Factors Influencing MMSE-T Score among Thai Subjects

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Objectives: *To explore association of variables influencing MMSE-Thai version (MMSE-T) score among Thai subjects.*
Material and Method: *365 general non dementia Thai subjects of age 45-87 years were randomly recruited in Bangkok. All subjects were screened with MMSE-T and interviewed. Demographic factors that might affect the score of MMSE-T were collected. Relationship between demographic variables and MMSE-T score were evaluated.*
Results: *Of 365 subjects, mean MMSE-T score was 27.2 and ranged 17 - 30. There were 27 cases (7.44%) with MMSE-T score ≤ 23. Subjects who had a score ≤23, were 18 cases (27.69%) and 9 cases (3.01%) in education level less than bachelor degree and at least bachelor degree respectively (p value <0.001). By linear regression analysis, the factors significantly affected the lower score were age higher than 60 years (p=0.017) and education below bachelor degree (p<0.001).*
Conclusion: *Factors including elderly and low education were negatively influenced on MMSE-T performance among Thai subjects.*

Keywords: *MMSE, Thai version, MMSE-T, Education*

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Dementia is an important condition that predominately affects the elderly worldwide[1]. The dementia prevalence in Thailand is 1.8-16.5%[2-4]. The prevalence of dementia has a trend to increase according to increased life expectancy. The most common dementia is Alzheimer s disease that occurred from degenerative process. Some dementias are reversible conditions or treatable if they can be detected early [5-8]. Clinical and neuropsychological tests are standard diagnostic tools but these need a long time and should be done by well trained specialists[9-13]. MMSE has been widely used to measure cognition and to be a dementia screening instrument including Thailand because this test is convenient and valid[14-16]. In Thailand, MMSE is translated into the Thai version (MMSE-T)[17]. The score 23 is generally used as a cut off point of dementia or organic brain disease but sometimes can not be used in different conditions such as younger age, higher education, social and tradition[18-25]. Many patients with a high education have a score of more than 23 in spite of dementia being diagnosed. The authors would like to explore the association of variables influencing MMSE-T score among normal Thai subjects.

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Material and Method

The present study was a cross-sectional study. The authors randomly recruited the subjects from May to October, 2004 in Bangkok from many places such as the students of National Defense College, people in public gardens, travel place, foundation meeting and check up department of Phramongkutklao Hospital. Inclusion criteria were 45-87 years old, healthy person who had no memory complaint and had normal activity daily living. Exclusion criteria were old cerebrovascular disease, Parkinson's disease, dementia, depression, anxiety, psychosis, and acute or chronic active medical conditions such as pain,

thyroid disease, renal disease, liver disease and heart disease, etc. Using sedative or hypnotic medication within 1 week was also excluded. All subjects were interviewed for demographic data and screened with MMSE-T. Factors consisting of age, sex, marital status, occupation, educational level, residence, head injury, vision, hearing ability, smoking, alcohol drinking and sociability which might affect the result of MMSE-T were collected. The low MMSE-T score was the score of ≤ 23. The present study was reviewed and permitted by the ethical committee of Phramongkutklao Hospitol and subjects who were eligible after giving written the consent.

Statistical Analysis

The continuous data was determined by mean, standard deviation (SD) and discrete data was determined by percent. Relationship between demographic variables and MMSE-T scores were evaluated by using crosstab chi-square test, independent sample t-test and linear multiple regression analysis. The authors accepted statistical significance if p value < 0.05. The authors used the statistical software package (SPSS) for windows version 11.5.

Results

Of 365 subjects, 220 (60.3%) were male and 145 (39.7%) were female. Mean age was 63.5 years and ranged 45-87. There were 142 cases (39%) in the group ages 45-60 years and 222 cases (60.8%) in the group ages 61-87 years. The underlying diseases were recorded in 184 cases. The common underlying diseases were diabetes mellitus (31%) and hypertension (16.3%). Multiple underlying diseases were found in 116 cases. The demographic characteristics are shown in Table 1. The duration of education in the presented population ranged 0-22 years. The mean duration of education was 17.1 years and SD was 3.0.

