

The Benefits of Physical Activity in Patients With Parkinson's Disease

Ciarra Ashworth, Jessica Vetter, and Danielle Burke

Exercise Science, Gardner-Webb University

What is Parkinson's Disease?

Parkinson's Disease (PD) is a common neurodegenerative disorder that is caused by the death and impairment of neurons found in the substantia nigra part of the brain. These neurons are responsible for producing dopamine, the neurotransmitter that is responsible for coordinated muscle movements. The most common sign of PD is tremors or shaking in extremities such as the hands, the loss of fine motor control showing in this way is one of the first noticed symptoms. Other signs of PD include bradykinesia, poor balance, muffled speech, depression, and even a lack of arms swing while walking.

Testing for Parkinson's Disease?

There is no single test to identify PD, oftentimes it is diagnosed by a neurologist based on symptoms and a full neurological exam. Blood work and MRI's may be used to help diagnose by eliminating other possibilities, but not to confirm PD.

What causes Parkinson's Disease?

There is no known cause of PD at this time, but there is speculation that there may be a genetic link as well as studies of gene mutation of dopamine cell function.

Medical Intervention

While there is no cure for PD, symptoms are often slowed or managed with different medications. The most common medication is Levodopa, this medication promotes the brain to produce dopamine in order to help with PD symptoms such as muscle tremors and stiffness. The known side effects of Levodopa are reduced BP, nausea, loss of appetite, confusion, and hallucinations.

Exercise Testing

Previously, Jacob (2018) explained it was assumed that people with Parkinson's disease (PD) should not participate in resistance training programs because of the chances of it increasing rigidity. However, there have been studies found that resistance training is beneficial for individuals with PD. It has shown to increase muscle strength, mobility and walking capacity, muscular endurance, balance, and fat-free mass (Jacob 2018).

According to Martignon et al., (2021), the ACSM Guidelines for Exercise Testing and Prescription recommend improving four main factors, stride, movement, balance, and functional capacity. One major problem is the level of physical exertion a PD patient can be subjected to. However, the most effective is non-pharmacological interventions which includes, physiotherapy, walking, running, strength training, or functional exercises. Also, challenging exercises training multiple aspects of physical status simultaneously have resulted in positive outcomes. It is important to prescribe a variety of physical activities to overcome the difficulties of PD patients. The change of activities and variation of movements will help improve this disease (Martignon et al., 2021).

Exercise Prescription

Clients with Parkinson's disease can benefit from exercise that is catered to them. According to Alberts & Rosenfeldt (2020), exercise is medicine for Parkinson's disease (PD) patients. Exercise gives PD patients a way to feel control over their bodies, despite the PD slowly taking motor and non-motor functions away. Aerobic exercise at high intensities daily can enhance brain function and can improve PD symptoms and slow disease progression. An ideal exercise prescription for a PD patient would be resistance training and aerobic exercise 3× a week for 30-40 minutes at 60–80% of heart rate reserve or 70–85% of heart rate max. The patients can ideally reach up to a 14-17 on a 20-point RPE scale. Patients should progress on their own time as tolerated (Alberts & Rosenfeldt, 2020).

According to Jacobs (2018), PD patients can also benefit from exercise by improving their balance. They are more at risk for falls because they have poor reaction times and are not great at moving their center of mass outside their base of support. Clients can also benefit from stretching, flexibility, and mobility sessions to work major muscles and joints. Clients can expect progression and improvement, but safety is extremely important when working with PD patients. PD clients move at slower speeds and have poor balance. The clients can have a hard time adapting to a dynamic environment. To create a safe and comfortable environment the trainer should have sessions when the facility is quiet and not busy. The client should also be under supervision at all times. Unstable surfaces or equipment, such as treadmills and upright or free weight exercises may not be the best idea because of tremors and poor coordination. The time of exercise should also be considered based on their medication schedule. The PD patients should also have their heart rate, blood pressure, and thermoregulation monitored at all times due to their poor autonomic systems (Jacobs, 2018).

