

**ORIGINAL RESEARCH**

# Partial Body Weight-Supported Treadmill Training in Patients With Parkinson Disease: Impact on Gait and Clinical Manifestation



Mohan Ganesan, PT, PhD,<sup>a,b</sup> Talakad N. Sathyaprabha, MBBS, MD,<sup>a</sup>  
Pramod Kumar Pal, MBBS, MD, DM,<sup>c</sup> Anupam Gupta, MBBS, MD<sup>d</sup>

From the <sup>a</sup>Department of Neurophysiology, National Institute of Mental Health and Neurosciences, Bangalore, India; <sup>b</sup>Department of Physical Therapy, College of Applied Health sciences, University of Illinois, Chicago, IL; <sup>c</sup>Department of Neurology, National Institute of Mental Health and Neurosciences, Bangalore, India; and <sup>d</sup>Department of Neurological Rehabilitation, National Institute of Mental Health and Neurosciences, Bangalore, India.

## Abstract

**Objective:** To evaluate the effect of conventional gait training (CGT) and partial weight-supported treadmill training (PWSTT) on gait and clinical manifestation.

**Design:** Prospective experimental research design.

**Setting:** Hospital.

**Participants:** Patients with idiopathic Parkinson disease (PD) (N=60; mean age, 58.15±8.7y) on stable dosage of dopaminomimetic drugs were randomly assigned into the 3 following groups (20 patients in each group): (1) nonexercising PD group, (2) CGT group, and (3) PWSTT group.

**Interventions:** The interventions included in the study were CGT and PWSTT. The sessions of the CGT and PWSTT groups were given in patient's self-reported best on status after regular medications. The interventions were given for 30min/d, 4d/wk, for 4 weeks (16 sessions).

**Main Outcome Measures:** Clinical severity was measured by the Unified Parkinson Disease Rating Scale (UPDRS) and its subscores. Gait was measured by 2 minutes of treadmill walking and the 10-m walk test. Outcome measures were evaluated in their best on status at baseline and after the second and fourth weeks.

**Results:** Four weeks of CGT and PWSTT gait training showed significant improvements of UPDRS scores, its subscores, and gait performance measures. Moreover, the effects of PWSTT were significantly better than CGT on most measures.

**Conclusions:** PWSTT is a promising intervention tool to improve the clinical and gait outcome measures in patients with PD.

Archives of Physical Medicine and Rehabilitation 2015;96:1557-65

© 2015 by the American Congress of Rehabilitation Medicine

Gait rehabilitation in patients with Parkinson disease (PD) uses various approaches, including compensatory strategies, motor skill learning, use of visual strategies, auditory strategies, education to optimize physical activity, and combinations of these.<sup>1</sup> Although beneficial effects of dopaminomimetic medication on gait in PD have been reported,<sup>2-5</sup> gait parameters (eg, cadence, double-limb support phase) did not show any significant changes with medications.<sup>6</sup> Therefore, levodopa therapy alone has limitations when it comes to correcting the gait abnormalities and resulting

impaired mobility in persons with PD. The progressive nature of the disease invariably leads to disability associated with gait. Gait rehabilitation in PD is aimed to increase stride length, increase step length, widen the base of support, improve heel-toe gait pattern, and provide an emphasis on arm swing strategies.<sup>7-9</sup> Meta-analysis of treadmill training in PD identified 8 trials (n=203) and reported considerable evidence for the utility of variants of treadmill training and partial weight-supported gait training in improving gait in PD.<sup>9</sup> Herman et al<sup>8</sup> identified 14 studies on the effect of treadmill training on patient's immediate effects and longer-term positive benefits in gait speed, stride length, and disease severity (Unified Parkinson Disease Rating

Disclosures: none.

Scale [UPDRS]). Moreover, gait training with partial body weight supported using the treadmill has shown to be effective in improving gait,<sup>8,10</sup> dynamic balance,<sup>7</sup> lower-extremity functional task performance,<sup>11</sup> and baroreflex sensitivity<sup>12</sup> in patients with PD. However, the role of partial weight-supported treadmill training (PWSTT) as a form of treatment for persons with PD has yet to be formerly validated in comparison with testing of a nonexercising control group and conventional gait training (CGT) group. We hypothesize that PWSTT will be better than the CGT in improving clinical and gait outcome measures in patients with PD.

