

Abstract

Background: Although movement impairment in Parkinson's disease includes slowness (bradykinesia), decreased amplitude (hypokinesia), and dysrhythmia, clinicians are instructed to rate them into a combined 0-4 severity scale using the Unified Parkinson's Disease Rating Scale motor subscale.

Objective: To evaluate whether bradykinesia, hypokinesia, and dysrhythmia are associated with differential motor impairment and response to dopaminergic medications in patients with Parkinson's disease.

Methods: Eighty five Parkinson's disease patients performed finger-tapping (item 23), hand-grasping (item 24), and pronation-supination (item 25) tasks OFF and ON medication while wearing motion sensors on the most affected hand. Speed, amplitude, and rhythm were rated using the Modified Bradykinesia Rating Scale. Quantitative variables representing speed (root-mean-square angular velocity), amplitude (excursion angle), and rhythm (coefficient-of-variation) were extracted from kinematic data. Fatigue was measured as decrements in speed and amplitude during the last five seconds compared to the first five seconds of movement.

Results: Amplitude impairments were worse and more prevalent than speed or rhythm impairments across all tasks ($p < 0.001$); however in the ON state, speed scores improved exclusively by clinical ($p < 10e-6$) and predominantly by quantitative measures ($p < 0.05$). Motor scores from OFF to ON improved in subjects who were strictly bradykinetic ($p < 0.01$) and both bradykinetic and hypokinetic ($p < 10e-6$) but not in those strictly hypokinetic. Fatigue in speed and amplitude was not improved by medication.

Conclusions: Hypokinesia is more prevalent than bradykinesia but dopaminergic medications improve predominantly the latter. Parkinson's disease patients may show different degrees of impairment in these movement components, which deserve separate measurement in research studies.