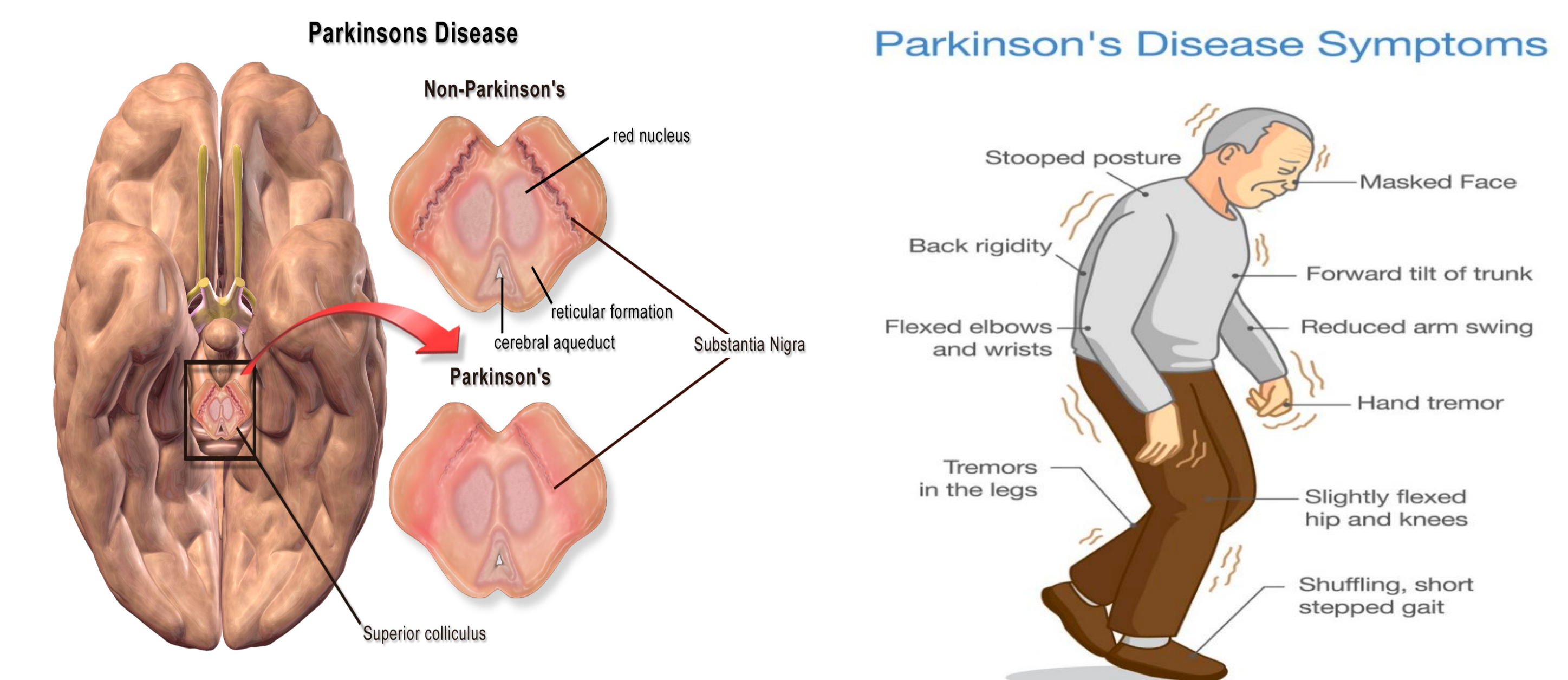
Special Considerations

The biggest consideration when working with PD patients is the understanding that it is a progressive disease. The medical and exercise intervention is to help manage and delay the signs and symptoms of PD. The common impacts of PD on exercise include the loss of motor function, concentration, and depression. It should be expected for individuals with PD to be at risk for falling, poor cueing strategies, and more cognitive challenges. Exercise may be performed by the individual on their own or performed with an assistive devices. As PD progresses, exercise intervention must change. Patients with PD should have variations of exercises including, aerobic training, flexibility, strengthening, and balance. Also, the exercises should incorporate multi-tasking elements to improve cognitive function during physical movements.