Overall data, mean of MMSE-T was 27.20, SD 2.2 and ranged 17-30. There were 27 cases (7.44%) with MMSE-T score ≤ 23. These cases were suspected of having sub-clinical dementia according to the low score. By crosstab chi-square test and independent sample t-test, factor that significantly affected MMSE score ≤ 23 were aged>60 years, female sex, education < bachelor degree, unemployed, non-alcoholic drinking, non-smoking and non-sociability. Subject who had a score ≤ 23, were 18 cases (27.7%) and 9 cases (3.0%) in education level less than bachelor degree and at least

Table 1. Demographic characteristics of 365 studied subjects

Profile	Group	Number	Percent
Age	< 60 years	142	39.0%
	≥ 60 years	222	61.0%
Sex	Male	220	60.4%
	female	145	39.6%
Residence	Central region	244	81.3%
Marital status	Couple	234	93.6%
	Single / divorce	16	6.4%
Education level	< bachelor degree	65	17.9%
	≥ bachelor degree	299	82.1%
Occupation	employed	194	73.8%
	unemployed	69	26.2%
Vision	Poor	73	20.3%
Hearing	Poor	11	3.3%
History of head injury	Yes	41	11.3%
Dementia in family	Yes	32	8.8%
Alcoholic drinking	Yes	119	32.7%
Smoking	Yes	157	43.1%
Underlying disease	Yes	184	63.0%
Sociability	Yes	47	12.9%

bachelor degree respectively (p value <0.001). By linear multiple regression analysis, factors significantly affected the lower scores were lower education (p value < 0.001) and higher age (p value 0.017).

Discussion

The present study had a prevalence of dementia 7.7% (by MMSE-T score screening ≤23). Some risk factors of the present study such as female, elderly, unemployed, lower education and non-sociability were similar to the dementia theories[26-27]. The non-modifiable factors were age and sex while the modifiable risk factors were education, occupation, alcoholic, smoking and sociability. From the present study, one of the important modifiable factors for dementia was education that should be encouraged. High education might have a protective effect for dementia. A previous study found increased synaptic receptor and improved cerebral function in higher education[28]. Higher education will improve many aspects of the whole country and will reduce the prevalence of dementia[29]. From the present study, education level at least bachelor degree was the most important factor which influenced MMSE-T performance among Thai subjects that might be a protective against dementia. The present study had some limitations because almost all population (81.3%) lived in the central region of Thailand and were mainly employed. So, some value might not represent overall Thailand status. Further more, a generalized survey should be performed in the future.

References

1. Cummings JL, Benson DF. Dementia: A clinical approach. London: Butterworth, 1983.
2. Phanthumchinda K, Jitapunkul S, Sitthi-amron C, Bunnag SC, Ebrahim S. Prevalence of dementia in an urban slum population in thailand: Validity of screening methods. International J Geriat Psychiatry 1991; **6**: 639-46.
3. Senanarong V, Poungvarin N, Sukhatunga K, Prayoonwiwat N, Chaisewikul R, Petchurai R, et al. Cognitive status in the community dwelling Thai elderly. J Med Assoc Thai 2001; 84: 408-16.
4. Jitapunkul S, Kunanusont C, Phoolcharoen W, Suriyawongpaisal P. Prevalence estimation of dementia among Thai elderly: a national survey. J Med Assoc Thai 2001; 84: 461-7.
5. Cummings JL. Treatable dementias. Adv Neurol 1983; 38: 165-83.
6. Arnold SE, Kumar A. Reversible dementias. Med Clin North Am 1993; 77: 215-30.
7. Green R, Kinsella LJ. Current concepts in the diagnosis of cobalamin deficiency. Neurology 1995; 45: 1435-40.
8. Luboshitzky R, Oberman AS, Kaufman N, Reichman N, Flatau E. Prevalence of cognitive dysfunction and hypothyroidism in an elderly community population. Isr J Med Sci 1996; 32: 60-5.
9. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 3rd ed, revised. Washington,D.C.: American Psychiatric Association, 1987.
10. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, D.C.: American Psychiatric Association, 1994.
11. Graham JE, Rockwood K, Beattie BL, McDowell I, Eastwood R, Gauthier S. Standardization of the diagnosis of dementia in the Canadian Study of Health and Aging. Neuroepidemiology 1996; 15: 246-56.
12. Fratiglioni L, Grut M, Forsell Y, Viitanen M, Winblad B. Clinical diagnosis of Alzheimer's disease and other dementias in a population survey. Agreement and causes of disagreement in applying Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition Criteria. Arch Neurol 1992; 49: 927-32.
13. Farrer LA, Cupples LA, Blackburn S, Kiely DK, Auerbach S, Growdon JH, et al. Interrater agreement for diagnosis of Alzheimer's disease: the MIRAGE study. Neurology 1994; 44: 652-6.
14. Folstein MF, Folstein SE, McHugh PR. "Mini Mental State" A practical method for grading the cognitive state of patients for the clinician. J Psychiat Res 1975; 12: 189-98.
15. Karno M, Burnam MA, Escobor JI, Hough RL, Eaton WW. Development of the spanish-language version of the national institute of mental health diagnostic interview schedule. Arch Gen Psychiatry 1983; 40: 1183-8.
16. Burnam MA, Kerno M, Hough RL, Escobar JI, Forsythe AB. Arch Gen Psychiatry 1983; 40: 1189-96.
17. The committee for primary brain test. Thai version. Primary brain test. Institute of geriatric medicine. Deparment of Medicine.Ministry of Public Health,1999 : 7-11.
18. Anthony JC, Leresche L, Niaz U, Vonkorff MR, Folstein MF. Limits of the mini-mental state as a screening test for dementia and delirium among hospital patients. Psycho Med 1982; 12: 397-408.

