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Original article

Effects of a resistance training program on balance and fatigue perception in patients with Parkinson's disease: A randomized controlled trial

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ABSTRACT

Introduction and objective: Fatigue and balance impairment leads to a loss of independence and are important to adequately manage. The objective of this study was to examine the effects of a resistance training program on dynamic balance and fatigue in patients with Parkinson's disease (PD).
Patients and methods: Randomized controlled trial. Forty-six patients with PD were randomly allocated to an intervention group receiving a 8-week resistance training program focused on lower limbs or to a control group. Balance was assessed using the Mini-BESTest and fatigue was assessed by the Piper Fatigue Scale.
Results: Patients in the intervention group improved significantly ($p < 0.05$) on dynamic balance (reactive postural control and total values) and perceived fatigue.
Conclusions: An 8-week resistance training program was found to be effective at improving dynamic balance and fatigue in patients with PD.

Efectos de un programa de resistencia sobre el equilibrio y la fatiga percibida en pacientes con enfermedad de Parkinson: ensayo clínico aleatorizado

Palabras clave:
Enfermedad de Parkinson
Equilibrio
Entrenamiento de resistencia
Fatiga

RESUMEN

Antecedentes y objetivo: La inestabilidad postural y la fatiga son 2 síntomas que contribuyen a disminuir la independencia del paciente con la enfermedad de Parkinson (EP), y cuyo manejo terapéutico es importante. El objetivo de este estudio fue examinar los efectos de un programa de resistencia sobre el equilibrio y la fatiga en pacientes con EP.
Pacientes y métodos: Ensayo clínico controlado aleatorizado. Cuarenta y seis pacientes con EP se distribuyeron aleatoriamente en un grupo que recibió un programa de resistencia centrado en miembros inferiores durante 8 semanas o en un grupo control. El equilibrio se evaluó usando el Mini-BESTest y la fatiga con la Escala Revisada de Piper.
Resultados: Los pacientes incluidos en el grupo experimental mejoraron significativamente ($p < 0,05$) el equilibrio (control postural reactivo y valores totales) y la fatiga percibida.
Conclusiones: Un programa de resistencia fue efectivo para la mejora del equilibrio y la fatiga en pacientes con EP.

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Introduction

Parkinson's disease (PD) is a neurodegenerative condition that leads to progressive disability, reduced health-related quality of life and high healthcare costs.[1] Instability is a frequent symptom in the advanced stages of PD. This impairment is the result of deficient processing of sensory inputs and anticipatory responses disturbances, reduced stability and inability to adequately balance the body's center of mass over the base of support during an external perturbation.[2] Transitions between states of static and dynamic balance where the center of mass moves outside the base of support are also affected, including activities such as getting out of a chair.[3]

Previous authors have demonstrated that muscle strength is related to physical performance in PD.[4] Progressive resistance exercise has been suggested as a treatment option to preserve function and health-related quality of life.[5] In addition, exercise may be limited because of the apparent increase of difficulty with mobility, weakness and fatigue.

Fatigue, defined as an extreme and persistent tiredness, weakness or exhaustion (mental, physical or both) is an important disabling sign that added to balance impairment increases the difficulty of gait performance and leads to a loss of independence and disability. It is present in up to two-thirds of persons with PD and has been previously related to a multitude of factors including motor symptoms.[6]

The objective of this study was to examine the effects of a twice-a-week resistance training program using elastic bands during 8 weeks on dynamic balance and fatigue in patients with PD.

Methods

Design

The design consisted of a single-blinded randomized controlled trial. After obtaining Ethical Approval from the University of Granada Ethics Committee, people with PD were recruited from a local Parkinson Association. Right of human subjects were protected in the study. Prior to participation, individuals were informed about the purpose and the course of the study, after which they gave their informed written consent to participate. To ensure concealment of allocation, eligibility was determined by a blinded assessor not involved in the randomization process. After being assessed for eligibility, participants were randomly assigned to the following: (1) experimental group or (2) control group. The randomization sequence was drawn up and kept off-site by a statistician who was not aware of the study aims, using a random number generator in blocks of eight with no stratification. The sequence of subjects included in the experimental or control group was mailed from the statistician to an independent research who distributed the participants. The design of the study and participants' distribution between-groups is shown in Fig. 1.

Participants

For this clinical trial, 50 participants were initially screened for eligibility. The inclusion criteria included a clinical diagnosis of PD according to UK Brain Bank Criteria in the II-III Hoehn & Yahr stages, to be aged more than 65 years old, stable medication usage and to be able to walk 10 m without assistance from another person or a walking frame. The exclusion criteria included cognitive impairment (Mini-Mental State Examination score lower than 24) or comprehension deficits that prevented them from following verbal commands, to have visual or acoustic limitations, to be diagnosed of a neurological condition other than PD or to have clinically significant comorbidities, likely to affect gait.

Measures

After allocation, baselines measures were taken. All the data were collected by an independent researcher who was blinded to the allocation group of the patients at baseline and after the intervention. Subjects were asked to not reveal their group assignment

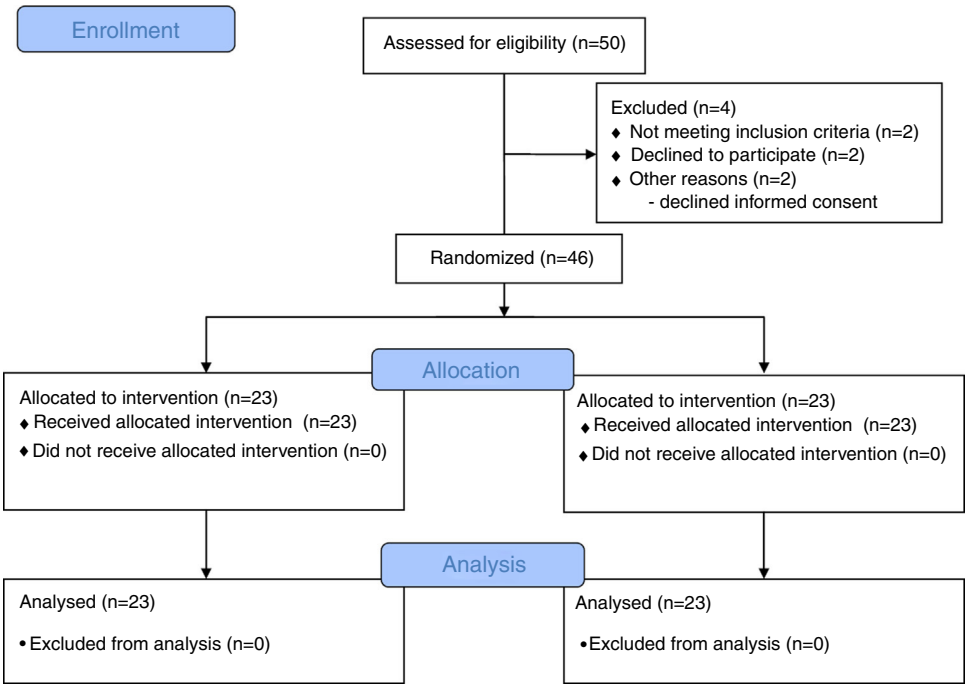

Fig. 1. Flow-chart of the participants distribution.