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LETTER TO THE EDITOR

Relationship between arterial stiffness parameters and cardiovascular responses to maximal exercise testing in Parkinson's disease patients

Relação entre parâmetros da rigidez arterial e resposta cardiovascular em prova de esforço máximo em pacientes com doença de Parkinson

To the Editor:

Parkinson's disease (PD) patients frequently present cardiovascular autonomic regulation dysfunction, leading to blunted heart rate (HR) and systolic blood pressure (BP) response to exercise compared to healthy subjects.[1,2] Arterial stiffness may also be increased in some PD patients.[3] In these patients, higher arterial stiffness has been associated with several cardiovascular alterations, including orthostatic hypotension, supine hypertension and nocturnal hypertension.[3] Therefore, it is plausible that arterial stiffness in these patients is also associated with blunted cardiovascular responses to exercise. However, whether similar responses occur in PD patients is unknown. Thus, the aim of the study was to assess the relationship between arterial stiffness parameters and cardiovascular response to maximal exercise test in PD patients.

Nineteen male PD patients (65±7 yr, 27.6±4.1 kg/m^2, 6.8±3.6 yr disease diagnosis, and 2.2±0.6 modified Hoehn & Yahr) and presenting no other neurological disorders, or any diagnosed cardiac disease, hypertension or diabetes completed the study. Patients were under PD medication treatment, such as levodopa (100%), dopamine agonist (42%), amantadine (32%) and selegiline (11%).

All patients performed a maximal exercise test on a cycle ergometer, following the previously published protocol.[1] HR and systolic BP response to maximal exercise testing was calculated based on the difference between peak exercise minus pre-exercise values. After an interval of at least five days, all the patients participated in an experimental session that assessed arterial stiffness parameters, such as carotid-femoral pulse wave velocity (PWV), pulse pressure and augmentation index (AIx), following the guidelines of the Clinical Application of Arterial Stiffness, Task Force III.[4]

The study protocol complies with the principles of the Declaration of Helsinki. The study was approved by the local ethics committee of the Universidade Nove de Julho (Certificate of Submission for Ethical appraisal: 95350718.6.0000.5511), and written informed consent was obtained from all patients.

Correlation between arterial stiffness parameters and cardiovascular response to maximal exercise testing were analyzed by partial correlation and used the peak workload obtained during maximal exercise testing as covariate response ($p \leq 0.05$).

Patients presented mean values for pulse pressure of 32±9 mmHg, 22±10% for AIx and 6.8±2.1 m/s for PWV. In response to maximal exercise testing, patients presented an increase of 46±14 bpm and 51±23 mmHg for HR and systolic BP, respectively. They also presented mean values for peak workload of 91±22 watts.

Pulse pressure and AIx were negatively correlated with systolic BP response to maximal exercise test ($r=-0.699$, $p \leq 0.01$ and $r=-0.468$, $p=0.05$, respectively). However, PWV was not significantly correlated with systolic BP and HR response to maximal exercise testing ($r=-0.003$ and $r=-0.307$, $p>0.05$, respectively). Pulse pressure and AIx were also not significantly correlated with HR response to maximal exercise test ($r=-0.076$ and $r=0.031$, $p>0.05$, respectively).

The correlation between increased pulse wave reflection parameters assessed at rest and blunted systolic BP response to maximal exercise testing suggests that alterations in peripheral artery function, such as arterial endothelial dysfunction,[5] among other alterations also impair the vascular response to exercise in these patients.

The results of the current study have some practical relevance, since a significant correlation was observed between increased wave reflection parameters with blunted systolic BP. In practical terms, the increased pulse pressure at rest may be potentially related to impaired cardiovascular responses during maximal exercise. Thus, the PD treatment should also include strategies that improve vascular functionality and structure in these patients.

In conclusion, in PD patients, increased wave reflection parameters are related to blunted systolic BP response to exercise.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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