Motor fluctuations are associated with impaired postural control in Parkinson's Disease patients: a severity-matched mobile health technology analyses

Luca Colombo[1,2,3] and Andrea Pilotto[1,2,3], Cinzia Zatti[1,2,3], Andrea Rizzardi[1,2], Chiara Trasciatti[1,2,3], Sofia Bonomelli[1,2,3], Alessandro Lupini[1,2,3], Clint Hansen[4], Robbin Romijnders[4], Walter Maetzler[4] and Alessandro Padovani[1,2,3,5]

INTRODUCTION

Motor fluctuations are a common feature in patients with Parkinson's disease (PD) and are associated with reduced quality of life. While postural instability generally correlates with the progression of PD, it remains unclear whether motor fluctuations contribute to impaired balance independently from severity and disease duration.

The aim of the present study was to investigate differences in postural control between PD patients with (PD-F) and without (PD-NF) motor fluctuations using Mobile Health Technology (MHT).

MATHERIALS AND METHODS

Matched PD patients with and without motor fluctuations:

- Clinical assessment
- Balance assessment using MHT
- Statistical analysis:
  - Clinical between-group differences using non-parametric test
  - Differences in balance parameters using comparation of z-score

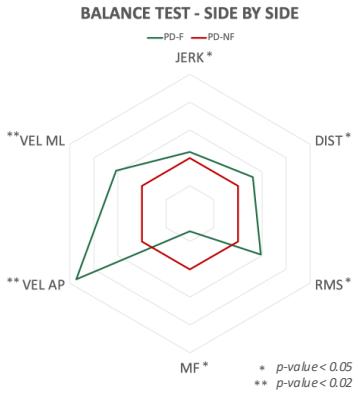
International Parkinson and Movement Disorder Society

30 sec quiet standing test with feet together

RESULTS

DEMOGRAPHICS			
	PD-NF (n.26)	*PD-F (n.18)*	*p-value*
Female	13	7	0,53
Male	13	11	
Age	69,69 ± 8,37	67,23 ± 8,66	0,34
Height	1,63 ± 0,20	1,66 ± 0,08	0,719
Disease duration	7,74 ± 3,55	9,32 ± 4,71	0,21
MDS-UPDRS III	18,62 ± 11,23	20,00 ± 10,85	0,542
MDS-UPDRS IV		6,00 ± 4,57	
Hoehn and Yahr	1,94 ± 0,60	2,22 ± 0,81	0,296
LEDD	413,95 ± 183,57	507,21 ± 291,85	0,074

BALANCE TEST – SIDE BY SIDE
JERK: *Jerk Index*
DIST: *Mean Distance*
RMS: *Root Mean Square*
MF: *Mean Frequency*
VEL AP: *Anteroposterior velocity*
VEL ML: *Mediolateral velocity*



CONCLUSIONS

Patients with motor fluctuations (PD-F) exhibit significantly altered postural control compared to patients without fluctuations (PD-NF), in particular increased instability of centre of pressure and less dynamic postural adjustments (independent from severity and disease duration).
Ongoing analyses with a larger sample size and longitudinal follow-up will further investigate the clinical utility of digital monitoring in the management of patients with motor fluctuations.

[1] *Department of Clinical and Experimental Sciences, Neurology Unit, University of Brescia, Italy*
[2] *Laboratory of digital Neurology and biosensors, University of Brescia, Italy*
[3] *Department of continuity of care and frailty, Neurology Unit, ASST Spedali Civili of Brescia, Brescia, Italy*
[4] *Department of Neurology, Christian-Albrechts-University of Kiel, Kiel, Germany*

Sistema Socio Sanitario Regione Lombardia ASST Spedali Civili

UNIVERSITY OF BRESCIA

UNIBS DIGITAL NEURO LAB