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Original Research Article

Early cognitive decline and its assessment in idiopathic Parkinson disease and its correlation with duration of illness

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ABSTRACT

Background: Parkinson disease (PD) is one of the most common age-related brain disorders, with cardinal symptoms rigidity, bradykinesia, resting tremor and postural instability. These are dopamine-related motor symptoms. PD is increasingly recognized as heterogeneous multisystem disorder involving other neurotransmitter associated with nonmotor symptoms. In which cognitive decline is the most common and important NMS. cognitive decline in PD makes profound effect on patient quality of life and imposes significant burden on the caregiver.
Methods: Hospital based cross sectional study conducted among 52 patients of idiopathic Parkinson disease, 61 to 80 years of age (fulfilling UKPDS brain bank criteria) at GSVM medical college, Kanpur during February 2020 to October 2021 using SCOPA COG scale.
Results: Using SCOPA COG score in 52 patients, 17 (33%) patients found with declined cognition There was weak negative correlation between total score and duration of illness (p=0.091), weak negative correlation between executive function (assessed by dice) and duration of illness (p=0.047) and a moderate negative correlation between visuospatial function (assessed by assembling pattern) and duration of illness (p=0.003).
Conclusions: Significant cognitive decline found with increase in duration of illness in terms of visuospatial function.

Keywords: Parkinson disease, Cognitive decline, SCOPA COG

INTRODUCTION

PD is one of the most common age-related brain disorders. PD is defined primarily as a movement disorder, with the typical symptoms being resting tremor, rigidity, bradykinesia and postural instability and is pathologically characterized by degeneration of nigrostriatal dopaminergic neurons and the presence of lewy bodies (misfolded α-synuclein) in the surviving neurons. PD has defining dopamine-related motor symptoms, but nowadays PD is increasingly recognized as a heterogeneous multisystem disorder involving other neurotransmitter systems, such as the serotonergic, noradrenergic and cholinergic circuits. Thus, a wide variety of nonmotor symptoms (NMS) linked with these neurotransmitters are commonly observed in patients with PD. Cognitive decline is among the most common and important NMS. Cognitive deficits are common in PD even in early stages and over 75% of PD patients may eventually develop dementia (PDD) over time.[1-3] The full spectrum of cognitive abilities can be observed in PD, from normal cognition, through early mild subjective and objective decline (mild cognitive impairment (MCI)), to mild, moderate and even severe PD dementia (PDD). Cognitive deficits in PD typically affect executive functions, attention, visuospatial function and processing speed[4]

Cognitive dysfunction and dementia can have a greater effect than motor symptoms on the quality of life of the patient and caregivers as well as being a risk factor for nursing home admission and early mortality.[5-7] However,

the motor impairment makes it difficult to administer cognitive tests in these patients, which often require good motor skills. Very few studies have attempted to study the cognitive impairment in PD, particularly from India.[8] The timing, profile and rate of cognitive decline vary widely among individuals with PD, so identifying and predicting future cognitive decline in this population is crucial for researchers and clinicians.[9] Cognitive decline in PD is a continuous process affecting nearly all patients over time and the demarcations between the four cognitive groups cognitively normal, SCD, PD-MCI and PDD are not strict. Several longitudinal studies have shown that MCI is a harbinger of dementia in PD, although the course is variable and stabilization of cognition or even reversal to normal cognition is not uncommon.[10]

The dual syndrome hypothesis which proposes that those with PD-MCI characterized by executive dysfunction, principally driven by changes in dopaminergic pathways, are less likely to transition to PDD.[11] In contrast, those PD-MCI patients with deficits in memory and visuospatial function, caused predominantly by deficits in acetylcholine (ACh) are more prone to rapid cognitive decline and PDD.

Aim and objectives

Aims and objective of the current study were to assess cognitive decline in idiopathic PD and was correlation with duration of illness.

METHODS

Study design, location, population, duration and sample size

Current study was an observational cross-sectional study conducted in PG department of medicine GSVM medical college Kanpur. All subjects attending medicine outpatient department or admitted in medicine wards were included in study. Patients diagnosed as idiopathic PD (fulfilling UKPDS brain bank criteria) attending medicine OPD or admitted in medicine wards. Study was conducted between February 2020 to October 2021.

