Using MoCA-Thai to Evaluate Cognitive Impairment in Patients with Schizophrenia

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Background: *Schizophrenia is a chronic devastating illness with specific effects on cognitive function. A few studies have been performed on Asian patients.*
Objective: *To examine prevalence of cognitive impairment and associated factors in Thai patients with schizophrenia.*
Material and Method: *A descriptive cross-sectional study of patients with schizophrenia that were selected consecutively from a psychiatric outpatient clinic at Srinagarind Hospital, Khon Kaen University between June 2008 and December 2009 was conducted. The Montreal Cognitive Assessment-Thai version (MoCA-T) test was used to evaluate cognitive functions. Associated factors such as age of onset, type of antipsychotics were assessed by collecting data from medical records. Data analysis used descriptive statistics, and univariate analysis used Chi-square.*
Results: *Seventy-five patients with schizophrenia were recruited. The majority of cases was single, male, had low education, and manifested paranoia. The prevalence of cognitive impairment was 81.3%. Significant factors associated with cognitive impairment were the year of education lower than 12 (OR = 9.25, 95% CI 1.90-45.03, p = 0.002) and those who had taken typical and combined antipsychotic drugs (OR = 5.97, 95% CI 1.66-21.55, p = 0.005).*
Conclusion: *Thai patients with schizophrenia showed a high prevalence of cognitive impairment. Therefore, clinicians should assess cognitive function and cognitive remedy.*

Keywords: *Cognitive impairment, Schizophrenia, MoCA-Thai*

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Schizophrenia is a chronic devastating illness with specific effects on the brain and cognitive function. The study of cognition in schizophrenia has been studied extensively in Western countries since the beginning of the twentieth century. Nowadays, various data tend to assert that cognitive deficits are considered to be core symptoms of schizophrenia. The aspects of specific cognitive impairment are verbal memory, motor function, attention, executive functions, and verbal fluency[1-9]. There are no reports, however, of cognitive impairment in schizophrenia in South-East Asian countries. In particular, patients with schizophrenia have limited education and low-level employment. These differences may be reflected differently in those patients who demonstrate cognitive impairment. Han et al[10] reported that patients with first-episode schizophrenia had global neurocognitive deficits. Cognitive impairment is associated with work-related impairment and academic failure. There are, however, some methodological limits to these cognitive assessments. First, schizophrenia is a heterogeneous disease and there are no specificities of the different subgroups in terms of cognition. Secondly, the time chosen to evaluate the cognitive functions of each patient is also a limiting factor. Thirdly, the battery of tests used in different studies is not standardized and time consuming. Therefore, physicians want to evaluate cognitive function at the bedside or outpatient clinic where physicians are very busy due to case overload. They need a simple, quick, easy to use, valid and reliable cognitive screening test. The Montreal Cognitive Assessment (MoCA) was designed as a rapid test for "mild cognitive impairment" among elderly persons[11]. The MoCA takes about 12 minutes to administer and scores range from 0 to 30. For persons with no cognitive impairment, MoCA scores averaged 27.4±2.2. Persons with known dementia of the Alzheimer type had MoCA scores that averaged 16.2±4.8. Persons with "mild cognitive impairment"

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had MoCA scores that averaged 22.1±3[12]. In a 2010 study at Thresholds, the mean ± SD MoCA score of persons with schizophrenia was 22.7±4.3. This score falls squarely into the "mild cognitive impairment" range observed with the elderly study. On the Folstein Mini-Mental State Exam, the same schizophrenic individuals had a score of 27.1±2.5, which is in the normal range[12]. In Thailand, the Montreal Cognitive Assessment-Thai version (MoCA-T) was translated by Hemrungrojn S. and back translated by a linguistic staff person at the Chulalongkorn Language Institute. Content validity was also verified by two psychiatrists and one neurologist. Criterion validity was studied by Tangwongchai S et al[13] in 40 patients with Alzheimer's disease, 40 patients of MCI, and 40 healthy subjects by using the Clinical Dementia Rating Scale (CDR) as the gold standard. The MoCA-T was found to have good internal consistency (Cronbach's alpha coefficient of 0.914) and the score below 25 appeared to be the accurate cutoff point, which showed sensitivity of 0.8 and specificity of 0.8. Years of education were a significant factor that was correlated with the score of the MoCA-T. Therefore, compensation by adding 1 point for subjects with at least 6 years of education was considered to be more appropriate in Thai subjects.

No studies had been done using the MoCA to examine cognitive impairment in patients with schizophrenia. The goal of this study was to examine several domains of cognitive functioning by using MoCA-T in patients with schizophrenia and to identify the magnitude of cognitive deficits and associated factors.

