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ORIGINAL ARTICLE

Postural Rehabilitation and Kinesio Taping for Axial Postural Disorders in Parkinson's Disease

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Abstract

Objective: To assess the effects of postural rehabilitation (PR) on trunk asymmetry and balance, with and without Kinesio taping (KT) of the back muscles as additional treatment, in patients with Parkinson's disease (PD) who have postural disorders.

Design: Single-blind, randomized controlled trial with 1-month follow-up.

Setting: Ambulatory care in referral center.

Participants: Patients (N=20) with PD showing postural abnormalities of the trunk, in the sagittal and/or coronal plane.

Interventions: Four weeks of patient-tailored proprioceptive and tactile stimulation, combined with stretching and postural reeducation, was provided to 13 subjects (PR group), while 7 received no treatment (control group). Six of the 13 subjects receiving PR also had KT strips applied to their trunk muscles, according to the features of their postural abnormalities.

Main Outcome Measures: Berg Balance Scale, Timed Up and Go, and degrees of trunk bending in the sagittal and coronal planes were assessed at the enrollment (t0), 1 month later (t1), and 2 months later (t2).

Results: At t1, all treated patients showed a significant improvement in trunk posture in both the sagittal ($P=.002$) and coronal planes ($P=.01$), compared with baseline. Moreover, they showed an improvement in measures of gait and balance ($P<.01$). Benefits persisted at t2 for all measures, except lateral trunk bend. No differences were found when comparing the PR and KT groups.

Conclusions: The combination of active posture correction and trunk movements, muscle stretching, and proprioceptive stimulation may usefully impact PD axial symptoms. Repeated training is advocated to avoid waning of the effect.

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Abnormal posture is a recurrent feature in Parkinson's disease (PD), with more than 30% of patients showing a deformity of their limbs, neck, or trunk, including the classic stooped posture.[1] Some patients with PD (2%−12.3%) present with the most severe abnormalities of trunk alignment, consisting of camptocormia, Pisa syndrome, and antecollis.[2-5] The severity of motor impairment, much more than age, disease duration, and long-term L-dopa treatment, is thought to adversely influence axial abnormalities, and especially camptocormia.[2,4] The diagnosis of postural disorders is often based on qualitative assessment of the patient's posture. Evidence of treatment efficacy is poor; dopaminergic drugs exert inconsistent effects, and botulinum toxin injections give uncertain benefits, whereas the role of rehabilitation is rarely investigated.[6] Postural disorders induce both functional impairment and social embarrassment because of trunk movement restrictions, body image alteration, back pain, balance impairment, and gait difficulty, eventually causing an increased risk for falls.[7]

The latest meta-analyses,[8-10] assessing the effectiveness of physiotherapy interventions for motor symptoms (gait and balance)

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in PD, conclude that physiotherapy yields a functional benefit over the short-term (<3mo). However, no consensus is available concerning the efficacy of physiotherapy for PD-related postural abnormalities.[11] Intensive exercise, manipulative treatment, hydrotherapy, the Alexander technique, yoga, and Pilates, together with orthoses (neck collars, lumbar support belts) and aids (high-level walking devices), have been proposed as possible effective strategies, without any supporting evidence.[6]

The pathogenesis of PD-related postural abnormalities is likely multifactorial as well as largely unknown, and this may compromise treatment selection and efficacy. In addition to dystonia and rigidity, proprioceptive and sensorimotor disintegration as well as peripheral degenerative processes (myopathy, skeletal and soft tissue changes) have been proposed as causative factors of abnormal trunk postures.[12-15]

It has been well established that motor deficits do not occur in isolation in either PD or dystonias and are associated with sensory integration deficits.[15] Following this assertion, we focused our attention on 2 physiotherapy approaches aimed at providing sensory stimulation and manipulation: one is a postural rehabilitation (PR) method based on the global postural reeducation concept (global postural rehabilitation [GPR]),[16] while the other uses Kinesio taping (KT).[17] Both methods use muscle stretching and proprioceptive stimulation.[16,18,19]