Inclusion criteria

Inclusion criteria for current study were; all patients fulfilling UKPDS brain bank criteria for idiopathic Parkinson disease between age 61 to 80 years both male and female with diagnosis duration within 5 years, newly diagnosed or taking treatment after taking explicit consent.

Exclusion criteria

Exclusion criteria for current study were; a typical/secondary Parkinsonism, drug induced, Wilson's disease induced, dementia with lewy bodies, progressive supranuclear palsy, multisystem atrophy (cerebellar and Parkinson types), young onset PD, aided visual acuity 6/18 or less, significant hearing difficulty. Sample size for current study was 52.

Assessment method

Cognitive decline-Scopa-COG score used with the permission of International Parkinson and movement disorder society. Individual patient score was documented out of total score of 43. The scales for outcomes in Parkinson's disease-cognition (SCOPA-COG) consists of 10 items divided over four domains: memory (4 items); attention (2 items); executive function (3 items) and visuospatial function (1 item). Scores range from 0-43, with higher scores reflecting better performance. Memory: verbal recall (5), digit span backwards (7), indicate cubes (5), delayed recall (5). Attention: counting backwards (2), months backwards (2), executive function: fist edge palm (3), semantic fluency (6), dice (3), visuospatial function: assembling pattern (5).

Table 1: SCOPA COG score.

Score	Memory and learning			Attention		Executive function			Visuospatial function	Memory
	Verbal recall	Digit span backward	Indicate cubes	Counting backwards	Month backwards	Fist edge palm	Semantic fluency	Dice	Assembling pattern	Delayed recall
Min	0	1	1	0	0	0	0	0	1	0
Max	5	7	5	2	2	3	6	3	5	5

Statistical analysis

Data was collected and entered in excel spreadsheet for statistical analysis. free trial version of SPSS software was downloads and used for statistical analysis. since the data was non normal hence non-parametric tests (Wilcoxon-Mann-Whitney U Test) has been used to make group comparisions. Spearman's Rho has been calculated to measure the strength of relationship. Probabilities are considered statistically significant if $p<0.05$.

RESULTS

A sample of 52 subjects who were included in study and their baseline characteristics describe below in the charts and subsequent texts. Conversely, for every 1 unit increase in duration of illness (years), the SCOPA-COG: dice decreases by 0.13 units. There was a weak negative correlation between SCOPA-COG: dice and duration of illness (years) and this correlation was statistically significant (rho=-0.28, p=0.047). There was a moderate negative correlation between SCOPA-COG: assembling pattern and duration of illness (years) and this correlation was statistically significant (rho=-0.4, p=0.003). For every 1 unit increase in SCOPA COG: assembling pattern, the duration of illness (years) decreases by 0.58 units. There was a weak negative correlation between SCOPA COG: total score and duration of illness (years), and this correlation was not statistically significant (rho=-0.24, p=0.091).

Table 2: Baseline characteristics.

Characteristics	Categories	N	%
Age (years)	61-70	41	79
	71-80	11	21
Gender	Male	26	50
	Female	26	50
Duration of illness (years)	1	26	50
	5	26	50
Education	Middle school	2	4
	High school	19	36
	Intermediate	17	33
	Graduate	9	17
	Post graduate	5	10
Cognitive decline	No	35	67
	Present	17	33

Using SCOPA COG score in 52 patients, 17 (33%) patients found with declined cognition There was weak negative correlation between total score and duration of illness (p=0.091), weak negative correlation between executive function (assessed by dice) and duration of illness (p=0.047) and a moderate negative correlation between visuospatial function (assessed by assembling pattern) and duration of illness (p=0.003).

DISCUSSION

This study consist of 52 subjects with idiopathic Parkinson Disease in which 26 (50%) are male and 26 (50%) were female. Among subjects 41 (79%) are between 61-70 yr and 11 (21%) were between 71-80 year of age. 26 (50%) had 1 year of duration of illness and 26(50%) had 5 year of duration of illness. Among subjects 17 had declined cognition according to SCOPA COG SCORE (score <24). There was weak negative correlation between total score and duration of illness that says cognitive decline increases as score decreases with increase in duration of illness but it was not statistically significant (p=0.091) but there was a weak negative correlation between executive function (assessed by dice) and duration of illness (p=0.047) and a moderate negative correlation between visuospatial function (assessed by assembling pattern) and duration of illness (p=0.003) which are statistically significant which says that with increase in duration of illness executive function and visuospatial function decreases assessed by lower scores supported by the study Aarsland et al 2003 which also results in the increase in prevalence in dementia in PD patients with increase in duration of illness.[12] Another study by Das et al 2016 also concluded increase prevalence of cognitive decline in increase duration of illness.[13]