19. Kangsanarak A, Kotchabhakdi N. Mini-Mental State Examination (MMSE) and Clinical Dementia Rating (CDR) for use with the aged in community. J Psychiatr Assoc Thai 1991; 36: 89-97.
20. Escobar JI, Burnam A, Korno M, Forsythe A, Landsverk J, Golding JM. Use of the mini-mental-state examination (MMSE) in a community population of mixed ethnicity. J Nerv Ment Dis 1984; 174: 607-14.
21. Berkman LF. The association between educational attainment and Mental Status Examinations: of etiologic significance for senile dementias or not ?. J Chronic Dis 1982; 39: 171-4.
22. Jitapunkul S, Lailert C. Mini-Mental Status examination: is it appropriate for screening in Thai elderly? J Med Assoc Thai 1997; 80: 116-20.
23. Cullen B, Fahy S, Cunningham CJ, Coen RF, Bruce I, Greene E, et al. Screening for dementia in an Irish community sample using MMSE: a comparison of norm-adjusted versus fixed cut-points. Int J Geriatr Psychiatry 2005; 20: 371-6.
24. Pi J, Olive JM, Esteban M. Mini Mental State Examination: association of the score obtained with the age and degree of literacy in an aged population. Med Clin (Barc) 1994; 103: 641-4.
25. O Connor DW, Pollitt PA, Hyde JB, Fellows JL, Miller ND, Brook CP, et al. The reliability and validity of the Mini-Mental State in a British community survey. J Psychiatr Res 1989; 23: 87-96.
26. Mehta KM, Ott A, Kalmijn S, Slooter AJC, van Duijn CM, Hofman A, et al. Head trauma and risk of dementia and Alzheimer's disease. Neurology 1999; 53: 1959-62.
27. van Duijn CM, Stijnen T, Hofman A. Risk factors for Alzheimer's disease: overview of the EURODEM collaborative re-analysis of case-control studies. Int J Epidemiol 1991; 20(Suppl 2): S1-S73.
28. Liao YC, Liu RS, Teng EL, Lee YC, Wang PN, Lin KN, et al. Cognitive reserve: a SPECT study of 132 Alzheimer's disease patients with an education range of 0-19 years. Dement Geriatr Cogn Disord 2005; 20: 8-14.
29. Canadian Study of Health and Aging. Risk factors for Alzheimer s disease in Canada. Neurology 1994; 44: 2073-80.

ปัจจัยที่มีผลต่อคะแนน MMSE-T ในประชากรไทย

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วัตถุประสงค์: *เพื่อศึกษาปัจจัยที่มีผลต่อคะแนน MMSE ภาคภาษาไทย (MMSE-T) ในคนไทย*

วัสดุและวิธีการ: *ศึกษาจากคนไทยอายุระหว่าง 45-87 ปี จำนวน 365 คน ทำการสุ่มตรวจจากบุคคลที่ไม่มีประวัติสมองเสื่อมจากหลายสถานที่ในกรุงเทพมหานคร ทุกรายได้รับการประเมิน MMSE-T และสัมภาษณ์ ปัจจัยพื้นฐานต่างๆ ที่อาจมีผลต่อคะแนน วิเคราะห์หาความสัมพันธ์ระหว่างปัจจัยกับคะแนน MMSE-T*

ผลการศึกษา: *จากผู้เข้าร่วมการวิจัย 365 คน คะแนน MMSE-T เฉลี่ยคือ 27.2 และอยู่ในช่วง 17-30 พบผู้ที่มีคะแนนน้อยกว่าหรือเท่ากับ 23 จำนวน 27 คน (ร้อยละ 7.44) ในกลุ่มนี้เป็นผู้ที่มีการศึกษาต่ำกว่าปริญญาตรีจำนวน 18 คน (ร้อยละ 27.69) และผู้ที่มีการศึกษาสูงกว่าหรือเท่ากับปริญญาตรีจำนวน 9 คน (ร้อยละ 3.01) ค่า P<0.001 ปัจจัยที่มีผลต่อการได้คะแนนต่ำโดยวิธี linear regression ได้แก่ อายุมากกว่า 60 ปี (p=0.017) และการศึกษาต่ำกว่าปริญญาตรี (p<0.001)*

สรุป: *ปัจจัยที่มีผลต่อคะแนนต่ำในคนไทยซึ่งอาจเป็นความเสี่ยงต่อภาวะสมองเสื่อมคือ อายุมากและระดับการศึกษาต่ำ*