

CASE REPORT

Effect of task-specific hip flexion training on gait parameters in patients with Parkinsonism: A case report

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Abstract

Background: Parkinsonism is characterised by bradykinesia, rigidity, and postural instability, leading to reduced hip flexion, a short shuffling gait, and an increased risk of falls. Although conventional therapy improves mobility, evidence on the effectiveness of task-specific hip flexion training is limited. This study aimed to examine the effects of task-specific hip flexion training on gait and motor performance in a patient with Parkinsonism.

Case description and management: A 65-year-old man with idiopathic Parkinson's disease underwent a four-week intervention comprising progressive hip flexion-specific exercises, including seated and standing hip flexion, step-ups, and stair climbing. Pre- and post-intervention assessments were conducted using the Unified Parkinson's Disease Rating Scale (UPDRS III), Step Length, Cadence, and the Timed Up and Go (TUG) test. Post-intervention results showed improvements across all outcomes: UPDRS III score decreased from 38 to 28, step length increased from 28 cm to 42 cm, cadence improved from 82 to 96 steps/min, and TUG time decreased from 22 to 16 seconds.

Conclusion: Task-specific hip flexion training effectively enhanced gait performance, stride efficiency, and motor control in Parkinsonism. The findings from this single case study are satisfactory and support the incorporation of hip flexion-focused exercises into physiotherapy rehabilitation.

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Ethical approval

Ethical approval was not sought because this is a case report. However, informed written consent was obtained from the patient for the preparation of this manuscript.

Trial registration number

Not applicable

Key messages

Task-specific hip flexion training led to clinically meaningful improvements in gait and motor performance in a patient with Parkinsonism. Notable gains were observed in step length, cadence, mobility, and motor severity, highlighting the potential role of targeted, function-oriented physiotherapy interventions in addressing Parkinsonian gait impairments.

Introduction

Parkinsonism is a progressive neurological syndrome caused by degeneration of dopaminergic neurons in the substantia nigra. It is clinically characterised by bradykinesia, rigidity, postural instability, and impaired motor control, leading to significant limitations in functional independence and mobility [1, 2].

Gait impairment is one of the most disabling features of Parkinson's disease and commonly presents as reduced step length, decreased gait speed, shuffling gait, impaired balance, and difficulty initiating movement, which substantially increases fall risk and negatively affects activities of daily living [3].

As the disease progresses, deterioration in stride length, gait variability, and dynamic postural stability becomes more pronounced. Although dopaminergic medications provide symptomatic relief, they are often insufficient to maintain long-term gait performance, underscoring the essential role of physiotherapy-based rehabilitation [4].

Lower-limb muscle weakness, particularly reduced strength of the hip flexors and extensors, plays a central role in Parkinsonian gait abnormalities by contributing to shortened stride length, impaired swing-phase clearance, reduced gait speed, and difficulty with functional tasks such as sit-to-stand and gait initiation [5, 6].

Task-specific training emphasises repeated practice of functional movements that closely resemble real-life activities and directly targets gait-related biomechanical and motor-control deficits, making it a promising approach to improving walking ability and functional mobility in individuals with Parkinson's disease [7, 8].

Case description and management

A 65-year-old man with a five-year history of idiopathic Parkinson's disease (ICD-10:G20) presented with progressive gait impairment, characterised by short, shuffling steps, difficulty initiating walking, freezing episodes, and impaired balance, leading to increased dependence in daily activities and fear of falling. Patient information was de-identified to maintain confidentiality. The patient had a history of hypertension and mild cognitive impairment, with no history of stroke or other neurological disorders. Family history was non-contributory for Parkinson's disease. Psychosocial assessment revealed that the patient was cooperative and motivated but exhibited kinesiophobia and reduced confidence during ambulation, limiting community participation.

The patient was on standard dopaminergic pharmacological management, which provided partial symptom relief; however, gait disturbances persisted. Previous conventional physiotherapy, focusing on general strengthening and balance training, yielded minimal functional improvement,

particularly in step length and gait initiation. Clinical examination revealed classical Parkinsonian features, including bradykinesia, rigidity, tremor, and postural instability. Gait assessment showed reduced hip flexion during the swing phase, short shuffling steps, reduced cadence, and impaired balance. Functional mobility assessment using the Timed Up and Go (TUG) test showed a prolonged duration of 22 seconds, indicating increased fall risk.

