Mini-Mental Status Examination: Is it Appropriate for Screening in Thai Elderly?

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Abstract

Appropriateness of using the Mini-Mental Status Examination with Thai elderly was examined in three samples of fifty elderly subjects living in contrasting locations in Thailand. Literacy, age, gender, principle occupation and place of residence were each associated with MMSE score. Multiple regression analysis, demonstrated that literacy and place of residence had strong independent effects on MMSE. Result of this study suggests that use of the MMSE as a screen for cognitive impairment in Thailand may be inappropriate. New screening tests that are not influenced by literacy and place of residence are needed.

Mini Mental Status Examination (MMSE) has been widely used for nearly twenty years[1]. Its validity and reliability tested in Western populations are well documented[2]. Although it is well recognized as a screening tool for cognitive impairment in Western countries, it is certainly affected by age, education level and cultural background[2]. The MMSE is the most popular cognitive function screening test which has been translated into Thai and used with Thai elderly[3-6]. However, limitation of using this test with Thai elderly particularly those with low socioeconomic status is demonstrated[3]. To complete the MMSE, reading and writing ability is required. This may make the MMSE unsuitable in a population with a high rate of illiteracy such as a Thai elderly population. Low cutoff level and high false positive rate for screening of dementia is shown in several studies conducted in an Eastern population including Thai elderly [3,7,8]. These findings suggest that the MMSE may be inappropriate for the elderly in less developed countries. In order to determine appropriateness of this screening test with Thai elderly, we conducted a cross-sectional study in 150 Thai elderly who had normal cognitive function.

SUBJECTS AND METHOD

Three samples of 50 Thai elderly people aged 60 and over were recruited for study. The first group was randomly selected from people

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living in the Klong Toey slum in central Bangkok. The second group was randomly selected from people living in a rural area of Singburi province, located 150 kilometers north of Bangkok. The sampling frames for these two groups were population registers compiled with earlier research studies. The third group were patients from Bangkok who attended the geriatric clinic of Chulalongkorn hospital for reasons other than cognitive impairment or behaviour/affective problems. These elderly people were not randomly selected but comprised a consecutive series of people attending the geriatric clinic who lived in the central Bangkok region. All subjects were of normal cognitive function clarified by having no history of cognitive impairment, having no history of abnormal behavior and having a normal social life particularly during the last six months. A Thai version of MMSE was applied to these subjects[5]. All subjects were willing to participate and were interviewed by the same interviewer (CL). Other information such as age, gender, literacy, principle occupation, vision and hearing impairment which might affect the MMSE score were also collected. Mann-Whitney U test was used for univariate analysis to identify factors influencing the MMSE score. Stepwise multiple regression analysis was used for multivariate analysis to clarify independent factors which influence the MMSE score. The SPSS-PC+ programme was used for statistical analysis.

RESULTS

Age, sex ratio and other data of the three elderly groups are shown in Table1. All subjects had normal visual and hearing function. The factors associated with the MMSE score in univariate analysis were literacy, age, gender, place of residence and principle occupation and these are shown in Table 2. These five variables were entered into a stepwise multiple regression analysis but only literacy and place of residence contributed significantly to the model giving an adjusted R square of 0.51. The regression model was MMSE = 5.8 (literacy) + 1.7 (place of residence) + 9.4. Percentage of correct answer of each item of the MMSE by literacy is shown in Table 3. Items which required reading and writing ability ("reading and do", "writing", "drawing") were mostly affected by illiteracy.

DISCUSSION

Five factors (age, gender, literacy, place or residence, and principle occupation) were identified as having influence on the MMSE score analyzed by univariate analysis. Age is a well documented factor associated with MMSE score[2,3]. Gender effect may be due to indirect effect of education which is far better in male elderly. This is supported by the result of multiple regression analysis which found no independent gender effect. Although occupation has been used for social class classification in the United Kingdom[9] and was

Table 1. Age, sex ratio, literacy and principle occupation of Thai elderly recruited from three different places.

	Slum area (n = 50)	Singburi (n = 50)	Bangkok (n = 50)	Total (n = 150)
Age [mean (S.D.)]	68.3 (7.0)	66.8 (4.7)	67.3 (5.8)	67.5 (5.9)
Sex [male to female ratio]	0.39	0.61	0.85	0.60
Literacy [n (%)]				
illiteracy	16 (32)	7 (14)	2 (4)	25 (16.7)
literacy	34 (68)	43 (86)	48 (96)	125 (83.3)
Principle occupation [n (%)]				
housework	37 (74)	20 (40)	22 (44)	79 (52.7)
farmer/labor	6 (12)	21 (42)	2 (4)	29 (19.3)
merchant	6 (12)	7 (14)	1 (2)	14 (9.3)
civil servant or business officer	1 (2)	2 (4)	25 (50)	28 (18.7)

Table 2. Relationships between variables and MMSE score.

