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Original Research Article

A study on cognitive profile in parkinsons disease

S. Ragasivamalini*, S. Gobinathan, V. Balambighai

Department of Neurology, Sree Balaji Medical College and Hospital, Tamil Nadu, India

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***Correspondence:**
Dr. S. Ragasivamalini,
E-mail: jabarali2009@gmail.com

ABSTRACT

Background: Parkinson's disease (PD) is a neurodegenerative disorder characterized by α-synuclein accumulation, leading to motor and non-motor complications. Cognitive decline in PD ranges from mild cognitive impairment to Parkinson's disease-related dementia. This study aimed to examine the cognitive profile and identify the subclinical range of cognitive impairments in patients with Parkinson's disease.
Methods: This cross-sectional study was conducted on 85 patients with Parkinson's disease at Sree Balaji Medical College and Hospital, Chennai, between October 2022 and January 2025. Standardized neuropsychological tests, including the MMSE, ACE-R, MoCA and FAB, were used for cognitive assessment. Demographic and clinical data were collected through interviews and medical records and cognitive function was assessed at baseline.
Results: Most patients were male, 66 (77.6%) and 23 (27.1%) patients were aged 71-75 years. Parkinson's disease duration was <5 years in 38 (44.7%) patients. Hypertension and diabetes were present in 64 (75.3%) and 39 (45.9%) patients, respectively. The most common Hoehn and Yahr stage was 2.5 in 17 (20.0%) patients, followed by stage 1 in 15 (17.6%) and stage 3 in 13 (15.3%) patients. MMSE scores showed mild cognitive impairment in 45 (52.9%) patients, moderate in 27 (31.8%) and severe in 13 (15.3%). MoCA scores indicated severe impairment in 26 (30.6%) patients, moderate impairment in 23 (27.1%), mild impairment in 21 (24.7%) and normal cognition in 15 (17.6%).
Conclusions: The demographic profile showed a predominance of older adults. Comorbidities such as hypertension and diabetes mellitus are common and complicate PD management.

Keywords: Cognitive impairment, Dementia, Neuropsychological assessment, Parkinson's disease

INTRODUCTION

Parkinson's disease (PD) is a neurodegenerative disorder characterized by the accumulation of α-synuclein in intraneuronal inclusions, resulting in oxidative stress, mitochondrial dysfunction, intracellular calcium dysregulation and neuroinflammation.[1] In addition to motor symptoms, PD is associated with non-motor complications, including cognitive impairment, which significantly affects the patient's quality of life and functional capacity.[2,3] Cognitive impairment in PD ranges from mild cognitive impairment (PD-MCI) to Parkinson's disease dementia (PDD), the latter being associated with severe deficits in memory, executive function and daily living activities.[4-6] PD-MCI is defined as a reduction in cognitive functioning that is measurable through neuropsychological assessments but does not significantly interfere with daily activities.[7] PDD, in contrast, represents a more profound cognitive decline, often accompanied by motor and autonomic symptoms and is strongly linked to Lewy body pathology in the limbic and cortical brain regions.[8,9] Although distinctions between PDD and dementia with Lewy bodies (DLB) exist, such as the timing of cognitive versus motor symptoms, these distinctions remain a topic of debate.[10-13] Despite advancements in the understanding of PD, current treatment options for cognitive impairment remain limited. There are no approved therapies for PD-MCI and cholinesterase inhibitors are the only recommended treatment for PDD.[14,15]

This study aimed to examine the cognitive profile and identify the subclinical range of cognitive impairments in patients with Parkinson's disease.

METHODS

This cross-sectional study was conducted on 85 patients with Parkinson's disease at Sree Balaji Medical College and Hospital, Chennai, between October 2022 and January 2025 (2 years and 3 months). The Institutional Ethics Committee approved the study before its initiation and informed consent was obtained from all patients.

Inclusion criteria

Patients aged>18 years and diagnosed with Parkinson's disease according to the MDS-UPDRS criteria were included.

Exclusion criteria

Patients with severe illness, other neurodegenerative diseases or conditions that could affect cognitive function (for example, Alzheimer's disease, severe depression and brain tumours), conditions such as progressive supranuclear palsy, corticobasal degeneration, dementia with Lewy bodies or recent stroke that could mimic or complicate the diagnosis of Parkinson's disease were excluded.

Methods

Eligible patients underwent a comprehensive neurological examination focusing on Parkinson's disease symptoms and cognitive function. Cognitive assessments were performed using standardized neuropsychological tests, such as the mini-mental state examination (MMSE), Addenbrooke's cognitive examination-revised (ACE-R), montreal cognitive assessment (MoCA) and frontal assessment battery (FAB).

Demographic and clinical data, including age, gender, duration of Parkinson's disease and medical history, were collected through structured interviews and a review of medical records. Data on cognitive function were collected at baseline and are presented as frequencies and percentages.

RESULTS

Regarding age distribution, the largest proportion of patients, 23 (27.1%), were aged 71-75 years, followed by those aged<65 years (n=20, 23.5%). The majority of patients were male 66 (77.6%), while females accounted for 19 (22.4%).

Most patients had a normal weight of (n=56, 65.9%), 28 (32.9%) classified as overweight and only 1 (1.2%) as obese. Hypertension was prevalent in 64 (75.3%) patients, whereas 21 (24.7%) had no history of hypertension. Diabetes mellitus was present in 39 (45.9%) patients, while 46 (54.1%) were non-diabetic. In terms of disease duration, 38 (44.7%) had Parkinson's disease for<5 years, 31 (36.5%) for 6-10 years and 16 (18.8%) for>11 years (Table 1).