The FITT principle will change over time when working with PD patients. The goal is to manage symptoms as PD continues and the FITT principle should be revisited. In the early stages, it is recommended that cardiorespiratory exercise should occur at least 3 times a week and resistance training 2-3 times a week. The intensity can vary depending on what stage of PD the individual is in, if they have an active lifestyle, and the frequency level of exercise. Intensity can be gauged by using an RPE scale or having a goal HR to meet during exercise. Also, intensity depends on if the patient wants to increase strength or muscle endurance. The recommended exercise time for PD patients is 30-60 minutes, typically starting with 10-minute sessions and working up to 20–30-minute sessions. The type of exercise should be determined by the state of the client. Some patients may need to focus on strengthening and fine motor control, whereas others may need to focus on cardiorespiratory. The special considerations of working with PD patients is that minimal efforts can have significant impacts on their life.

Program Guidelines

Exercise Type	Frequency/Progression	Intensity	Volume/Time
Resistance Training			
A. Weight training with machines and dumbbells B. Body exercises C. Exercises with elastic tubing	Start with 1-2 session per week and progress to 3-4 sessions per week.	Start with 8-10 exercises at a 40-60% resistance based off of 1-RM testing. Progress to 60-80% of 1-RM. Use a multijoint approach.	Start with 1 set per exercise of 10-12 reps each. Progressively increase to 2-3 sets per exercise and rest 1-2 minutes between each set.
Aerobic Training			
A. Walking B. Cycling C. Rowing D. Swimming E. Elliptical	Start with 1-2 session per week and progress to 3-4 sessions per week.	Start with a light to moderate intensity of 30-60% of HRR or 9-13 RPE. Increase gradually, reaching up to 60-80% of HRR or a 14-17 RPE.	Start with 15-20 minute sessions, and gradually increase to 30-40 minute sessions.
Also include a 10 minute stretching, flexibility, mobility session after each exercise session.			



Conclusion

In conclusion, Parkinson's disease is a progressive neurological disorder and can affect voluntary movements, however exercise intervention can benefit a person with PD. Symptoms of PD include a stooped posture, masked face, tremors, shuffling, reduced arm swing, flexed elbows and wrists, and a forward tilt of the trunk. Exercise intervention is found to ease the symptoms and slow the progression of the disease. Aerobic exercise and resistance training are the most beneficial to PD patients. Exercise gives these patients a way to feel control over their bodies despite progressively losing their motor and non-motor functions. It is recommended that clients exercise 3 times a week for 30-40 minutes at an intensity of 14-17 on a 20-point RPE scale. Although there is no cure for Parkinson's disease, a variety of exercises and movements along with stretching, flexibility, and mobility sessions gives the patients many benefits in slowing down the progression of PD.

References

- Alberts, J. L., & Rosenfeldt, A. B. (2020). The Universal Prescription for Parkinson's Disease: Exercise. *Journal of Parkinson's disease*, 10(s1), S21–S27. <https://doi.org/10.3233/JPD-202100>
- Davie C. A. (2008). A review of Parkinson's disease. *British medical bulletin*, 86, 109–127. <https://doi.org/10.1093/bmb/ldn013>
- DeMaagd, G., & Philip, A. (2015). Parkinson's Disease and Its Management: Part 1: Disease Entity, Risk Factors, Pathophysiology, Clinical Presentation, and Diagnosis. *P & T : a peer-reviewed journal for formulary management*, 40(8), 504–532.
- Jacobs, P. L. (2018). *Nsca's Essentials of Training Special Populations*. Human Kinetics.
- Martignon, C., Pedrinolla, A., Ruzzante, F., Giuriato, G., Laginestra, F. G., Bouça-Machado, R., Ferreira, J. J., Tinazzi, M., Schena, F., & Venturelli, M. (2021). Guidelines on exercise testing and prescription for patients at different stages of Parkinson's disease. *Aging clinical and experimental research*, 33(2), 221–246. <https://doi.org/10.1007/s40520-020-01612-1>