Material and Method

The present study was approved for all research procedures by the Ethics Committee in Human Research of the Khon Kaen University (EC code: HE521092).

Seventy-five patients who met the Diagnostic and Statistical Manual of Mental Disorders IV Text Revision (DSM-IV-TR) diagnosis of schizophrenia and aged above 18 years old were recruited consecutively from the psychiatric outpatient clinic, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University between June 2009 and May 2010. Confirmation of the diagnosis was made in all patients by an experienced senior psychiatrist using information obtained from the clinical history, existing medical records, and an interview with significant others as well as the administration of the MoCA-T. All patients were of Thai nationality and at least 18 years old. The patients were maintained on a stable dose of antipsychotic medications for at least six months, and had not had electro-convulsive therapy for at least four months. There was no history of any significant neurological illness such as seizure disorder, head trauma, cerebral infection, or cerebrovascular accident and no subject met DSM-IV-TR criteria for mental retardation, or alcohol or other substance abuse within preceding six months. The duration of illness was calculated in years by deducting the age of onset of having the first evident psychotic symptoms as reported by the patient and confirmed with other sources wherever possible, from the age at the date of last visit. All participants gave written informed consent. Cognitive assessment obtained using the MoCA-T. The test was administered in Thai by the co-author that was qualified and trained to use MoCA-T. Demographic variables were sex, marital status, and years of education. Clinical variables were (1) age at onset expressed in years (2) duration of illness (3) type of schizophrenia (4) duration of antipsychotics use (5) type of antipsychotics and (6) previous ECT history. Primary outcomes were (1) the mean of total scores of MoCA-T and sub-domain scores including trail making B, copy of cube, clock drawing, naming three animals, digit forward, digit backward, vigilance, subtract by 7, two sentence repletion, word fluency, two abstracts, delay recall, and orientation, and (2) the percentage of cognitive impairment as defined by MoCA-T total score below 25. Descriptive statistics analysis was used to describe sample characteristics and clinical variables. Univariate analysis was used to identify significant associations between cognitive impairment and years of education, duration of illness, duration of antipsychotics use, type of antipsychotic, and previously receiving ECT by Chi-square tests or Fisher's exact tests for categorical data. All analysis was performed using the Statistical Package for the Social Science (SPSS) 16.0.

Results

In Table 1, 2, the demographic variables for all patients are described. Subjects had an average age of 36.2 years (SD 9.4), 12.5 years of (SD 3.7) education. Eighty-four percent of the subjects were single and 62.7 percent male. On average, the age at onset of the first psychotic symptoms occurred at 26.7 years (SD 8.6) and duration of illness was 9.5 years (SD 6.6). The majority of the schizophrenic types were paranoid (74.7%). All subjects were taking antipsychotics for a median of 8 years

(range 1-30 years), 24 patients (32%) using classical antipsychotics, 28 (37.3%) atypical antipsychotics, and 23 (37%) with a combination of classical and atypical antipsychotics. Eighty-four percent of subjects had not received electroconvulsive therapy.

The means and SDs of the MoCA-T are presented in Table 2 including subtest scaled scores. The percent of accuracy, defined as the number of subjects who answered correctly in each sub-domain test divided by total subjects was calculated as a percentage. The mean total score of the MoCA-T was 19.65 (SD = 5.16) with a range of 6 to 29 and the delay recall subtest had the lowest percentage of accuracy. Cognitive impairment was defined as the total score below 25 and the prevalence of cognitive impairment in this sample was 81.3% (95% CI = 76.8-85.8%).

Table 1. Demographic variables of Thai patients with schizophrenia (n = 75)

Variables	Mean (SD)	Range
Age (years)	36.2 (9.4)	19-64
Age of onset (years)	26.7 (8.6)	15-52
Duration of illness	9.5 (6.6)	1-30
Duration of antipsychotics taking	8.9 (6.4)	1-30
Number of hospitalization	1.4 (1.9)	0-10
	n	%
Male	47	62.7
Marital status		
Single	63	84.0
Married	11	14.7
Divorce	1	1.3
Type of schizophrenia		
Paranoid	56	74.7
Undifferentiated	5	6.7
Residual	14	18.7
Type of antipsychotics		
Classical	24	32.0
Atypical	28	37.3
Combined	23	30.7
Concomitant medication		
Benzodiazepines	27	36.0
Anticholinergics	40	53.3
Antidepressants	19	25.3
Anticonvulsants	10	13.3
Previous receiving ECT		
Ever	12	16.0
Never	63	84.0
MoCA score below 25	61	81.3

ECT = electro convulsive therapy

Table 3, shows there were significant relationships between the impaired cognitive test performance and the use of typical or combined antipsychotics (OR = 5.97, 95% CI 1.66-21.55, p = 0.005) and the years of education lower than 12 (OR = 9.25, 95% CI 1.90-45.03, p = 0.002).

