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**Sex-Specific White Matter Correlates of Neuropsychological Measures in Parkinson's disease with Mild Cognitive Impairment**  
V. Mishra, K. Sreenivasan, D. Cordes, A. Ritter, Z. Mari, J. Caldwell (Las Vegas, NV, USA)

**Objective:** To identify sex-specific white-matter (WM) correlates of neuropsychological measures in Parkinson's disease (PD) with mild cognitive impairment (MCI).

**Background:** Neuropsychological measures of executive function and processing speed are poorer in PD-males than in PD-females. Furthermore, higher-order diffusion MRI (dMRI) measures such as Diffusion kurtosis imaging (DKI) model have revealed sex-specific WM disorganization in PD. However, whether there is a sex-specific correlation between neuropsychological scores and DKI-derived measures is yet unknown. Establishing the correlation between neuropsychological scores and MRI

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**Cognitive Impairment in Parkinson's disease Patients: a Descriptive Study**  
R. Nindela, A. Kurniawan, Y. Harun, S. Marisdina, I. Irfanuddin (Palembang, Indonesia)

**Objective:** This study aims to describe the cognitive profile in Parkinson's disease (PD) patients.

**Background:** Cognitive impairment is a common non-motor symptom of PD. Cohort studies demonstrated that about 50% of PD patients would develop dementia after ten years, and >80% would develop dementia after 20 years. Cognitive impairment significantly decreases the quality of life of PD patients.

**Methods:** A total of 38 PD patients (based on United Kingdom Parkinson's Disease Society Bank criteria) at the outpatient clinic of Mohammad Hoesin General Hospital, Palembang, Indonesia, between

## ABSTRACTS

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September 2019 and January 2020 recruited for this study. The severity of the disease examined using the Hoehn and Yahr stage, and the cognitive function was measured using the Indonesian version of the Montreal Cognitive Assessment (MoCA-Inda). Data were analyzed with SPSS version 22 for windows.

**Results:** The average age of subjects was 59.9±10.9 years. The majority (55.3%) were diagnosed with PD at the age of ≥60 years. Most subjects (65.8%) were male. A total of 78.9% of subjects finished senior high school or higher. The proportion of subjects in the early stages (stage <3) and the advanced stages of disease (stage ≥3) is approximately the same, 52.6% and 47.4% respectively. Cognitive impairment (MoCA-Inda score <26) was found in 89.5% of subjects; 42.1% of them are from advanced-stage group while the other 47.4% came from early-stage group. Cognitive decline was seen in all domains assessed in MoCA-Inda but visuospatial/executive function (averaged 2.9±1.5 out of a maximum of 5 points) and delayed recall (averaged 1.2±1.6 out of a maximum 4 points) experienced the most significant decrease.

**Conclusions:** Cognitive impairment is found in the majority of PD patients regardless of the severity of the disease. Most impaired domains are visuospatial/executive function and memory.

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**The retrograde procedural memory in people with Parkinson's disease with or without freezing of gait – a cross-sectional study**  
L. Pauby, A. Rauschenberger, C. Pauly, M. Hansen, L. Pavelka, A. Hanff, V. Schröder, A. Leist, R. Krüger (Esch-sur-Alzette, Luxembourg)

**Objective:** To investigate the retrograde procedural memory in people with typical Parkinson's disease (PwP) with or without freezing of gait (FOG). We hypothesized that the retrograde procedural memory is more strongly impaired in patients with FOG (FOG<sup>+</sup>) than in patients without FOG (FOG<sup>-</sup>).

**Background:** Given that cognitive functions, like executive control and automaticity, are crucial for mobility, it is of great importance to get a deeper knowledge of the cognitive impairment that may interfere with walking and causing gait disturbances in PwP, i.e. FOG. The integrity of retrograde procedural memory, the ability to execute skills that have been learned in earlier life stages, is essential for a person's ability to complete

# COGNITIVE IMPAIRMENT IN PARKINSON'S DISEASE PATIENTS: A DESCRIPTIVE STUDY

RINI NINDELA\*, ADRIAN KURNIAWAN\*\*, YUSRIL HARUN\*, SELLY MARISDINA\*, IRFANNUDDIN\*\*\*



## METHODS

A total of 38 PD patients (based on United Kingdom Parkinson's Disease Society Bank criteria) at the outpatient clinic of Mohammad Hoesin General Hospital, Palembang, Indonesia, between September 2019 and January 2020 recruited for this study. The severity of the disease examined using the Hoehn and Yahr stage, and the cognitive function was measured using the Indonesian version of the Montreal Cognitive Assessment (MoCA-Ina). Data were analyzed with SPSS version 22 for windows.