The most common Hoehn and Yahr stage was 2.5, observed in 17 (20%) patients, followed by stage 1 in 15 (17.6%) and stage 3 in 13 (15.3%) patients. Based on the MMSE scores, 45 (52.9%) patients had mild cognitive impairment, 27 (31.8%) had moderate cognitive impairment and 13 (15.3%) had severe cognitive impairment. According to MoCA scores, 26 (30.6%) patients had severe cognitive impairment, 23 (27.1%) had moderate impairment, 21 (24.7%) had mild impairment and 15 (17.6%) had normal cognitive function (Table 2).

Table 1: Demographic and clinical characteristics.

		N (%)
Age in years	<65	20 (23.5)
	66-70	13 (15.3)
	71-75	23 (27.1)
	76-80	20 (23.5)
	>81	9 (10.6)
Gender	Female	19 (22.4)
	Male	66 (77.6)
BMI category	Normal weight	56 (65.9)
	Overweight	28 (32.9)
	Obese	1 (1.2)
Hypertension	No	21 (24.7)
	Yes	64 (75.3)
Diabetes mellitus	No	46 (54.1)
	Yes	39 (45.9)
Duration of illness (years)	<5	38 (44.7)
	6-10	31 (36.5)
	>11	16 (18.8)

Table 2: Distribution of Hoehn and Yahr scale, MMSE and MoCA scores.

		N (%)
Hoehn and Yahr scale	1	15 (17.6)
	1.5	7 (8.2)
	2	11 (12.9)
	2.5	17 (20)
	3	13 (15.3)
	4	12 (14.1)
	5	10 (11.8)
MMSE score	Mild	45 (52.9)
	Moderate	27 (31.8)
	Severe	13 (15.3)
MoCA score	Normal	15 (17.6)
	Mild	21 (24.7)
	Moderate	23 (27.1)
	Severe	26 (30.6)

DISCUSSION

In our study, a large population of older adults, with 27.1% of patients aged between 71 and 75 years old. This finding is consistent with previous studies, which emphasize the increased incidence of PD in older populations due to age-related neurodegeneration.[16,17] Das et al found that age significantly correlates with PD prevalence, showing the vulnerability of older adults to neurodegenerative diseases.[16] Similarly, Bennett et al, reported that the average age of diagnosis for PD tends to fall within the seventh decade of life, emphasizing our findings.[17]

The demographic profile of our study also showed a male predominance, with 77.6% of the patients identifying as male. This finding is consistent with those of other studies showing a higher prevalence of Parkinson's disease among men.[18] A cohort study conducted by Kenborg et al, reported a significant male-to-female ratio in patients with PD, noting that men are approximately 1.5 times more likely to develop Parkinson's disease than women. This gender disparity may be caused by various factors, including genetic predispositions, hormonal differences and environmental influences that contribute to the development of PD.[18] İlkhan et al reported that testosterone levels may play a protective role against neurodegenerative diseases, potentially explaining the lower incidence in females.[19]

Our study also found a prevalence of comorbidities, with hypertension affecting 75.3% of patients and diabetes mellitus affecting 45.9% of patients. These findings are consistent with those of other studies, such as that of King et al, who reported a high burden of comorbidities among patients with PD, particularly cardiovascular and metabolic disorders. The coexistence of these comorbidities can complicate the management of PD, leading to an increased risk of disability and exacerbation of PD symptoms.[20] Sagna et al, emphasized that hypertension and diabetes are prevalent in PD populations, with these conditions further contributing to the overall morbidity and mortality associated with the disease.[21] Additionally, Jung et al, found the need for a multidisciplinary approach in treating PD patients with comorbid conditions to enhance their overall management and care.[22]

Regarding disease duration, our study found that 44.7% of patients had been diagnosed with Parkinson's disease for <5 years. The importance of early intervention is supported by literature demonstrating that timely management of PD can improve patient outcomes and potentially slow disease progression.[23] Zaghloul et al, emphasized the critical role of early diagnosis and intervention in enhancing the quality of life of PD patients, as these approaches may lessen the severity of symptoms.[23] Moreover, Anari et al reported that early treatment could lead to a better prognosis, allowing patients to maintain independence for a longer period.

In our study, Hoehn and Yahr stage 2.5 showed moderate PD severity, consistent with Ray et al, who reported cholinergic atrophy in stage 2, predictive of cognitive decline.[24] Litvan et al also found that Progression beyond stage 2 increases cognitive impairment risk.[25]

In our study, cognitive assessment via MMSE and MoCA revealed mild (52.9%), moderate (31.8%) and severe (15.3%) impairment in MMSE, with MoCA showing 30.6% severe impairment. These findings are aligned with those of Kandiah et al, who reported MoCA's high discriminatory power (AUC: 0.912) for PD-MCI, with 93.1% sensitivity for scores≤26. Longitudinally, a 1-point MoCA decline correlated with a 34% increased risk of cognitive deterioration.[26] Ling et al, found MoCA-C≤23 as optimal for PD dementia detection (sensitivity: 0.70, specificity: 0.77).[27] Kumar et al, reported 23.33% PD-MCI prevalence and a 0.4-point MoCA decline over one year.[28]

Our study's findings show the multifaceted nature of Parkinson's disease, characterized by significant demographic variations, high comorbidity rates and prevalent cognitive impairments.

CONCLUSION

The demographic profile showed a predominance of older adults. Comorbid conditions, such as hypertension and diabetes mellitus, are prevalent among patients, further complicating the management of PD. Cognitive decline in PD ranges from mild cognitive impairment to more severe forms, which can impact the quality of life and functional capacity of patients. These results emphasise the importance of early identification of cognitive deficits and the need for a comprehensive multidisciplinary approach in the management of PD to optimise patient outcomes. Early intervention and tailored treatments can potentially slow the progression of cognitive decline, thereby improving the overall prognosis and quality of life of individuals with Parkinson's disease.

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