Discussion

Prevalence of cognitive impairment in Thai patients with schizophrenia is 81.3%. That is higher than other studies that had been reported as 50 to 67%[14,15]. The reasons may be due to using different instruments to assess cognitive function and the Thai subjects had lower educational attainment. As expected, these subjects also displayed substantial impairment of delayed recall, language, attention, visuospatial and executive functions. These findings are consistent with previous neurocognitive studies of patients with schizophrenia[7,9,16-19]. Moreover, the mean total scores of MoCA-T in these subjects (19.65, SD 5.16) are lower than Thai patients with mild cognitive impairment (MCI) (21.30, SD 3.64) and normal elderly (25.90. SD 2.14) in the present study of Tangwongchai S et al[13]. This evidence may be suggestive that schizophrenia has more impaired cognitive function than MCI and there are impaired multiple functions, including verbal memory learning, attention, language and executive functions which call attention to the importance of prefrontal cortex dysfunction and disturbances in the frontal-parieto-temporal circuit. Three studies have been reported in which patients with schizophrenia have deficits in frontal-parietal connections, key components of white matter circuitry[20], a deficit in physiological activation of the right dorsolateral prefrontal cortex (Brodmann's area 46/9) in the context of normal task-dependent activity in other regions[21] and decreased frontal blood flow and abnormalities of both gray and white matter at parietal operculum, medial temporal lobe, left Broca's area, and left arcuate fasciculus[22].

The factors associated with cognitive impairment such as duration of illness, duration of medication exposure, type of antipsychotic drug, previous exposure of ECT, and years of education attainment were examined. Only typical antipsychotic exposure and low education were associated with impaired cognitive test performance that was consistent with other studies[9,14,23]. However, recent studies have reported that atypical antipsychotics did not show a clear advantage over typical antipsychotics on both emotional and cognitive functioning[24,25].

Table 2. Cognitive functioning in Thai patients with schizophrenia based on MoCA-T scores

Domain	Range	Min	Max	Mean (SD)	% accuracy*
Trail making B	0-1	0	1	0.43 (0.50)	42.67
Copy of cubic	0-1	0	1	0,60 (0.49)	60.00
Clock drawing	0-3	0	3	2.32 (0.81)	49.33
Naming 3 animals	0-3	1	3	2.83 (0.42)	84.00
Digit forward and backward	0-2	0	2	1.36 (0.69)	48.00
Vigilance (number 1 tapping)	0-1	0	1	0.83 (0.38)	82.67
Subtract by 7	0-3	0	3	1.91 (1.05)	37.33
2 sentences repletion	0-2	0	2	0.79 (0.79)	22.67
Word fluency	0-1	0	1	0.27 (0.45)	26.67
2 abstracts	0-2	0	2	0.77 (0.78)	21.33
Delay recall	0-5	0	5	1.57 (1.49)	4.00
Orientation	0-6	4	6	5.84 (0.40)	85.33
Total score (max = 30)	0-30	6	29	19.65 (5.16)	

* % accuracy defined as number of subjects who answering correctly in each sub domains test divided by total subjects and calculated to percent.

Table 3. Univariate analysis to identify significant factors associated with cognitive impairment in Thai patients with schizophrenia

Variables	Cognitive impairment (n = 61)	No cognitive impairment (n = 14)	OR* (95% CI)	p-value
Duration of illness				
≥2 years	57 (93.4%)	12 (85.7%)	2.38 (0.39-14.48)	0.311
<2 years	4 (6.6%)	2 (14.3%)		
Duration of antipsychotic taking				
≥4 years	49 (80.3%)	9 (64.3%)	2.27 (0.64-8.02)	0.286
<4 years	12 (19.7%)	5 (35.7%)		
Type of antipsychotics				
Classical & combined	43 (70.5%)	4 (28.6%)	5.97 (1.66-21.55)	0.005*
Atypical	18 (29.5%)	10 (71.4%)		
Previous receiving ECT				
Ever	10 (16.4%)	2 (14.3%)	1.18 (0.23-6.09)	1.000
Never	51 (83.6%)	12 (85.7%)		
Years of education				
≤12 years	37 (60.7%)	2 (14.3%)	9.25 (1.90-45.03)	0.002*
>12 years	24 (39.3%)	12 (85.7%)		

* OR = odds ratio

Therefore, further study will be needed to explore the effects of typical and atypical antipsychotic drugs and cognitive function in Thai patients with schizophrenia.

