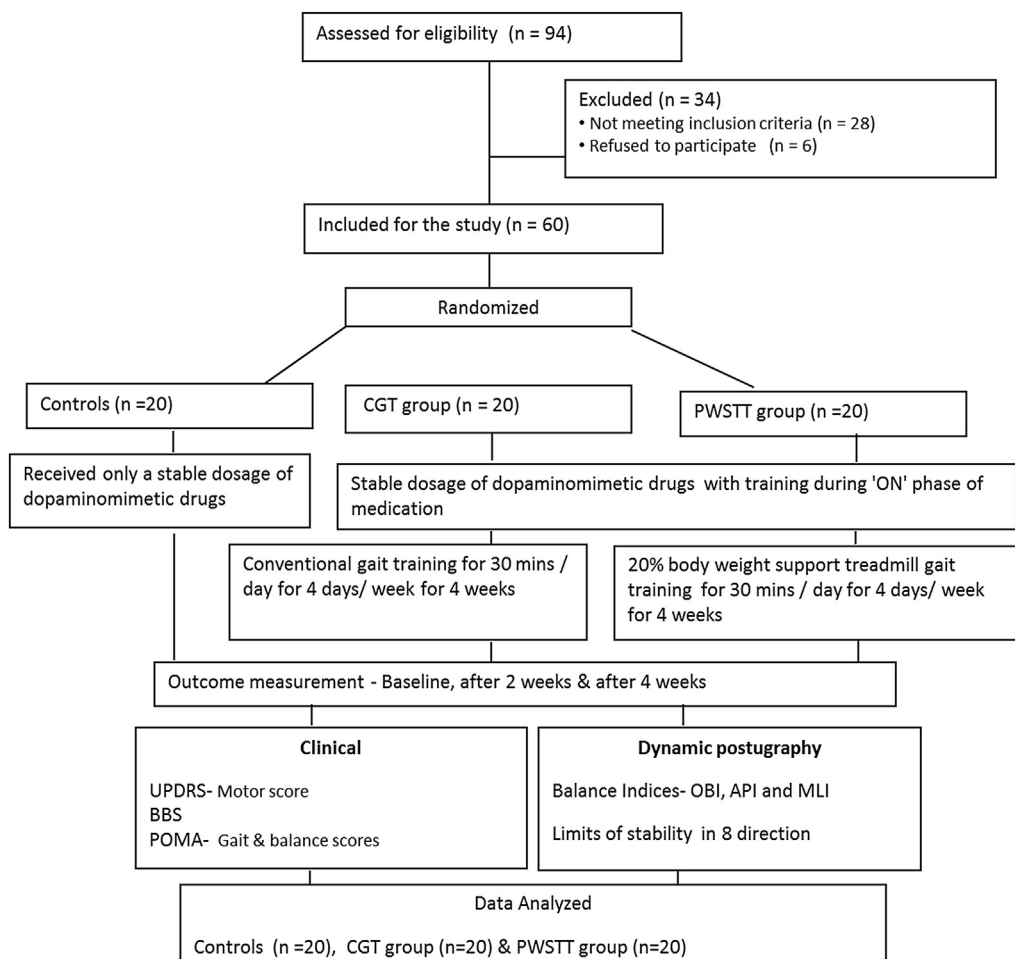


Figure 1. A flow chart of the study. CGT = conventional gait training; PWSTT = partial weight–supported treadmill training, UPDRS = Unified Parkinson’s diseases rating scale; OBI = overall balance index; API = anteroposterior index; MLI = mediolateral index; BBS = Berg balance scale; POMA = Tinetti Performance-Oriented Mobility Assessment.

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