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Set-shifting function is associated with dynamic balance in people with Parkinson's disease

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Keywords

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Abstract

BACKGROUND:

Parkinson's disease (PD) is responsible for more balance and cognitive disability than most chronic diseases. Cognitive function, mainly executive function, is essential for safe balance. Recent studies have revealed that neuropsychological assessments (e.g., Montreal Cognitive Assessment [MoCA]) are related with static balance in people with PD. Here, we used the Mini Balance Evaluation System Test (Mini-BESTest) to assess static and dynamic balance. We aimed to investigate if instrumented assessment of executive function (a Tablet-based Cognitive Assessment Tool [TabCAT]) and the clinical global cognition (MoCA) can explain the variation in the Mini-BEST score and its subscores in people with PD.

METHODS:

A total of 44 individuals with idiopathic PD (age=69.8 years, disease duration=7.8 years, MDS-UPDRS-III=35.8 score, MoCA=26.6 score) were assessed in the ON-medication state. Phone screening established eligibility, and consent was obtained in-person. The Mini-BESTest, MoCA, and TabCAT tests were completed in the laboratory. The TabCAT assessed visuospatial function (Line Orientation task modeled after the Benton Judgement of Line Orientation task) and executive function (Set-Shifting and Flankers tasks).

RESULTS:

Mini-BESTest total score was associated with MoCA score ($r=0.47$, $p=0.005$) and Set-Shifting ($r=0.49$, $p=0.002$); however, linear multiple regression showed Set-Shifting as the best predictor of MiniBESTest variation ($R^2=0.48$, $p=0.004$). Although the anticipatory subscore was associated with both MoCA ($r=0.61$, $p<0.001$) and Set-Shifting ($r=0.34$, $p=0.042$), only reactive postural control ($r=0.53$, $p=0.001$) and dynamic gait subscores ($r=0.37$, $p=0.026$) were associated with Set-Shifting.

CONCLUSIONS:

Our preliminary findings support the association between cognition and balance. Specifically, our results show that better performance in set-shifting, the component of executive function related to cognitive flexibility, is related to better dynamic balance in people with mild to moderate PD.