The possible confounding factors such as genetics, aging, nutritional status, substance use, and co-morbidity with physical illnesses cannot be ignored. Limitations of the present study could be that, 1) patients were tested by a MoCA-T without comparing the second neuropsychological test for the purpose of external validity, 2) there was no baseline cognitive test before illness, and 3) no comparison with age-matched healthy volunteers.

Summarizing, prevalence of cognitive impairment in Thai adult patients with stable schizophrenia was 81.3% and supports previous studies that a generalized brain dysfunction (frontal, temporal, and parietal lobes) may be the core

symptoms of schizophrenia. The results of this study are consistent with the unifying hypothesis proposed that schizophrenia is a disorder of connectivity involving cortical-cortical and cortical-subcortical circuits. It is hoped that this will ultimately guide clinicians to perform cognitive assessments and cognitive remediation in the treatment plans for patients with schizophrenia.

Conclusion

There were 75 Thai patients with schizophrenia in this study, which focused on cognitive impairment. Prevalence rate was 81.3%. This will guide clinicians to assess cognitive function of patients with schizophrenia and provide cognitive rehabilitation in the future.

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Potential conflicts of interest

None.

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การใช้ MoCA-Thai เพื่อประเมินภาวะความบกพร่องทางพุทธิปัญญา ในผู้ป่วยจิตเภทคนไทย

สุวรรณา อรุณพงค์ไพศาล, เอกลักษณ์ แสงศิริรักษ์

ภูมิหลัง: *โรคจิตเภทเป็นโรคเรื้อรังและเสื่อมถอยโดยเฉพาะความบกพร่องด้านพุทธิปัญญา (cognitive impairment) การศึกษาเกี่ยวกับเรื่องนี้ในคนเอเชียยังมีน้อย*

วัตถุประสงค์: *เพื่อศึกษาความชุกและปัจจัยที่เกี่ยวข้องกับภาวะความบกพร่องทางพุทธิปัญญา (cognitive impairment) ในผู้ป่วยโรคจิตเภทคนไทย*

รูปแบบการศึกษา: *การศึกษาเชิงพรรณนาภาคตัดขวาง*

วัสดุและวิธีการ: *ผู้ป่วยโรคจิตเภทคนไทยทุกรายที่มารับการตรวจรักษาที่แผนกผู้ป่วยนอกจิตเวช โรงพยาบาลศรีนครินทร์ ระหว่างวันที่ 1 มิถุนายน พ.ศ. 2552 ถึง 30 ธันวาคม พ.ศ. 2553 เครื่องมือที่ใช้ประเมิน cognitive function คือ Montreal cognitive assessment ฉบับภาษาไทย (MoCA-Thai) และแบบบันทึกข้อมูลปัจจัยที่เกี่ยวข้อง ได้แก่ เพศ อายุ ระดับการศึกษา อายุที่เริ่มป่วย ชนิดของยารักษาโรคจิต โดยรวบรวมจากเวชระเบียน สถิติวิเคราะห์ใช้สถิติเชิงพรรณนา ร้อยละ วิเคราะห์ปัจจัยเชิงเดี่ยวใช้อัตราเสี่ยงสัมพัทธ์และสถิติ Chi-square*

ผลการศึกษา: *จากกลุ่มตัวอย่างทั้งหมด 75 ราย ส่วนใหญ่เป็นเพศชาย โสด การศึกษาน้อย ป่วยเป็นโรคจิตเภทชนิดหวาดระแวง พบว่ามีความชุกของภาวะ cognitive impairment เป็นร้อยละ 81.3 ปัจจัยที่สัมพันธ์กับภาวะ cognitive impairment อย่างมีนัยสำคัญทางสถิติ คือ ระดับการศึกษาน้อยกว่า 12 ปี (OR = 9.25, 95% CI 1.90-45.03, p = 0.002) และการได้รับยารักษาโรคจิตชนิดดั้งเดิมและชนิดผสม (OR = 5.97, 95% CI 1.66-21.55, p = 0.005)*

สรุป: *ความชุกของภาวะ cognitive impairment ในผู้ป่วยโรคจิตเภทคนไทยมีอัตราสูง จึงควรมีการตรวจประเมิน cognitive function และวิธีการรักษาด้านนี้*