



Revista Portuguesa de
Cardiologia
Portuguese Journal of **Cardiology**
www.revportcardiol.org



LETTER TO THE EDITOR

Exercise prescription for Parkinson's disease patients: Dealing with cardiovascular autonomic dysfunction

Prescrição de exercício para pacientes com doença de Parkinson: lidando com a disfunção autonómica

To the Editor:

Parkinson's disease (PD) is a progressive neurodegenerative disease widely recognized by motor symptoms, such as bradykinesia, rigidity, tremor, and postural instability.¹ Neurodegeneration may also occur in autonomic cardiovascular control centers and in the projection structures for the target organs, producing autonomic cardiovascular dysfunction (i.e. deleterious alterations of sympathetic and/or parasympathetic autonomic activities).² It is important to note that these alterations in cardiovascular control may also be observed even in the early stages of the disease or in patients without cardiovascular diseases.^{3,4} Moreover, comorbidities and cardiovascular disease risk factors are also frequent in these patients.⁵

Exercise training has been recommended for management of PD. However, because of the cardiovascular dysfunction observed in some patients, some cardiovascular responses at rest (e.g., supine hypertension) and during exercise (blunted cardiovascular submaximal and maximal response to a maximal cardiopulmonary exercise test) are different compared to healthy subjects.^{2,4} Therefore, cardiovascular dysfunction as a target of exercise prescriptions should be crucial for PD patients. Despite this, recommendations have been vague or simplistic.

Aerobic exercise is recommended three to seven days per week, for 20-60 minutes daily at an intensity of 60-85% of heart rate peak or 30-89% of heart rate reserve or 9-17 on 6-20 rate of perceived exertion (RPE) scale, according to each patient's motor severity. In addition, resistance exercise has also been recommended two to three days per week, of 1-4 sets of 8-15 repetitions of <30-80% of one repetition maximum, and with interval of 2-4 minutes duration between sets, according to the patient's motor severity. In this context, the use of the target percentage of the heart rate reserve should be employed with caution, since exercise

intensity prescribed could be overestimated if a maximal exercise test is not performed. Besides, the cardiovascular dysfunction inherent in PD, the cardiovascular comorbidities and use of medications that affect the cardiovascular system (e.g., beta blockers, among others) may also blunt heart rate response to maximal exercise test. For PD patients with heart diseases (e.g. coronary artery disease, arrhythmias, among others) maximal exercise test may also provide important information, such as the exercise intensity below the ischemia or arrhythmias threshold.⁶

Similarly, exercise prescription based on RPE also requires caution in some situations. A previous study⁷ observed a disconnection between RPE and heart rate parameters during aerobic exercise in PD patients with mild to moderate motor severity, who reported a level of effort between "fairly mild" to "somewhat hard" while they exercised at moderate to vigorous intensity (60-80% of heart rate peak) on the cycle ergometer. Future studies are required to understand the relationship between physiological and perceptual parameters during exercise in PD.

Aerobic exercise with self-selected intensity performed on a cycle ergometer may be one option for PD patients with mild to moderate motor severity and without cardiac diseases who do not have access to more precise exercise prescription via maximal exercise testing. We previously observed that PD patients performed exercise with self-selected intensity within the recommended intensity (60-80% of heart rate peak obtained during a maximal exercise test).⁷ However, this strategy should also be tested in other situations, such as while walking, in PD patients with other characteristics, among others situations.

Cardiovascular dysfunction may also negatively impact on resistance exercise in PD. We previously demonstrated that PD patients exhibit blunted cardiovascular response during resistance exercise as well as during the interval between sets.⁸ In this context, the monitoring of cardiovascular parameters during these periods (e.g., blood pressure and heart rate) should be to considered for determining the individualized prescription. Furthermore, PD patients may also present orthostatic hypotension and/or supine hypertension, meaning sudden changes of positions should be taken into attention when exercise is performed, and patients should also avoid remaining in a supine position for a long time. Finally, resistance exercise prescription should also consider the use of medications that affect the cardiovascular system and the presence of cardiovascular

<https://doi.org/10.1016/j.repc.2021.07.011>

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Please cite this article as: H. Kanegusuku, M.A. Correia, G.G. Cucato et al., Exercise prescription for Parkinson's disease patients: Dealing with cardiovascular autonomic dysfunction, *Revista Portuguesa de Cardiologia*, <https://doi.org/10.1016/j.repc.2021.07.011>

comorbidities. It is important to check the recommended exercise prescription for each specific comorbidity.

In light of the above, PD patients should also be screened for autonomic cardiovascular conditions before exercise prescription. Maximal exercise testing should be performed for a cardiovascular evaluation and higher accuracy for the exercise prescription. Strategies for exercise prescription should be envisaged for when patients do not have access to more precise exercise prescription based on maximal exercise testing.

Sources of Funding

RR received a research productivity fellowship granted by National Council for Scientific and Technological Development.

Conflict of interest

The authors have no conflicts of interest to declare.

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