

Hand dexterity in Parkinson's disease: a study with a sensorized-glove

Martina Patera¹, Luca Pietrosanti², Alessandro Zampogna^{1,3}, Virginia Gallucci¹, Marco Falletti¹, Francesco Ascì¹, Giulia Pinola¹, Giovanni Saggio² and Antonio Suppa^{1,3}

¹ Department of Human Neurosciences, Sapienza University of Rome, 00185 Rome, Italy,

² Department of Electronic Engineering, University of Rome Tor Vergata, 00133 Rome, Italy ,

³ IRCCS Neuromed, 86077 Pozzilli, Italy

Introduction & objectives:

Parkinson's disease (PD) compromises fine motor control, leading to impaired hand dexterity and coordination¹. Accurate assessment of hand function is therefore critical for evaluating motor impairment, guiding therapeutic decisions, and monitoring disease progression². In this study, we present objective data on hand dexterity in PD patients, collected through a sensorized glove during a standardized clinical assessment.

Materials and methods:

A total of 40 participants—20 PD and 20 HS—performed standardized motor tasks, (finger tapping, hand gripping, and prono-supination), while wearing a sensorized glove (fig. 1).

PD patients also underwent evaluation using validated clinical scales. Kinematic data were analyzed in both time and frequency domains to extract fundamental harmonics and quantify harmonic distortions. Kinematic parameters were then compared between the PD and HS groups, and correlations between kinematics and clinical scores were examined.



Fig.1 Sensorized glove

Results:

PD exhibited significant alterations in both fundamental harmonics and harmonic distortion across all tested tasks compared to HS. Within the PD group, significant differences in kinematic features were observed between the more and less affected sides. Harmonic distortion demonstrated significant correlations with MDS-UPDRS score.

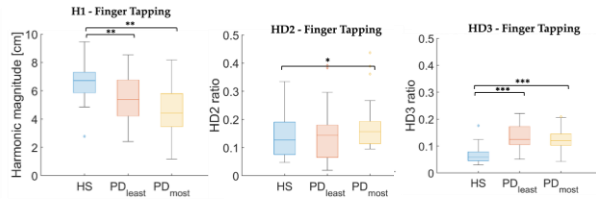


Fig.2 Finger tapping harmonic content

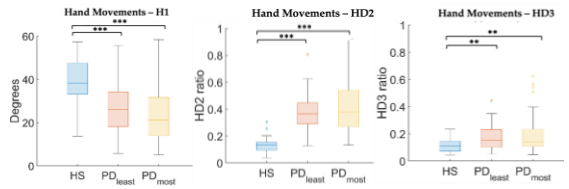


Fig.3 Hand gripping harmonic content

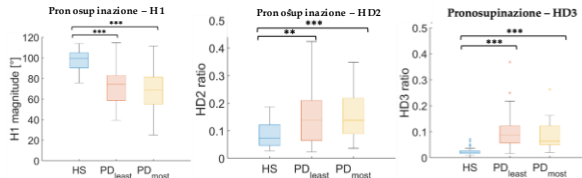


Fig.4 Prono-supination harmonic content

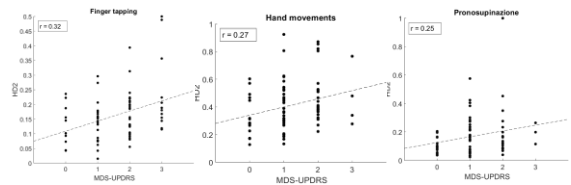


Fig.5 Clinical-behavioral correlations in patients with Parkinson's disease

Discussion and Conclusions:

Hand motor dysfunction in PD is characterized not only by reduced movement amplitude and speed, but also by a disrupted harmonic structure during repetitive motor tasks. These alterations reflect impairments in coordination and rhythm. The objective assessment of such impairments through wearable technologies holds promise for enhancing clinical practice.

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