

Reactive Postural Control on the Mini-BEST is differentially associated with Fall History in Parkinson's Disease

C. Behling, ATC, DPT¹; K. Jacobs, DPT¹; E. Rift, DPT¹; S. Su, DPT¹; M. Volden, DPT¹
C. Kiang²; J.L. McKay PhD, MSCR³

¹ Emory University Department of Physical Therapy, ² Rollins School of Public Health, Emory University, ³ Coulter Department of Biomedical Engineering Emory University and Georgia Tech

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Introduction

Over 70% of patients with Parkinson's Disease fall each year. However, there is limited knowledge about which components of balance are associated with falling. This study examines associations between subdomains of the Mini-BEST and history of falls.

Hypothesis

Parkinson's patients with more impaired reactive postural control scores on the Mini-BEST (Subdomain 2) have an increased prevalence of fall history compared to their peers who do not demonstrate reactive postural control impairments.

Methods

- Cross-sectional observational study embedded within a 12-month observational study of fall risk
- 32 patients with Parkinson's Disease (n=28 included in analyses)
- Outcome Measures:
 - Functional Assessments: Mini Balance Evaluation Systems Test (Mini-BEST), Gait Speed
 - Cognitive Assessments: Montreal Cognitive Assessment (MOCA), Stroop Color Word Test, Trailmaking Test
 - Movement Disorders Society Unified Parkinson's Disease Rating Scale (MDS – UPDRS)
 - Questionnaires: Freezing of Gait Questionnaire (FOGQ), Beck Depression Inventory II (BDQ-II), Beck Anxiety Inventory (BAI), Activities Based Confidence Scale (ABC)

Procedure

1. Informed consent and study enrollment
2. Collection of demographic information
3. Cognitive assessments
4. Functional assessments
5. MDS-UPDRS-III (Rated by SA Factor, DO)
6. Preparation and collection of longitudinal study measurements (electromyography + dynamic posturography)
7. Data analysis performed by C Kiang

Results

1. We assessed n=28 patients with PD in the 12-hour OFF medication state.

Characteristic	Fallers (n=13)	Non-fallers (n=15)	Total (n=28)
Female, n (%)	6 (46)	4 (27)	10 (39)
Freezer, n (%)	7 (54)	5 (33)	12 (43)
Age*, y	64 ± 5	69 ± 7	67 ± 6
Age at onset*, y	53 ± 5	62 ± 7	58 ± 7
PD duration*, y	10.2 ± 5.3	6.9 ± 4.7	8.8 ± 5.4
MDS-UPDRS III** (/132)	33.0 ± 9.4	29.8 ± 13.2	31.2 ± 11.6
MoCA	27.5 ± 2.4	27.2 ± 2.1	27.1 ± 2.4
FOG-Q	6.4 ± 5.1	2.0 ± 3.6	4.9 ± 4.6
LEDD, median (range) †	900 (370-1828.75)	753.25 (300-1800)	825 (300 – 1828.75)

Reported as mean ± standard deviation, unless otherwise noted.

* P < 0.05

** Fallers n=8, Non-fallers n=11, Total n=19

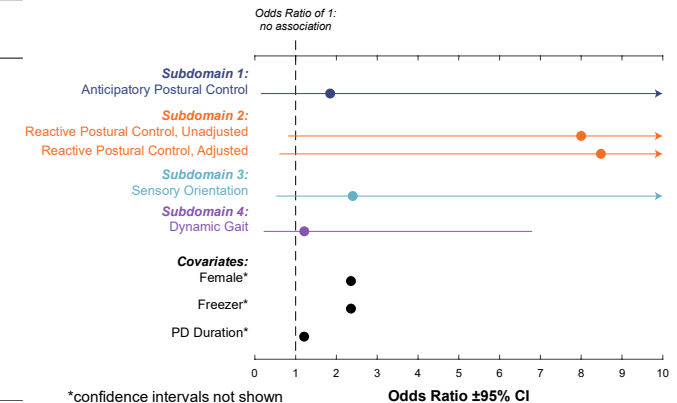
† LEDD among those taking anti-Parkinsonian medication, n=27

2. Univariate analyses suggested that submaximal performance on Mini-BEST subdomain 2, but not other subdomains, was strongly associated with previous falls (OR = 8.00; P<0.05, Chi-square).

	Fallers	Non-Fallers	Odds Ratio	P-value
N	13	15		
Subdomain 1: Anticipatory Postural Control			1.85	1.00
Below Max Score, <6, n (%)	12 (92)	13 (87)		
Max Score, 6, n (%)	1 (8)	2 (13)		
Subdomain 2: Reactive Postural Control*			8.00	<0.05
Below Max Score, <6, n (%)	12 (92)	9 (60)		
Max Score, 6, n (%)	1 (8)	6 (40)		
Subdomain 3: Sensory Orientation			2.40	0.26
Below Max Score, <6, n (%)	8 (62)	6 (40)		
Max Score, 6, n (%)	5 (38)	9 (60)		
Subdomain 4: Dynamic Gait			1.21	0.59
Below Max Score, <10, n (%)	10 (77)	11 (73)		
Max Score, 10, n (%)	3 (23)	4 (27)		

*P<0.05; Chi-square; P=0.08; Fisher

3. Multivariate analyses suggested that submaximal performance on Mini-BEST subdomain 2 remained strongly associated with previous falls (OR = 8.48; P>0.05, logistic regression) after controlling for covariates



Discussion

- Submaximal performance on Mini-BEST subdomain 2 indicates that multiple steps or assistance was needed to regain balance after displacement from of the center of mass. This was strongly associated with previous falls and may result from hypokinesia common in PD.
- Mini-BEST subdomain 2 may potentially represent a particularly sensitive screen for fall risk in PD as the majority of falls in PD involve inappropriate control of the center of mass, as opposed to slips or trips.
- Determining if the relationship between submaximal Mini-BEST subdomain 2 scores and falls in PD-specific requires further examination comparing healthy older adults and a larger sample size of PD patients both with and without falls.

Conclusion

A strong association was found between submaximal score on subdomain 2 of the Mini-BEST and a history of falls in a small sample of patients with PD, even after controlling for covariates.

This study contributes to understanding the mechanisms of PD and fall history. If further examination supports our hypothesis, subdomain 2 could be used as a quick clinical screening tool for patients with PD to determine their risk of falls and need for referral to additional balance training services.

Works Cited

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