A Multi-Liner Regression Model for Prediction of Walking Speed on Postural Muscle Strength, Bradykinesia, Postural Instability and Freezing of Gait in Subjects with Parkinson's Disease

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Abstract

Background: Parkinson's disease (PD) is a progressive neuro-degenerative disorder characterized by motor symptoms such as bradykinesia, rigidity, tremor, and postural instability. These symptoms significantly affect walking speed and overall mobility. Understanding the individual and combined impact of these motor impairments on walking speed is crucial for developing effective rehabilitation strategies.

Objective: This study aims to investigate the correlation between walking speed and postural muscle strength, bradykinesia, postural instability, and freezing of gait in subjects with Parkinson's disease.

Methods: A total of 31 participants with PD, aged 50-80 and classified as stages 1-3 on the modified Hoehn and Yahr scale, were recruited. Postural muscle strength was measured using a leg, chest, and back dynamometer. Bradykinesia, postural instability, and freezing of gait were assessed using part 3 of the MDS-UPDRS. Walking speed was evaluated using a 2-minute walk test. Data were analyzed using descriptive and inferential statistics, including multiple linear regression and correlation analyses.

Results: The study found that postural muscle strength significantly correlates with walking speed in PD patients. The combination of predictors, including bradykinesia, postural instability, and freezing of gait, explained approximately 67.4% of the variance in walking speed. While individual predictors might not show significance alone, their combined effect provides valuable insights into walking performance.

Conclusion: Postural muscle strength plays a critical role in determining walking speed in PD patients. The interplay between various motor impairments, such as bradykinesia, postural instability, and freezing of gait, highlights the importance of a comprehensive approach to rehabilitation. These findings emphasize the need for targeted interventions focusing on strengthening postural muscles to improve mobility and reduce fall risk in PD patients.