

Gait patterns in patients affected by Parkinson disease with and without freezing of gait

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Introduction: Freezing of Gait (FoG) is a disabling gait disorder in patients with Parkinson Disease (PD). FoG is defined by "brief, episodic absence or marked reduction of forward progression of the feet despite the intention to walk." [1]. Apart from FoG episodes, previous studies showed that PD patients with FoG display higher gait variability measures and increased asymmetry [2, 3].

Objective: To compare gait patterns in PD patients with and without self-reported FoG, in both single and dual task.

Methods: Seventy-one PD patients were consecutively enrolled and classified into freezers (FoG+) and no-freezers (FoG-), based on their answer on item 2.13 of MDS-UPDRS. All patients were assessed by Gait analysis, through BTS Bioengineering gait analysis system. Gait analysis protocol included a single task (normal gait) and two different dual tasks (a motor dual task and a cognitive dual task). A univariate statistical analysis was performed through SPSS software with Mann Whitney test on spatio-temporal gait parameters for each task in order to compare gait patterns between FoG+ and FoG-.

Results: Sixteen out of 71 PD patients were classified as FoG+, whereas 55 were classified as FoG-. As compared to FoG-, FoG+ PD patients showed increased swing variability (p-value=0.044) in single task, augmented double support phase (p-value=0.036) and reduced both mean velocity (p-value=0.042) and cycle length (p-value=0.040) in cognitive dual task.

Conclusions: Beyond FoG episodes, FoG+ vs FoG- PD patients showed increased measures of dynamic instability, especially in cognitive dual task. Our findings would support to employ early integrated rehabilitation strategy aimed at improving dynamic balance in FoG+ PD patients, thus reducing risk of falling.

References:

[1] Nutt JG et al., 2011., Lancet Neurol.; 10 (8):734-44.

[2] W. Nanhoe-Mahabier et al., 2011., Neuroscience; 182:217-24.

[3] Carlo Ricciardi et al., 2020., IEEE Medical Measurement and Applications - Conference Proceedings; art no. 9137317.