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BRIEF COMMUNICATION

The performance of patients with Parkinson's disease on the Face-Name Associative Memory Examination

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Abstract

In this study, we examined the performance of patients with Parkinson's disease (PD) with different cognitive profiles on the Face-Name Associative Memory Examination (FNAME). We evaluated 71 patients with a comprehensive neuropsychological battery. The results revealed that the group with executive and additional visuospatial deficits demonstrated significantly lower scores on FNAME. This finding indicates the possible clinical utility of FNAME for screening patients with PD with distinct cognitive profiles. Further longitudinal studies are needed to consider the prognostic adequacy of FNAME in detecting high-risk Parkinson's disease dementia (PDD).

Keywords Face-Name Associative Memory Examination · Parkinson's disease · Cognitive impairment · Visuospatial functions · Executive functions

Introduction

Mild cognitive impairment (MCI) is one of the most common non-motor symptoms of Parkinson's disease (PD) [1]. Patients diagnosed with PD-MCI have a significantly higher probability of developing Parkinson's disease dementia (PDD) than the general population and the prevalence of PDD is 80% after 15–20 years of living with PD-MCI [2]. However, there is great heterogeneity in the PD-MCI profiles that predict transition to PDD. It has been proposed that "purely" frontostriatally based neuropsychological deficits of PD are not associated with incident dementia, contrary to an additional posterior temporal-parietal cortical profile [3].

The dual syndrome hypothesis suggests the existence of two distinct overlapping neuropsychological phenotypes with different etiologies [4]. A frontal-striatal dysfunction that is associated with dopaminergic loss leads to executive function/attention deficits and presents at an early disease stage. Furthermore, many patients with PD may develop an additional posterior cortical degeneration that is associated with cholinergic loss which contributes to visuospatial impairments and often co-occurs with PDD [5].

As independent cognitive profiles have potentially different prognoses of PDD, sensitive neuropsychological measures are necessary to detect subtle cognitive changes that may be associated with early preclinical indicators of PDD. Forming and recalling unfamiliar face-name associations are reportedly related to dysfunction and increased Aβ deposition in posterior cortical areas such as the precuneus, posterior cingulate, and lateral parietal cortex in asymptomatic individuals [6, 7]. We aimed to compare the performance of patients with PD with different cognitive profiles on the Greek version of the Face-Name Associative Memory Examination (GR-FNAME12).

Method

We included 71 patients with PD (26 women and 45 men) aged 48–83 years old (mean, 67.22; SD, 8.25) having 3–18 years of formal education (mean, 11.99; SD, 3.97). The neuropsychological assessment comprised five cognitive tests: the Montreal Cognitive Assessment (MoCA) [8] standardized in Greek [9], the Trail Making Test Part B (TMT-B) [10] standardized in Greek [11], the Greek

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version of the Stroop Neuropsychological Screening Test (SNST) [12], the Rey Complex Figure Test-Copy Task (RCFT-Copy) [13] standardized in Greek [14], and the Greek version of the Face-Name Associative Memory Examination (GR-FNAME12) [15]. The cognitive diagnostic procedure was as follows. Patients were diagnosed as MCI if they had MoCA score < 26 to > 18. Then, based on the guidelines of the Movement Disorders Society [16], patients were classified into three cognitive groups: (a) PD-cognitively normal (CN), cognitively normal; (b) PD-MCI executive, 1–2 SD below normative scores on TMT-B and SNST; and (c) PD-MCI executive plus visuospatial, 1–2 SD below normative scores on TMT-B, SNST, and RCFT-Copy (Table 1). The results of the GR-FNAME12 were not used in the cognitive diagnostic procedure. Next, the three groups' scores on the GR-FNAME12 were compared using one-way analysis of variance (ANOVA) and Bonferroni post hoc tests.

Results

The results of the one-way ANOVA revealed significant differences between the groups in terms of their GR-FNAME12 scores [$F(2, 68) = 9.926$, $p < .01$]. The Bonferroni post hoc test showed that the PD-MCI executive plus visuospatial group had significantly lower performance (mean = 0.89, SD = 1.15) than the other two groups, PD-CN (mean = 4.43, SD = 3.83) and PD-MCI executive (mean = 3.00, SD = 1.54).

Discussion

With rising interest in early detection and therapeutic management of asymptomatic patients in the initial preclinical stages, innovative neuropsychological measures are being increasingly used in clinical and research settings. One such measure is FNAME, which is particularly sensitive to the detection of very early subtle posterior cortical dysfunctions due to Aβ deposition. For the first time, we used this demanding cross-modal neuropsychological measure in patients with PD with different cognitive profiles.

The main outcome of this study was that patients with Parkinson's disease and mild cognitive impairment with executive and visuospatial deficits had lower performance on face-name associative memory test compared to patients with single-domain MCI or with normal cognitive profile. Based on these results, we hypothesized that frontal and additional posterior neuropsychological deficits reveal a broader brain dysfunction of distinct but interdependent networks predicting inadequate performance on forming and retrieval unfamiliar faces-names pairs. Taking into account the dual syndrome hypothesis and the neuropathological associations of FNAME, it could be suggested that patients with Parkinson and multiple-domains MCI (executive and visuospatial) may have the highest risk for developing PDD [17].

The present study has some limitations. As this was a cross-sectional study, the data reflect a certain point in time; therefore, the prognostic adequacy of FNAME could not be confirmed in this paper. Furthermore, we used only neuropsychological measures for the cognitive categorization of patients with PD and did not use neuroimaging data or biomarkers. Future longitudinal follow-up studies are needed to consider the clinical utility of FNAME as a reliable cognitive measure for detecting PPD risk in early preclinical stages in relation to distinct cognitive and neuropathology profiles.

In conclusion, the results of the present study suggest that GR-FNAME12 may be a useful neuropsychological measure for the cognitive screening of patients with PD. GR-FNAME12 could be used as part of an initial neuropsychological evaluation in clinical settings targeting patients with PD with more severe cognitive deficits and high risk for PPD progression.

Table 1 Demographic characteristics and performances on the neuropsychological assessments of the three PD groups

	PD-CN	PD-MCI executive	PD-MCI executive plus visuospatial
N	30	22	19
Age (SD)	64.90 (7.79)	68.09 (7.87)	69.89 (8.77)
Education (SD)	13.30 (3.63)	12.13 (3.69)	9.00 (3.48)
MoCA (SD)	26.80 (1.00)	23.36 (1.43)	21.94 (2.61)
SNST (SD)	84.37 (21.33)	65.31 (17.70)	48.47 (21.75)
TMT-B (SD)	131.10 (76.83)	232.91 (137.40)	369.42 (147.44)
RCFT-Copy (SD)	32.76 (3.63)	30.65 (3.12)	24.43 (3.87)

MoCA Montreal Cognitive Assessment, *SNST* Stroop Neuropsychological Screening Test, *TMT-B* Trail Making Test—form B, *RCFT-Copy* Rey Complex Figure Test—Copy form

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The Ethics Committee of Aeginition Hospital, National and Kapodistrian University of Athens, approved the study protocol using the principles outlined in the Declaration of Helsinki.

Informed consent All participants were informed of the study purpose, and they signed a written informed consent form before they participated.

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