## RESULTS

The average age of subjects was 59.9±10.9 years. The majority (55.3%) were diagnosed with PD at the age of ≥60 years. Most subjects (65.8%) were male. A total of 78.9% of subjects finished senior high school or higher. The proportion of subjects in the early stages (stage <3) and the advanced stages of disease (stage ≥3) is approximately the same, 52.6% and 47.4% respectively. Cognitive impairment (MoCA-Ina score <26) was found in 89.5% of subjects; 42.1% of them are from advanced-stage group while the other 47.4% came from early-stage group. Cognitive decline was seen in all domains assessed in MoCA-Ina but visuospatial/ executive function (averaged 2.9±1.5 out of a maximum of 5 points) and delayed recall (averaged 1.2±1.6 out of a maximum 4 points) experienced the most significant decrease.

**Keywords:** cognitive impairment, Parkinson's disease, Montreal Cognitive Assessment

## BACKGROUND

Cognitive impairment is a common non-motor symptom of Parkinson's disease (PD). Cohort studies demonstrated that about 50% of PD patients would develop dementia after ten years, and >80% would develop dementia after 20 years. Cognitive impairment significantly decreases the quality of life of PD patients.

## OBJECTIVE

This study aims to describe the cognitive profile in Parkinson's disease (PD) patients.

## CONCLUSIONS

Cognitive impairment is found in the majority of PD patients regardless of the severity of the disease. Most impaired domains are visuospatial/ executive function and memory.

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## Artikel Lengkap

### Cognitive Impairment in Parkinson's disease Patients: a Descriptive Study

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#### Abstract

**Objective:** This study aims to describe the cognitive profile in Parkinson's disease (PD) patients.

**Background:** Cognitive impairment is a common non-motor symptom of PD. Cohort studies demonstrated that about 50% of PD patients would develop dementia after ten years, and >80% would develop dementia after 20 years. Cognitive impairment significantly decreases the quality of life of PD patients.

**Methods:** A total of 38 PD patients (based on United Kingdom Parkinson's Disease Society Bank criteria) at the outpatient clinic of Mohammad Hoesin General Hospital, Palembang, Indonesia, between September 2019 and January 2020 recruited for this study. The severity of the disease examined using the Hoehn and Yahr stage, and the cognitive function was measured using the Indonesian version of the Montreal Cognitive Assessment (MoCA-Ina). Data were analyzed with SPSS version 22 for windows.

**Results:** The average age of subjects was 59.9±10.9 years. The majority (55.3%) were diagnosed with PD at the age of ≥60 years. Most subjects (65.8%) were male. A total of 78.9% of subjects finished senior high school or higher. The proportion of subjects in the early stages (stage <3) and the advanced stages of disease (stage ≥3) is approximately the same, 52.6% and 47.4% respectively. Cognitive impairment (MoCA-Ina score <26) was found in 89.5% of subjects; 42.1% of them are from advanced-stage group while the other 47.4% came from early-stage group. Cognitive decline was seen in all domains assessed in MoCA-Ina but visuospatial/executive function (averaged 2.9±1.5 out of a maximum of 5 points) and delayed recall (averaged 1.2±1.6 out of a maximum 4 points) experienced the most significant decrease.

**Conclusions:** Cognitive impairment is found in the majority of PD patients regardless of the severity of the disease. Most impaired domains are visuospatial/executive function and memory.

**Keywords:** cognitive impairment, Parkinson's disease, Montreal Cognitive Assessment

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#### Background

Parkinson's disease is the second most common neurodegenerative disease after Alzheimer's dementia.<sup>1</sup> The disease has a very broad dimension of symptoms including motor and non-motor symptoms.<sup>2</sup> Although motor symptoms are used to establish the diagnosis, non-motor symptoms are important as determinants for quality of life for people with Parkinson's disease.<sup>3,4</sup> Cognitive impairment is one of the most common non-motor symptoms.<sup>1,2</sup> As the disease worsens, many patients show symptoms of Mild Cognitive Impairment

(MCI) with an average prevalence of 27%. MCI is a predictor of Parkinson's disease dementia, experienced by about 80% of patients after 20 years of the disease.<sup>3</sup> Cognitive impairment in Parkinson's disease has been widely studied with different methods and at varying stages of the disease. The study aims to describe the profile of cognitive function in Parkinson's disease patients in our hospitals.

#### Methods

This descriptive study used primary data of Parkinson's disease patients at the outpatient



clinic of Muhammad Hoesin Hospital from September 2019 to January 2020. The subject of this research is patients diagnosed with Parkinson's disease based on the criteria of the United Kingdom Parkinson's Disease Society Bank and willing to be included in the study. Patients with a history of stroke, intracranial tumors, and brain infections as well as patients with language disorders were excluded from the study. Cognitive function was assessed by Indonesian version of Montreal Cognitive Assessment (MoCA-Ina) while the severity of the disease is determined by Hoehn and Yahr stages. Data were analyzed with SPSS version 22 for windows.