Factors		mean (S.D.)	p value
Age			
	< 70 years	24.0 (3.8)	0.0223
	70 or over	22.2 (4.5)	
Sex			
	male	24.7 (3.6)	0.0053
	female	22.7 (4.2)	
Literacy			
	illiterate	17.7 (2.6)	0.0000
	literate	24.6 (3.3)	
Place of living			
	Bangkok	26.3 (3.1)	0.0000
	Klong Toey slum	21.3 (4.1)	
	Singburi	22.8 (3.4)	
Principle occupation			
	housework	22.4 (4.3)	0.0000
	farmer/labor	22.2 (3.0)	
	merchant	24.3 (3.5)	
	government/bussiness officer	27.2 (2.0)	
All subjects		23.4 (4.1)	-

Table 3. Percentage of correct answers of each item of the MMSE by literacy.

Items (scores)		all subjects (n = 150)	illiterate subjects (n = 25)	literate subjects (n = 125)
Date	(1)	67.3	48.0	71.2
Day	(1)	93.3	80.0	96.0
Month	(1)	82.7	56.0	88.0
Year	(1)	75.3	28.0	84.8
Season	(1)	100.0	100.0	100.0
Where	(1)	98.0	88.0	100.0
Level	(1)	97.3	96.0	97.6
District	(1)	76.0	56.0	80.0
Province	(1)	84.7	40.0	93.6
Region	(1)	84.7	52.0	91.2
Registration	(1)	0.7	0.0	0.8
	(2)	0.7	4.0	0.0
	(3)	98.7	96.0	99.2
Calculation	(1)	25.3	28.0	24.8
	(2)	12.7	24.0	10.4
	(3)	6.0	8.0	5.6
	(4)	19.3	8.0	21.6
	(5)	26.7	4.0	31.2
Recall	(1)	22.7	24.0	22.4
	(2)	24.0	8.0	27.2
	(3)	20.7	8.0	23.2
Naming	(2)	100.0	100.0	100.0
Speak follow	(1)	1.3	100.0	100.0
Do follow command				
	(1)	1.3	0.0	1.6
	(2)	1.3	0.0	1.6
	(3)	97.3	100.0	96.8
Reading and do	(1)	71.3	0.0	85.6
Writing	(1)	54	0.0	64.8
Drawing	(1)	58	16.0	66.4

demonstrated as having association with economical status of Thai elderly[10], it is not an independent factor of MMSE score of this population study. Only literacy and place of residence were independent factors associated with MMSE score of this Thai elderly population.

We were not surprised to find that literacy was the most important independent factor associated with MMSE score[2,3]. Some items of language domain of the MMSE needs ability to read and write (literacy) and the illiterate subjects got remarkably lower scores in these items than the literate subjects. Because there is a high percentage of illiteracy among Thai elderly[10], effect of education (literacy) on the MMSE score obtained from the Thai elderly should be much more pronounced than that obtained from Western elderly[2].

It is very interesting to find that place of residence is an independent factor of MMSE score but not the principle occupation or age. Place of residence effect may represent some hidden factors such as minor cultural difference, cohort effect, opportunity to access news and information, life style and effect of social class or socioeconomic status[11-14]. Further study is needed to clarify these hidden factors.

Problem of cut-off point affected by education was a concerning issue of generalization of the MMSE used in Western countries. Although many adaptations or modifications of the MMSE were suggested to cope with this problem, there still is limitation of their use[2]. This study demonstrated that literacy and place of residence affect the MMSE score of Thai elderly. Thus, generalized use of the MMSE in Thailand is warranted. Developing a new screening mental test in which literacy and place of residence effects its score has been lessened is probably a better solution than trying to use a test which was developed for a western society such as the MMSE.

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Mini–Mental Status Examination: เหมาะสมที่จะใช้สำหรับการค้นหาในผู้สูงอายุไทยหรือไม่?

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ความเหมาะสมของการใช้แบบทดสอบ Mini Mental Status Examination ในผู้สูงอายุไทยได้รับการศึกษาในผู้สูงอายุ 3 กลุ่มกลุ่มละ 50 คนที่อาศัยอยู่ในพื้นที่แตกต่างกันในประเทศไทย จากการวิเคราะห์พบว่า การอ่านออกเขียนได้, อายุ, เพศ, อาชีพหลัก และถิ่นที่อยู่อาศัยเป็นปัจจัยชนิด univariate ของ Mini Mental Status Examination (MMSE) จากการวิเคราะห์ multiple regression พบว่าการอ่านออกเขียนได้และถิ่นที่อยู่อาศัยเท่านั้นที่เป็นปัจจัยอิสระของ MMSE ผลการศึกษานี้บ่งว่าการใช้ MMSE ในการค้นหาความผิดปกติของการรับรู้ของสมอง (cognitive impairment) ในประเทศไทยอาจไม่เหมาะสม และมีความจำเป็นของการสร้างแบบทดสอบสภาพจิตเพื่อใช้ในการค้นหาขึ้นมาใหม่โดยที่จะต้องไม่มีอิทธิพลของการอ่านออกเขียนได้และถิ่นที่อยู่อาศัย

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