Prediction of Falls Risk with Six Different Biomarkers in Mild Cognitive Impairment Using Principal Component Analysis

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Introduction

Falls in older people cause much morbidity and societal cost. Early dementia (ED) is a neglected population in falls research, despite mild cognitive impairment (MCI) being a recognised risk factor. As part of ongoing research into falls in ED we compared different physical/cognitive biomarkers as falls predictors, and investigated if they gave independent information.

Methods

We recruited cross-sectionally, 50 older community-dwellers with ED or MCI [MMSE=19-26 or MoCA=13-25] and classified them, using Principal Component Analysis (PCA), into clusters, based upon similarity on 6 physiological/cognitive tests: *Montreal Cognitive Assessment* (*MoCA), gait speed (GS), Timed Up and Go (TUG), Berg Balance score (BBS), Falls Efficacy Scale International (FES-I)* and *Physiological Profile Assessment (PPA)*.

Results

Complete data was available for 44 participants (mean age=81, range=67-93 years; 21 women). *GS*, *TUG*, *BBS* and *FES-I* gave similar information and were therefore reduced to one Principal Component; while *MoCA* and *PPA* were reduced to another Principal Component (*table 1*). *Figure 1* shows the participants plotted for both Principal Components. Participants were classified into 2 clusters of similar characteristics, which correlated with a history of falls (last 6 months).

Conclusion

These data suggest that to characterize falls risk in older people with ED/MCI, it may be sufficient to choose two tests: one from Principal Component-1 (*GS, TUG, BBS, FES-I*) and another from Principal Component-2 (*MOCA, PPA*). Thus a minimum set of biomarkers could predict falls, allowing targeting of falls prevention to those at the highest risk. Larger longitudinal studies are now required to confirm these findings.

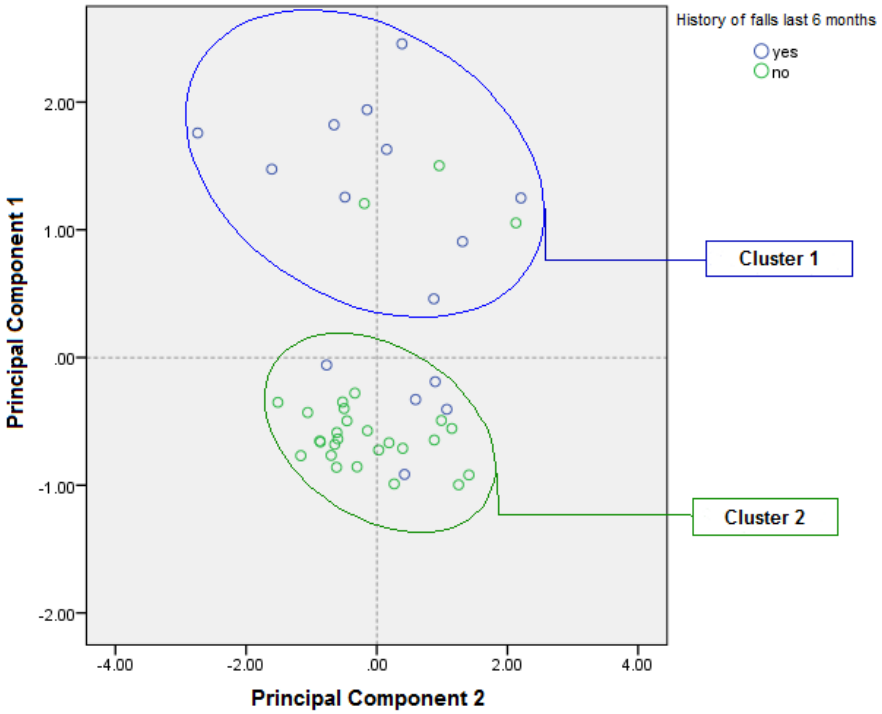

Figure 1. Score plot with PC1 and PC2.

Table 1. Component plot with loading values. *VAF=Variance Accounted For. Total VAF=85%.

	Component		
	1	2	VAF*
FES	.826	.185	0.72
MOCA	-.037	-.921	0.85
Gait speed	-.926	-.185	0.89
BERG	-.952	-.071	0.91
TUAG	.931	.222	0.92
PPA	.323	.835	0.80
Eigenvalue	**3.4**	**1.7**	**0.85**