Exercising for People with Parkinson’s Disease and Their Support Group

by Daniel M. Corcos, Ph.D. and Elizabeth M. Skender, ACSM-CEP

INTRODUCTION

Parkinson’s disease (PD) is a chronic, progressive, neurodegenerative brain disorder that markedly impairs the performance of activities of daily living (ADLs). PD is the second most common neurodegenerative disease after Alzheimer’s disease, affecting nearly 700,000 individuals in the United States 45 years and older, and is projected to double by 2030 (1). PD is characterized by bradykinesia (slowness in movement and reduced movement amplitude), resting tremor (rhythmic limb shaking), rigidity (increased muscle tone), postural instability (intolerance to postural threat, causing impaired balance), and gait abnormalities. The cause of PD is unknown, but aging, genetic susceptibility, environmental factors, inflammation, and mitochondrial dysfunction likely all play a role (2). PD advances over time resulting in increased disability, driven by the progression of motor and nonmotor symptoms, medication complications, and motor disabilities with poor responses to medication such as postural instability and gait (2).

Individuals with PD often display a stooped posture and a short shuffling walking stride along with a decreased arm swing and poorer walking economy when compared with persons without PD (3). Getting up, changing direction, turning around, and transferring from one place to another gets harder as PD advances. Other symptoms that affect quality of life may include excessive salivation or drooling; soft, slurred speech; and a variety of nonmotor features, including cognitive impairment, mood disorders, and sleep disorders. Individuals with PD (especially those in advanced stages) may have autonomic nervous system dysfunction, including cardiovascular dysfunction (4). Orthostatic hypotension, heat intolerance, sweating disturbances, and urinary problems also are associated with PD (4).

HOW PD IS DIAGNOSED, ASSESSED, AND TREATED

PD is diagnosed following a comprehensive review of medical history and a neurological and physical examination. A person must have bradykinesia and either tremor or rigidity for the diagnosis of PD. The Movement Disorder Society Unified Parkinson’s Disease Rating Scale (MDS-UPDRS) is used to monitor the burden and extent of PD (5). It is the gold standard for assessing treatment interventions. The MDS-UPDRS covers four domains: part I assesses the nonmotor experiences of daily living such as cognition, depression, sleep, fatigue, and hallucinations; part II assesses the patient’s perception of their ability to engage in ADLs such as eating, dressing, hobbies, and walking; part III covers the motor evaluation, which includes ratings for rigidity, bradykinesia, gait, postural stability, and tremor; and part IV assesses the motor complications, including ratings for dyskinesias (involuntary movements), dystonia (painful...
cramps), and motor fluctuations (irregular responses to PD medication) (5).

The standard treatments for PD are exercise, medication, and deep brain stimulation. However, medication and deep brain stimulation can have serious side effects, and neither have consistently demonstrated efficacy for balance/mobility, cognition, or delaying disease progression. By contrast, evidence suggests that exercise can reduce disease severity (6), slow the progression of the signs of the disease (7), as well as improve strength (6), aerobic capacity (7), and gait performance (8).

**EXERCISE BENEFITS AND PRESCRIPTION**

Because PD is a chronic and progressive disorder, an exercise program should be prescribed early when the individual is first diagnosed, should continue throughout life, and should be reviewed and revised as the disease progresses. Exercise prescription should ultimately aim to slow the rate at which the signs of the disease progress, limit comorbidities, minimize complications associated with muscle disease, and maintain the ability to live an independent life. This can be accomplished by simultaneously addressing cardiorespiratory fitness, muscular strength, flexibility/mobility, neuromotor training, and balance.

Regular aerobic exercise has been shown to attenuate PD progression (9). Moderate-intensity aerobic exercise improves aerobic fitness, fatigue, mood, executive function, and quality of life in mild to moderate PD (10,11) and high-intensity endurance exercise (80% to 85% HRmax) attenuates the worsening of motor signs (7).

