

Scale consistence in cognitive status awareness of patients with Parkinson's disease

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ABSTRACT

Objectives: This study aimed to investigate the relationship between patients' awareness of their cognitive symptoms and the presence of cognitive involvement according to neuropsychological tests.

Patients and methods: In this cross-sectional study, 539 patients (276 males, 263 females; mean age: 64.3±11.0 years; range, 19 to 88 years) were assessed between September 2020 and June 2023. The Mini-Mental Status Examination (MMSE) scores were recorded in addition to age, sex, education level, and chronic diseases. Patients were classified as having cognitive disorders if their MMSE scores were <26, while those with scores ≥26 were classified as cognitively healthy. The relationship between the frequency of cognitive involvement according to a related question from the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) and the frequency of cognitive disorders according to the MMSE scores was evaluated.

Results: No relationship was detected between the frequency of cognitive disorders according to the MMSE scores and the frequency of cognitive involvement according to the corresponding question in the nonmotor component of the MDS-UPDRS (p<0.001).

Conclusion: The findings indicate that the cognitive impairment inquiry in the nonmotor section of the MDS-UPDRS is not an effective method for detecting cognitive involvement in Parkinson's disease.

Keywords: Cognitive disorders in Parkinson's disease, Parkinson's disease dementia, the awareness of symptoms in Parkinson's disease.

The lack of awareness of one's own condition, known as anosognosia, is predominantly observed in patients with right hemisphere lesions, while partial anosognosia can also be present in other neurological diseases.^[1] In Parkinson's disease (PD), an unawareness of motor and cognitive impairments is common.^[2] The awareness of motor deficits in PD has been assessed in various studies through surveys and video evaluations, comparing the scores of the patients, caregivers, and professionals.^[3]

In these studies, patients often do not recognize the worsening of symptoms according to their relatives and attending physicians, and rarely, there can be cases where improvements are not perceived by the patients.

This situation is less valid for cognitive symptoms and is a topic currently being investigated with various new methods. According to a published review, awareness of cognitive and neuropsychiatric symptoms varies among patients with PD and

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is generally associated with their cognitive functions.^[4] Accordingly, it has been reported that PD patients within normal cognitive limits have more complaints than those with cognitive impairment, and as dementia progresses, they become less aware of neuropsychiatric symptoms and cognitive complaints.^[5]

It is also noted that the awareness of cognitive functions in PD can yield different results when assessed immediately after a cognitive test or without administering any cognitive tests.^[5] According to this study, patients' awareness of their cognitive functions is less reflective of reality when assessed immediately after a cognitive test. Hence, this study aimed to examine the relationship between patients' awareness of their cognitive symptoms and the Mini-Mental Status Examination (MMSE) scores.

PATIENTS AND METHODS

In this cross-sectional study, 572 patients examined at the movement disorders outpatient clinic of the neurology department of the Ankara University between September 2020 and June 2023 were evaluated. Information on patients' age, sex, education, and chronic diseases, as well as their MMSE scores, were reviewed. While a standardized MMSE was administered to patients with more than five years of education,^[6] an MMSE adapted for uneducated individuals was applied to patients with less than five years of education.^[7] After excluding cases with missing data, 539 patients

(276 males, 263 females; mean age: 64.3 ± 11.0 years; range, 19 to 88 years) were included in the analyses. As is known, the MMSE test, a screening tool, is more sensitive in detecting Alzheimer's disease dementia, and scores <24 are associated with dementia. However, there are data suggesting that this test is more sensitive in detecting patients with cognitive disorders when the threshold set for dementia is <26 in PD dementia.^[8] Therefore, in our study, patients with an MMSE score ≥ 26 were categorized as cognitively normal, while those with lower scores were considered to have a cognitive impairment. In addition, according to answers to the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS), question 1.1 (first question of part one), 0 points indicated no cognitive involvement, whereas 1, 2, 3, and 4 points indicated the presence of cognitive involvement.

Statistical analysis

Data were analyzed using MATLAB version 2022b (The MathWorks, Inc., Massachusetts, USA), employing statistical analysis and machine learning tools. Descriptive statistics were provided for quantitative variables, including mean \pm standard deviation (SD) and median (min-max) values. The presence of cognitive impairment based on MMSE scores and the presence of cognitive involvement according to the MDS-UPDRS were compared using the chi-square test. Correlations between MMSE scores, the degree of cognitive involvement according to the MDS-UPDRS and variables such as education level, duration of illness, and age

TABLE 1
Characteristics of the patients

	n	Mean \pm SD	Median	Min-Max
Age (year)		64.3 \pm 11.0	66	19-88
Sex				
Male	276			
Female	263			
Years of education		8.31 \pm 5.30	7	0-25
Disease duration (year)		5.34 \pm 5.66	4	0-35
Levodopa daily equivalent dose (mg)		590.47 \pm 471.89	550	0-2155
Mini-mental status examination		24.68 \pm 4.61	26	0-30
MDS-UPDRS (1 point)		12.53 \pm 7.24	11	0-41
MDS-UPDRS (2 points)		14.94 \pm 10.11	13	0-47
MDS-UPDRS (3 points)		37.46 \pm 18.56	37	0-104
MDS-UPDRS (4 points)		3.30 \pm 4.55	1	0-19
Hoehn and Yahr Scale		-	2	-

SD: Standard deviation; MDS-UPDRS: Movement Disorder Society Unified Parkinson's Disease Rating Scale.