The baseline assessment included the URDRS III, the TUG test, and gait parameters such as step length and cadence. Differential diagnoses, including vascular Parkinsonism and atypical Parkinsonian syndromes, were considered and ruled out based on clinical presentation and disease progression. Prognosis was considered favourable, given preserved cognition, good motivation, family support, and adherence to therapy.

The patient underwent a four-week task-specific hip flexion training programme, delivered in 5 sessions per week, each lasting 30–40 minutes. The intervention emphasised repetitive, progressive hip flexion exercises integrated into functional activities, including seated and standing hip flexion, step-ups, obstacle negotiation, stair climbing, and dual-task walking. Exercise intensity and complexity were gradually increased by adding resistance, increasing step height, incorporating unstable surfaces, and introducing cognitive-motor tasks. No changes were made to medication or other physiotherapy interventions during the study period.

Post-intervention assessment demonstrated meaningful clinical improvements. The UPDRS III score improved from 38 to 28, step length increased from 28 cm to 42 cm, cadence increased from 82 to 96 steps/min, and TUG duration decreased from 22 to 16 seconds, indicating enhanced gait performance, balance, and functional mobility. Apart from the task-specific hip flexion training programme, the patient did not receive any additional physiotherapy interventions during the study period. No conventional gait training, balance training, or strengthening exercises were administered, and the patient's medication regimen remained unchanged throughout the intervention. The patient demonstrated full adherence to the programme, and no adverse events were reported. Changes in clinical and gait outcome measures following task-specific hip flexion training (Table 1).

Discussion

This case report evaluated the effectiveness of task-specific hip flexion training on gait and motor outcomes in a patient with Parkinsonism, demonstrating clinically meaningful improvements across multiple parameters. After four weeks of intervention, notable gains were observed in step length, cadence, UPDRS III motor score, and TUG performance, suggesting enhanced gait efficiency, motor control, and functional mobility.

Table 1 Changes in clinical and gait outcome measures following task-specific hip flexion training

| Outcome measure | Pre-test score | Post-rest score | Delta (post-pre) | % Improvement (post minus pre-score) |
|---------------------------|----------------|-----------------|------------------|--------------------------------------|
| UPDRS III (motor section) | 38 | 28 | -10 | -26.3 |
| Timed Up and Go (seconds) | 22 | 16 | -6 | -27.3 |
| Step length (cm) | 28 | 42 | 14 | 50.0 |
| Cadence (steps/min) | 82 | 96 | 14 | 17.1 |

*UPDRS III indicate Unified Parkinson's disease rating scale, part III (motor examination)

The observed 50% improvement in step length and 17.1% increase in cadence indicate improved stride amplitude and rhythmicity, both of which are commonly impaired in Parkinsonian gait. These changes can be attributed to targeted strengthening and activation of the hip flexor muscles, which play a crucial role in the swing phase of gait by facilitating adequate foot clearance and forward limb progression. Focused training of hip flexion through functional activities such as step-ups, stair climbing, and obstacle negotiation likely reduced shuffling and improved gait initiation. Similar findings have been reported in task-specific training studies, where gait-focused interventions led to significant improvements in step length and walking performance [9].

Improvements in the UPDRS III motor score (26.3% reduction) and TUG time (27.3% reduction) further indicate enhanced motor function, dynamic balance, and transitional movement ability. Reduced UPDRS scores reflect decreased motor severity, while improved TUG performance suggests better postural control and a lower fall risk. In line with previous task-oriented rehabilitation studies, individualised and functionally relevant exercises targeting specific muscle groups, particularly the hip flexors, have been shown to produce measurable improvements in gait and mobility outcomes in Parkinson's disease [10].

Despite these positive findings, the single-case design limits generalisability. Additionally, the absence of long-term follow-up precludes conclusions about the durability of improvements. The patient reported increased walking confidence, greater ease of movement during daily activities, and greater independence following the task-specific hip flexion training programme.

Task-specific hip flexion training led to meaningful improvements in gait parameters, motor function, and functional mobility in a patient with Parkinsonism. Although limited to a single case, the findings support the potential role of hip flexion-focused, task-oriented physiotherapy in Parkinson's disease rehabilitation and underscore the need for larger controlled studies with long-term follow-up to confirm these results.

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Author contributions

Manuscript drafting and revising it critically: AP. Approval of the final version of the manuscript: KG, AS, MS, PS. Guarantor accuracy and integrity of the work: KG, AS.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

Supplementary file

None

AI disclosure

No artificial intelligence tools were used in the preparation, writing, data analysis, interpretation, or presentation of this manuscript.

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