An individual with PD can safely enjoy a variety of exercise modalities, including treadmills, stationary cycles, recumbent cycles, ellipticals, rowers, and arm ergometers. Aerobic training at high intensity (80% to 85% HRmax)(7) and even higher intensity (12) as well as HIIT training involving whole body movements (>85% HRmax) (13) can be safely prescribed to individuals with early stage PD and should be encouraged for individuals who are willing and able to do this. Aerobic exercise should be performed for 30 minutes per day, 3 to 4 days per week at high intensity (80% to 85% HRmax) for mild to moderate PD, or at moderate intensity (60% to 65% HRmax) for deconditioned individuals or those with more advanced PD, with the goal of eventually progressing to 80% to 85% HRmax. This combination of frequency, intensity, and time has the strongest support in the literature for potentially slowing down the progression of the signs of the disease. The optimum training load for each individual may vary, so it may be useful for certain individuals to break exercise bouts into shorter durations that accumulate to 30 minutes per day. Although some individuals may be capable of and motivated to exercise more than 3 to 4 days per week, it is important not to underestimate the importance of rest and recovery and be cognizant of the signs and symptoms of overtraining. Individuals who want to exercise more than 3 to 4 days per week should intersperse different types of low-intensity exercise between days of high-intensity exercise.

Resistance training also is beneficial in PD and can improve muscle strength and power (14), movement speed, and dynamic balance, along with quality of life, usually the same as seen in neurologically normal controls (6). Free weights may be used, although they tend to be less safe at more advanced stages and in those with increased severity of tremor, especially during exercises that involve overhead lifting (15). Resistance training should be performed between 2 and 3 days per week at 30% to 60% of 1-RM for individuals beginning to improve strength or 60% to 80% 1-RM for more advanced exercisers.

In lieu of free weights, weight machines, resistance bands, or body weight can be implemented as needed or preferred. As resistance training progresses, unstable devices such as balance pads, dyna discs, balance discs, BOSU balls, or Swiss balls should be incorporated with the resistance training routine. When unstable devices are incorporated, mobility, motor signs, neuromuscular outcomes, balance, and quality of life improve, whereas cognitive impairment and fear of falling are reduced (16–18). The increase in motor complexity of the exercise routine (i.e., degree of instability) along with the increase in strength both contribute to the positive outcomes (16–18).

Balance impairment and falls can be major problems in those with PD, and although both endurance and resistance exercise will benefit posture and balance, it is crucial for individuals with PD to perform neuromotor training specifically for posture, balance, gait, and mobility. Neuromotor training consists of a variety of different challenging physical activities (e.g., multidirectional step training, step up and down, reaching forward and sideways, obstacles, turning around, walking with suitable step length, standing up, and sitting down). Using rhythmic auditory stimulation during multidirectional step training can improve functional gait parameters, including balance, and those improvements will be maintained longer than when external cueing is not used (19). Neuromotor training should progress exercise motor complexity (coordinative and control requirements of the motor activity) and quantitative training parameters (i.e., FITT principles). The progression of both the exercise motor complexity and the quantitative training parameters should be done sequentially rather than simultaneously, as the former impairs the progression of the latter.

Other alternative forms of exercise are beneficial for individuals with PD, including Tai Chi, partnered and unpartnered dance (20,21), and Lee Silverman Voice Training (LSVT)/BIG. Dance interventions improve certain motor symptoms and functional mobility, especially those that use rhythmic tasks and visual and auditory cues (22). Tai Chi has been shown to improve motor function, balance, and quality of life in those with PD, and it also may improve fall risk and depression (20). LSVT/BIG is a movement-based behavioral treatment that improves motor function in people with PD (23). In addition, incorporating concepts of the LSVT/BIG program (large amplitude, exaggerated movement patterns performed with high intensity, and effort that become progressively more difficult and complex) into functional exercise helps to restore normal movement amplitude in real life situations (23).
SUMMARY

The PD exercise prescription consists of resistance, endurance (cardiovascular), and balance exercises. In addition, core training, neuromotor training, dual-task training, and multitask training also will benefit overall health, well-being, and the ability to perform everyday activities for the person with PD. Each exercise modality addresses different components of health and should not be overlooked. Although it is clear that there are benefits to rigorously quantifying exercise dose, many forms of exercise do not naturally lend themselves to the FITT principles, and should not be overlooked. Although it is clear that there are benefits to rigorously quantifying exercise dose, many forms of exercise do not naturally lend themselves to the FITT principles, and should not be overlooked. Although it is clear that there are benefits to rigorously quantifying exercise dose, many forms of exercise do not naturally lend themselves to the FITT principles, and should not be overlooked. Although it is clear that there are benefits to rigorously quantifying exercise dose, many forms of exercise do not naturally lend themselves to the FITT principles, and should not be overlooked. Although it is clear that there are benefits to rigorously quantifying exercise dose, many forms of exercise do not naturally lend themselves to the FITT principles, and should not be overlooked.