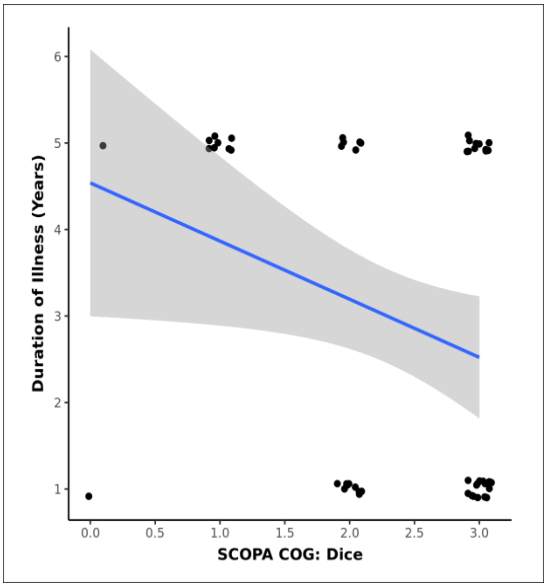

Figure 1: Correlation between SCOPA COG: dice and duration of illness (years) (n=52).

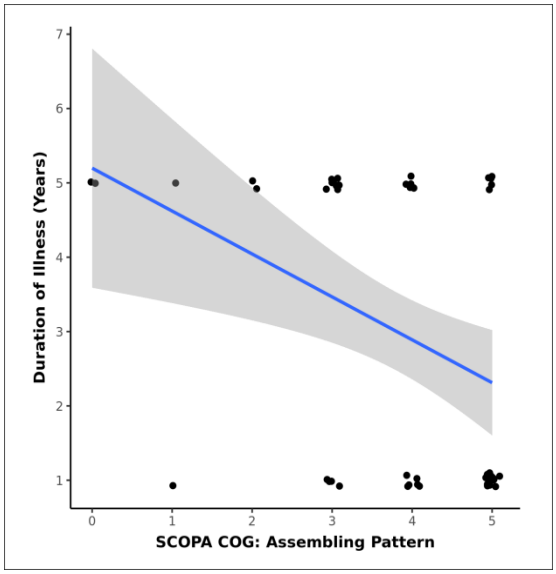

Figure 2: Correlation between SCOPA COG: assembling pattern and duration of illness (years) (n=52).

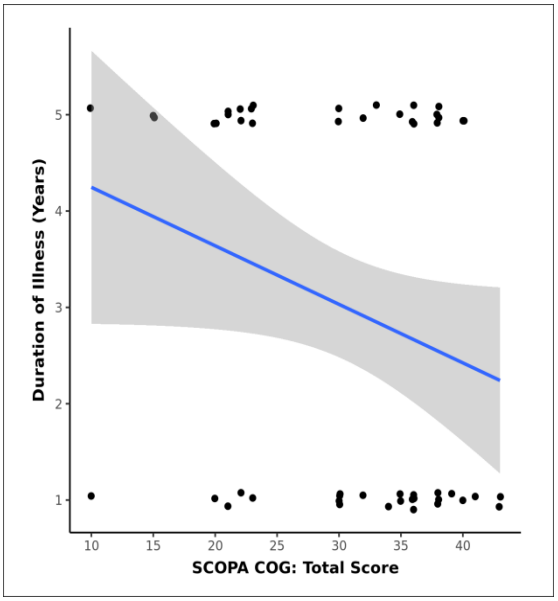

Figure 3: Correlation between SCOPA COG: total score and duration of illness (years) (n=52).

Limitations

Current study was conducted in a tertiary care hospital of Kanpur so the subject pool may not be representative of the general population also the sample size was not large enough with only 52 patients.

CONCLUSION

This study found cognitive decline in 17 (33%) of PD patients using Scopa cog score. Significant decrease in executive function (p=0.047) and visuospatial function (p=0.003) with increase in duration of illness. No significant relationship found between duration of illness and overall cognitive decline (p=0.091).

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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