

# **MoCA is better than MMSE for the diagnosis of cognitive dysfunction in Parkinson's disease : The Result of Dementia Registry for Parkinson's Disease in Taiwan.**

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## **Background**

We compare the accuracy of the Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE) in cognitive dysfunction in parkinson's disease (PD) from the result of dementia registry for parkinson's disease (DRPD) to understand the diagnosis accuracy.

## **Methods**

DRPD study totally enrolled 284 patients in 12 hospitals in Taiwan. In order to exam the cognitive dysfunction in PD with mild cognitive impairment (PD-MCI) and PD dementia (PDD) (attention, executive function, visuo-spatial function, and memory), several tests were performed. A 32-item cognitive decline questionnaire was used to screen the cognitive impairment in subjects. MMSE and MoCA were also used for cognitive evaluation. The motor symptoms severity of the PD was evaluated by the Hoehn & Yahr stage and motor portion of the Unified Parkinson's Disease Rating Scale (UPDRS). The

neuropsychiatric symptoms were recorded by Neuropsychiatric Inventory Questionnaire (NPI-Q). The daily living activity was evaluated by modified Lawton's instrumental activities of daily living scale (IADL) and pill questionnaire. Subjects also received 15-item Geriatric Depression Scale (GDS-S) to evaluate the mood status. The clinician's diagnosis of dementia was based on the diagnostic criteria of DSM-IV, which was compared with the PDD diagnostic criteria proposed by MDS in 2007. We tried to develop a PDD screening questionnaire.

## **Results**

The age of patients with PD, PD-MCI, and PDD were  $65.0 \pm 8.1$ ,  $71.5 \pm 9.1$ , and  $75.8 \pm 6.9$  years, respectively. The MMSE score of patients with PD, PD-MCI, and PDD were  $28.3 \pm 1.7$ ,  $24.7 \pm 3.4$ , and  $18.1 \pm 5.6$ , respectively. The sensitivity of MMSE for PDD, MoCA for PDD, MMSE for PD-MCI, and MoCA for PC-MCI were 72.6, 91.6, 80.2 and 81.0, respectively. The specificity of MMSE for PDD, MoCA for PDD, MMSE for PD-MCI, and MoCA for PC-MCI were 84.1, 72.0, 86.5 and 92.3, respectively. The likelihood ratios of MMSE for PDD, MoCA for PDD, MMSE for PD-MCI, and MoCA for PC-MCI were 4.56, 3.27, 5.94 and 10.51, respectively.

## Conclusions

Our results indicate that the MMSE and MoCA are useful tools to investigate the cognitive function in PD. Furthermore, the MoCA is superior than MMSE, especially in the early stage of cognitive dysfunction in PD.

### Table 1 Demographics

	PD (N=52)	PDMCI (N=37)	PDD (N=9)	ANOVA and post-Hoc tests (Scheffe)
Age	65 ± 8.1	71.5 ± 9.1	75.8 ± 6.9	PD vs. PDMCI (p<0.001) PD vs. PDD (p<0.001) PDMCI vs. PDD (p=0.001)
Education	12.4 ± 4.3	8.3 ± 5.3	7.3 ± 4.9	PD vs. PDMCI (p<0.001) PD vs. PDD (p<0.001) PDMCI vs. PDD (p=0.34)
Weight	65.2 ± 10.9	61.5 ± 10.3	59.8 ± 9.8	PD vs. PDMCI (p=0.09) PD vs. PDD (p=0.01) PDMCI vs. PDD (p=0.47)
Height	164.5 ± 8.2	160.4 ± 9.1	159.5 ± 7.5	PD vs. PDMCI (p=0.01) PD vs. PDD (p=0.003) PDMCI vs. PDD (p=0.73)
BMI	24.0 ± 3.3	23.9 ± 3.3	23.5 ± 3.5	PD vs. PDMCI (p=0.96) PD vs. PDD (p=0.64) PDMCI vs. PDD (p=0.69)
H & V stage	2.2 ± 0.9	2.1 ± 0.8	3.0 ± 0.9	PD vs. PDMCI (p=0.94) PD vs. PDD (p<0.001) PDMCI vs. PDD (p=0.001)

### Table 2 Cognitive tests

Tests	PD (N=52)	PDMCI (N=37)	PDD (N=9)	Post-Hoc Tests (Scheffe)
MMSE	28.3 ± 1.7	24.7 ± 3.4	18.1 ± 5.6	PD vs. PDMCI (p<0.001) PD vs. PDD (p<0.001) PDMCI vs. PDD (p<0.001)
MoCA	26.0 ± 2.2	20.3 ± 4.3	13.0 ± 5.3	PD vs. PDMCI (p<0.001) PD vs. PDD (p<0.001) PDMCI vs. PDD (p<0.001)