TABLE 2
The chi-square analysis of cognitive impairment according to MMSE and cognitive involvement according to MDS-UPDRS

		Cognitive impairment according to MMSE	
		Present (37.1%)	Absent (62.9%)
		n	n
Cognitive involvement according to MDS-UPDRS	Present (56.4%)	124	180
	Absent (43.5%)	76	139

MDS-UPDRS: Movement Disorder Society Unified Parkinson's Disease Rating Scale.

were evaluated. A p-value <0.05 was considered statistically significant.

RESULTS

The characteristics of the 539 patients included in the study are shown in Table 1. No relationship was found between the MMSE scores and the presence of cognitive involvement according to the relevant question in the nonmotor section of the MDS-UPDRS, which was assessed using the chi-square test ($p < 0.001$). The findings of the chi-square test are displayed in Table 2.

A weak negative correlation was found between MMSE scores and age ($p < 0.01$, $r = -0.288$), and a weak positive correlation was observed between MMSE scores and the duration of education ($p < 0.001$, $r = 0.225$). Additionally, weak negative correlations were detected between patients' MMSE scores and the duration of their illness ($p = 0.047$, $r = -0.085$), as well as the degree of cognitive involvement according to question 1.1 of the MDS-UPDRS ($p < 0.001$, $r = -0.287$). A weak negative correlation was found between the degree of cognitive involvement according to question 1.1 of the MDS-UPDRS and education level, while a weak positive correlation was observed with age. No correlation was found with disease duration.

In examining the responses to question 1.1 of the MDS-UPDRS, 3 and 4 points were thought to indicate severe cognitive involvement that could point to dementia, and the relationship between this high degree of cognitive involvement and the presence of cognitive impairment according to the MMSE was further evaluated. Accordingly, having a cognitive involvement level of 3 or 4 according to question 1.1 of the MDS-UPDRS was not associated with having cognitive impairment according to the MMSE ($p < 0.001$).

DISCUSSION

In this study, 37.1% of the patient population exhibited cognitive impairment based on MMSE scores. However, 56.5% of the patients reported various degrees of cognitive involvement in response to the relevant question in the nonmotor section of the MDS-UPDRS. This discrepancy may have several reasons. First, the literature suggests that PD patients who are cognitively healthy report more cognitive complaints than actually present. The presence of a weak negative correlation between MMSE scores and the degree of cognitive involvement according to question 1.1 of the MDS-UPDRS may also support this finding. Considering that the majority of our patient group is cognitively healthy based on MMSE score distributions, they may have reported more cognitive complaints than actually present in line with the literature. However, studies have reported that patients' assessments less accurately reflect reality when cognitive symptom awareness is questioned after a cognitive test.^[9,10] This awareness, particularly in memory tests, is reported to depend on the performance shown during the test and the characteristics of the test. During the detailed outpatient examinations of our patients, a station system was followed, and in approximately 50% of the patients, the MMSE cognitive screening test was administered before the MDS-UPDRS memory assessment. These patients may have perceived themselves as having more cognitive impairments than they did due to not scoring full points on the MMSE. Therefore, even patients without cognitive impairment may have frequently reported experiencing cognitive involvement. Moreover, patients without cognitive involvement frequently requested feedback after the MMSE and generally received positive feedback. However, as evidenced by the results, cognitively healthy participants often reported poorly despite this approach.

In our patient group, the majority (69.6%) of those considered to have cognitive impairments based on MMSE scores scored ≥ 20 and were likely not to have significant cognitive involvement. Given this information, questioning the presence of cognitive involvement may not be a good predictor of the presence of dementia in PD. This study also found no correlation between patients' awareness of their cognitive involvement and the presence of cognitive impairment according to MMSE scores. The weak negative correlation of MMSE scores with age and disease duration and the weak positive correlation with duration of education are consistent with the literature.^[9] The positive correlation of the degree of cognitive involvement in the MDS-UPDRS with age and the negative correlation with duration of education further indicate that this assessment follows a pattern opposite to that of the MMSE.

This study, in accordance with the literature, concluded that PD patients' awareness of their cognitive symptoms does not accurately reflect reality. Although this situation predominantly manifests as patients without cognitive disorders reporting more symptoms than present, approximately 42% of patients who were identified to have cognitive impairments according to the MMSE reported no cognitive involvement. A study highlighted that PD patients do not commonly utilize strategies such as maintaining a diary related to memory or making shopping lists, indicating a lack of awareness of their existing cognitive symptoms.^[5] Therefore, questioning patients' perceptions of their cognitive functions and proposing appropriate strategies in cases where these perceptions do not reflect reality could be beneficial for the patients.

There are some limitations to this study. The literature emphasizes the need to evaluate the impact of dopaminergic treatment when assessing patients' awareness of neuropsychiatric symptoms.^[8] However, patients in our study were not separately assessed during their on and off periods. The effect of medical treatment on patients' symptom awareness could have been assessed if separate evaluations had been conducted during on and off periods. In patients with cognitive difficulties, responses to the MDS-UPDRS questions could have also been provided by the relatives. Therefore, the evaluations in our study might not always represent the views of the patients.

In conclusion, PD patients exhibit variable awareness of their symptoms and tend to report

increased cognitive involvement when cognitively healthy. Therefore, the cognitive involvement question in the nonmotor section of the MDS-UPDRS is not an effective method for detecting the presence of cognitive involvement in PD. A detailed evaluation of both motor and nonmotor symptoms is more effective in determining the progression of the disease and cognitive involvement.

Ethics Committee Approval: The study protocol was approved by the Ankara University Faculty of Medicine Ethics Committee (date: 25.11.2021, no: İ10-649-21). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patient Consent for Publication: A written informed consent was obtained from each patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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