## Methods

### Participants

Sixty individuals with PD (mean age, 58.15±8.7y; height, 160±6.9cm; weight, 60.38±10.5kg) participated in the study. Subjects were recruited from the movement disorders clinic and neurology outpatient department. The diagnosis of PD was confirmed by a movement disorders specialist using UK Brain Bank criteria.<sup>13</sup> The study was approved by the institutional ethics committee and a written informed consent was obtained from each participant. All participants were right hand and right leg dominant, confirmed by the Edinburgh inventory.<sup>14</sup> Patients with Mini-Mental State Examination<sup>15</sup> scores ≤24, Beck Depression Inventory<sup>16</sup> scores ≥17, Goetz dyskinesia<sup>17</sup> scores >3, Hoehn and Yahr<sup>18</sup> stages >3, and unpredictable motor fluctuations and orthopedic problems influencing gait training were excluded from the study. All participants maintained a stable dosage of dopaminomimetic medications throughout the duration of the study. The stable dosage refers to the standard dosage of the dopaminomimetic medication required to improve the patient's symptoms, which were determined by a neurologist specializing in movement disorders. The recruited patients were randomly divided into 3 groups. The groups were labeled as follows: non-exercising PD group, CGT group, and PWSTT group (20% unweighting was used). The outcome measures and training were performed during the best on period after regular medications. The best on period refers to a period when the medication is working and the patient can move with relative ease (reduced tremor, rigidity, and bradykinesia). In the current study, the self-reported best on period was considered.

The schematic flowchart of the study design is given in [figure 1](#).

### Clinical severity

Clinical severity of the disease was rated using the UPDRS.<sup>19</sup> This scale consists of the following 4 parts: section I (mentation, behavior, mood), section II (activities of daily living), section III (motor score), and section IV (complications). Section I contains 4 items; section II contains 13 items; and section III, the motor section of the UPDRS, contains 14 items (speech, facial

expression, tremor at rest, action tremor, rigidity, finger taps, hand movement, hand pronation and supination, leg agility, rising from the chair, posture, gait, postural stability, body bradykinesia). For the 3 sections, each item is scored from 0 (normative) to 4 (unable to perform task). Section IV contains 11 items, with some items scored from 1 or 2, whereas others are scored from 0 to 4.

The following subscores of the UPDRS<sup>19</sup> were calculated. The first is the bradykinesia score, which represents overall slowness of the body and extremities. It consists of body bradykinesia, left- and right-hand finger taps, opening and closing of hands, pronation/supination of hands, and heel taps. The second is the tremor score, which represents both action and resting tremor of the extremities and face. It includes action tremor of right and left hands, resting tremor in the left and right hands and feet, and resting tremor of the face, lips, and chin. Third is the rigidity score, which represents the tightness of the neck and extremities. It includes rigidity in the neck and rigidity in the left and right upper and lower extremities. The last one is postural instability and gait difficulty (PIGD) disorder, which represents a composite score of posture, balance, and gait. It includes falling, freezing, ability to walk, gait, and postural stability. In addition, we calculated the right and left side scores by combining the right and left side scores separately for the resting tremor, rigidity of the upper and lower extremity, finger taps, opening and closing of hands, pronation/supination of hands, and leg agility. A single evaluator performed the UPDRS rating throughout the study. The total UPDRS scores measure the overall disease severity, and the motor score (section III) measures only the motor component changes. The total UPDRS score, motor scores, and subscores were considered for analysis.

### Gait assessment

Gait was assessed using 2 methods. The first was the 10-m walk test. Each patient was instructed to walk at their usual comfortable and safe walking speed over a distance of 10m, with a 1-m distance added on either end to minimize acceleration/deceleration effects.<sup>20</sup> During the walk, the time taken to complete the 10m was measured. The second method was the instrumented 2-minute walk test. Each patient was instructed to walk on the treadmill at a comfortable walking speed for 5 minutes. The treadmill speed was adjusted to match each patient's comfortable speed. Once the patient reached a comfortable speed, he or she was then asked to continue further for 5 minutes. During a 5-minute walk in the treadmill, 2 minutes of data were randomly collected for analysis. An instrumented treadmill<sup>a</sup> was used to record patient gait parameters, including step length, walking distance, walking speed, covariation of the right and left sides, and ambulation index. The ambulation index is the composite score relative to 100 based on foot-to-foot time distribution ratio and average step cycle (Biodex Gait Trainer Manual). These outcome measures were then further analyzed.

### Training groups

The nonexercising PD group received no other intervention except the stable dosage of medication throughout the entire study period. The nonexercising PD group was instructed not to undergo any specific gait, balance, or exercise training until the end of the study period. All 3 groups were also encouraged to perform their regular activities of daily living.

The CGT and PWSTT groups received gait training along with medication. The CGT consisted of training to walk in a straight

#### List of abbreviations:

CGT	conventional gait training
PD	Parkinson disease
PIGD	postural instability and gait difficulty
PWSTT	partial weight-supported treadmill training
UPDRS	Unified Parkinson Disease Rating Scale

Download English Version:

<https://daneshyari.com/en/article/3448062>

Download Persian Version:

<https://daneshyari.com/article/3448062>

[Daneshyari.com](https://daneshyari.com)