

Kinematic gait patterns in patients affected by Parkinson disease with and without mild cognitive impairment

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Introduction: Gait impairments and cognitive dysfunction are common in Parkinson's disease (PD) and both of them impact on physical and social health, since early stage. Previous studies suggested a close relationship between gait and cognition in PD [1].

Objectives: To assess biomechanical and kinematics changes in PD patients with (PD-MCI) and without mild cognitive impairment (PD-noMCI) in different gait settings, eventually phenotyping specific patterns.

Methods: Seventy-two PD patients (33 PD-MCI and 39 PD-noMCI) were evaluated with MDS-UPDRS, H&Y scale and gait analysis in three different conditions (normal gait, motor and cognitive dual-task). Kinematic variables were extracted. A univariate statistical analysis (t-Test for independent samples or Mann-Whitney U-test) was carried out to compare the two groups. Computation was supported by SPSS (v.27).

Results: PD-MCI, as compared with PD-noMCI patients, resulted older and affected by more disability and more severe motor symptoms, as indicated by higher H&Y scale and MDS-UPDRS part III. In the normal gait task, PD-MCI vs. PD-noMCI exhibited both increased plantarflexion and range of motion (ROM) in the ankle. In the motor dual-task, PD-MCI vs. PD-noMCI displayed significantly lower trunk maximum rotation, higher pelvic tilt and increased hip maximum flexion with consequent augmented ankle dorsiflexion [2]. In the cognitive dual-task, PD-MCI vs. PD-noMCI showed increased pelvic tilt and hip flexion with reduced ROM at both hip and knee and higher, likely compensatory, ankle plantarflexion [2].

Conclusions: PD-MCI vs. PD-noMCI patients display characteristic joints attitude with general lower limbs hyperflexion and reduction of ROM, especially in dual task conditions. Those kinematic changes could be propaedeutic for remodelling gait pattern and accounting for initial disability due to reduction of postural stability and strategical adaptability. On the one hand, these findings support the cognitive contribution to keep upright position during walking, on the other hand, they suggest early rehab intervention in PD patients with MCI.

References:

[1] Amboni M, Barone P, Hausdorff JM. Cognitive contributions to gait and falls: evidence and implications. *Mov Disord.* 2013 Sep 15;28(11):1520-33.

[2] Joseph B. Webster, Benjamin J. Darter Principles of Normal and Pathologic Gait, Chapter IV. 2019.