Recently, Oliveri et al[20] showed that active muscle stretching, elicited through GPR, exerts physiological effects at the cortical level, by increasing the amount of intracortical inhibition, reducing intracortical excitation, or both. These effects are posture and task specific; in fact, increased inhibition in the cortical areas controlling the flexor muscles counterbalances an increased excitation of the cortical areas controlling the extensor muscles. However, when the exercise/posture does not target the extensor muscles, as in the supine position, the inhibition of the flexor muscles is not matched with the excitation of the extensor ones. Therefore, a correct selection of GPR postures is recommended when treating neurologic disorders characterized by an imbalance of excitation and inhibition in the motor cortex. Indeed, patients with PD exhibit asymmetrical motor impairment, and an increase in motor symptom asymmetry has been associated with the onset of abnormal posture in the coronal plane (such as in the Pisa syndrome).[21]

Based on these premises, we designed a randomized controlled trial to assess the effects of a rehabilitation program, based on stretching and PR with or without KT of the back muscles, on postural disturbances in patients with PD.

Methods

Design

This study was a single-blind, randomized controlled trial, with a 1-month follow-up, of PR and KT of the trunk muscles, with respect to either PR alone or no treatment, in patients with PD who had abnormalities of trunk alignment.

List of abbreviations:

BBS	**Berg Balance Scale**
CG	**control group**
GPR	**global postural rehabilitation**
KT	**Kinesio taping**
PD	**Parkinson's disease**
PR	**postural rehabilitation**
TUG	**Timed Up and Go**

Participants

Twenty of 64 consecutive people with idiopathic PD, according to the criteria of Gelb et al,[22] were selected, since they showed postural abnormalities, which were defined as follows: (1) flexion in the sagittal plane originating in the thoracolumbar spine with an almost complete resolution in the supine position; and/or (2) lateral flexion that can be almost completely alleviated by passive mobilization or supine positioning. All subjects scored ≥2 at the item posture of the Unified Parkinson's Disease Rating Scale, motor part.

Exclusion criteria for this study were as follows: (1) a Mini-Mental State Examination score ≤20/30 and (2) syndromes that may determine muscle weakness (myasthenia gravis, motor neuron disease, polio/postpolio syndrome, myositis, amyloid or thyroid myopathy) or fixed vertebral deformities (ankylosing spondylitis, vertebral pathology such as fracture, spinal cord pathology such as syrinx, idiopathic or degenerative scoliosis). The above-mentioned conditions were ruled out through careful medical history, neurologic examination, and imaging studies (radiographs).

Procedure

Subjects were randomly assigned to 2 treatment groups and 1 control group (CG). The 2 treatment groups received PR (PR group, 7 patients) or PR plus KT (KT group, 6 patients), while the CG (7 patients) received no treatment (Consolidated Standards of Reporting Trials [CONSORT] flowchart is described in fig 1). Subjects from both treatment groups underwent 12 PR sessions (3d/wk for 4wk) lasting 40 minutes; the patients in the KT group received KT in addition. Treatment was delivered by well-trained therapists with more than 10 years of experience in the technique of PR.

PR was aimed at achieving the following 3 goals: (1) postural realignment of the trunk in the coronal and sagittal planes and with respect to the head; (2) correct coordination of trunk movement with respect to other body segments; and (3) physiological breathing coordination.

PR is a patient-tailored treatment based on proprioceptive and tactile stimulation, stretching, and postural reeducation through active movement execution. Tactile and proprioceptive stimuli of the back were provided to patients with materials of different texture. Moreover, physiotherapists help patients to realize a series of active, gentle movements and maintain postures aimed at realigning joints, stretching shortened muscles, and enhancing the contraction of antagonist muscles, thus avoiding postural asymmetry. The exercise program is based on the GPR concept of Souchard.[16] Postural corrections were achieved through an active involvement of the patient, while the physiotherapist surveyed the maintenance of posture alignment and discouraged compensatory movements.

The PR method required therapeutic postures to be held for 5 to 15 minutes each (according to patient's tolerance) in the lying, sitting, and standing positions. Most postures entailed either anterior or posterior muscle chain stretching (fig 2A). In the lying position, subjects started with the hips flexed and abducted and were asked to progressively extend the coxofemoral angle while abducting the upper limbs, thus lengthening the anterior trunk