### Results

Of the 38 subjects, most were aged 61-70 years (42.1%) and male (73.3%). More patients (55.3%) experienced the symptoms at the age of  $\geq 60$  years. Overall, the average onset of the disease is  $59.94 \pm 10.95$  years. Most subjects (78.9%) had a high school

education or higher. There were more patients (34.2%) on the 3<sup>rd</sup> stage of Hoehn and Yahr scale but the proportion of subjects in the early stages (stage  $< 3$ ) and the advanced stages of disease (stage  $\geq 3$ ) is approximately the same, 52.6% and 47.4% respectively. Majority of patients have cognitive impairment (89.5%); 42.1% of them are from advanced-stage group while the other 47.4% came from early-stage group. The average MoCA-INA score in the study was  $18.71 \pm 5.72$ .

The table below shows the average MoCA-Ina score per domain at varying degrees of severity. In general, it can be seen that the score of each domain decreases as the severity of the disease increases. However, domains that consistently decline as the disease gets worse are visuospatial/executive function, abstraction, and orientation. In terms of average score decline, the most disturbed domain is visuospatial/executive function (averaged  $2.9 \pm 1.5$  out of a maximum of 5 points) and delayed recall (averaged  $1.2 \pm 1.6$  out of a maximum 4 points).

**Table 1. MoCA-Ina scores per domain and stage of Hoehn and Yahr**

MoCA-Ina	Hoehn dan Yahr stadium (mean $\pm$ SD)			
	1	2	3	4
Visuospatial/ Executive	3,00 $\pm$ 1,73	3,27 $\pm$ 1,27	2,69 $\pm$ 1,49	2,40 $\pm$ 1,81
Naming	2,55 $\pm$ 0,88	2,90 $\pm$ 0,30	2,38 $\pm$ 0,86	2,40 $\pm$ 0,54
Attention	4,44 $\pm$ 1,33	5,09 $\pm$ 1,04	4,38 $\pm$ 1,60	4,00 $\pm$ 1,58
Language	1,22 $\pm$ 0,83	2,00 $\pm$ 1,00	1,84 $\pm$ 0,98	1,80 $\pm$ 1,30
Abstraction	1,11 $\pm$ 0,78	0,90 $\pm$ 0,83	0,92 $\pm$ 0,95	0,40 $\pm$ 0,54
<i>Delayed recall</i>	0,77 $\pm$ 1,39	0,72 $\pm$ 1,42	1,76 $\pm$ 1,73	1,20 $\pm$ 1,64
Orientation	5,11 $\pm$ 1,36	5,18 $\pm$ 0,60	4,69 $\pm$ 1,25	4,40 $\pm$ 1,51

### Discussion

The average age of patients is  $64.02 \pm 10.45$  years, with the majority in the age range of 61-70 years. These results are in accordance with the literature that states the highest incidence is between the age of 40-80 years and decreases at the age under 40 year and over 80 year due to chronic and progressive degenerative processes in Parkinson's

disease. The incidence over 80 years tends to decrease because only a few Parkinson's disease patients reach advanced age due to accompanying comorbid disease.<sup>4,5</sup> In addition, the majority of patients were  $\geq 60$  years old when they first experienced Parkinson's symptoms, with an average age of onset of  $59.94 \pm 10.95$  years. This is in line with the results of other studies where the

initial onset of Parkinson's disease is at an average age of 55 years.<sup>5</sup>

More than half of the study subjects were male. Merryrn et al., in 2019 also reported a greater percentage of male patients with a ratio of 7:3.<sup>6</sup> The frequency of male patients is higher than that of women due to the protective effects of estrogen. In addition, men are also more at risk of exposure to occupational toxins and head injuries which are also risk factors for Parkinson's disease.<sup>7</sup> Most patients have reached the severity of Hoehn and Yahr 3 (34%). At the stage of Hoehn and Yahr 1 generally patients have not felt their symptoms interfere with their daily lives. At grades 2 and 3 the patient begins to need the help of others, and this tends to lead the patient to treatment.

The majority of subjects have experienced a decline in cognitive function.<sup>5,8</sup> This result is in line with previous research by Rambe and Fitri in 2017 where 85.5% of patients showed MoCA-Ina results <26.<sup>9</sup> Basal ganglia as the primary location of pathological processes in Parkinson's disease is involved in a variety of cognitive functions. There is a wide connection between the basal ganglia and the cerebral cortex area, thus, damage to the basal ganglia can result in deficits in overall cognitive function.<sup>5,8</sup> The most impaired cognitive domains in the study were visuospatial/executive, memory, abstraction, and orientation. Pathologically, in Parkinson's disease patients there is neurodegeneration in the cortex and limbic system areas in the form of neuronal damage and deposition of Lewy bodies and Lewy neuritis. Cholinergic deficit theory states that the most commonly affected domains are attention, executive function, and visuospatial.<sup>10</sup> Chaudhary et al., in 2020 also revealed that attention, memory, executive and visuospatial functions were impaired in people with Parkinson's disease with mild cognitive impairment compared to the

control group and people with Parkinson's disease without cognitive symptoms.

## Conclusions

Most Parkinson's disease patients experience a decline in cognitive function and this decrease gets worse as the severity of the disease increases. Most impaired domains are visuospatial/executive function and memory.

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