

RELIABILITY AND VALIDITY OF THE CANTONESE VERSION OF MINI-MENTAL STATE EXAMINATION --- A PRELIMINARY STUDY

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SUMMARY

The Mini-Mental State Examination was translated into Cantonese and administered to 111 normal elderly and 79 demented patients. The scale was found to have good reliability and validity as an instrument to detect cognitive impairment in our locality. A cut-off score of 19/20 is recommended as indication for further evaluation of cognitive impairment.

Keywords: Cantonese, Mini-Mental State Examination, cognitive impairment

INTRODUCTION

The Mini-Mental State Examination (MMSE, Folstein et al, 1975) is a widely used instrument for assessing cognitive functions both in clinical settings and in research. The MMSE is divided into two sections, the first of which requires oral responses only and covers orientation, memory and attention. The second part tests subjects' ability to name objects, follow verbal and written commands, write a sentence and copy a complex polygon. The maximum total score is 30 and a cut-off point of 23/24 was reported to be able to discriminate between patients with cognitive impairment and normal subjects (Folstein et al, 1985). It has been validated in various studies conducted in Western countries. However, recent studies have found that the specificity of the MMSE was lower for individuals with less than 8 years of schooling and for those over the age of 65 (Anthony et al, 1982; Holzer et al, 1983). Furthermore, cultural differences can also influence the scores and performance on the MMSE (Escobar et al, 1986; Salmon et al, 1989).

Recently, several Chinese versions of the MMSE have been developed and used in surveys for dementia in China (Li et al, 1989; Yu et al, 1989). The version used in Shanghai (Yu et al, 1989) is of particular interest as it was carefully adapted from the original MMSE and has been used in a large scale study involving 5,055 elderly persons in Shanghai. However, this is a Mandarin version which has not been used in our locality. As the elderly population is rising rapidly in Hong Kong, from less than 5% 10 years

ago to 8.7% in 1991 for people at or above 65 years of age (1991 Census), there is an increasing need to develop screening instruments for the assessment of cognitive impairment for clinical and service planning purposes. An epidemiological survey of cognitive impairment in the elderly has been carried out in Hong Kong recently (Liu et al, 1993), using a Cantonese version of MMSE which has not been validated in Hong Kong. Fan (1992) reported a validation study of another Cantonese version of the MMSE based on the findings of a small sample of psychogeriatric outpatients. However, this study suffers from a number of limitations and they include: 1) the small number of subjects (N=29), 2) the failure to provide a control sample of normal subjects for comparison purpose and 3) the lack of information on the psychometric properties of the scale such as internal consistency and test-retest reliability. In this study, the MMSE was translated into Cantonese and the scale's reliability and validity were examined, using a sample of Chinese elderly in Hong Kong.

METHOD

THE INSTRUMENT

The MMSE was translated into Cantonese and back-translated by a team of bilingual psychiatrists. Most of the items on the MMSE could be directly translated and used in Hong Kong. Major adaptations, however, were necessary for several items. The phrase "No if's, and's, or but's" was changed to a Cantonese phrase of "Uncle buys fish intestine 姨丈買魚腸" which is an alliteration in Cantonese.

The phrase "Please close your eyes" was replaced by the phrase "Clap your hands" as the original phrase may sometimes be interpreted to be related to death in the Chinese culture. For the writing test, we adopted the strategy used in the Chinese MMSE (Katzman et al, 1988), i.e. the respondent was asked to "Say a sentence" instead of writing a sentence, to avoid failure on this item as a result of lack of education. The serial sevens test was retained, but there was no Cantonese equivalent for the test of spelling "W-O-R-L-D" backwards. As an alternative, the subjects were asked to reverse five digits. The Cantonese version of the MMSE (CMMSE) was then administered to 5 normal and 5 demented elderly in a pilot study. Feedback was obtained from these pilot subjects and further changes were made so that the wording of the sentences was readily comprehensible to the Hong Kong elderly. The CMMSE is shown in the Appendix.

SUBJECTS

Two groups of subjects between the ages of 60 and 93 were included in the study. There were 147 females and 43 males with a mean age of 75.1 years \pm 7.1. The 190 subjects were divided into two groups. The first group consisted of normal elderly persons recruited from a local multiservice centre for the elderly (N=111, 85 females, 26 males). The second group consisted of demented patients referred to the psychiatric unit of the Chinese University of Hong Kong in an 1 year period (N=79, 62 females, 17 males). These demented patients were either inpatients or outpatients. The mean educational level of all subjects was 3.5 years (S.D.= 7.9), with 46.3% being illiterate. As for the subjects' marital status, 61.3% were widowed, 27.5% married and the rest were either single or divorced.

PROCEDURE

All subjects in both samples of normal and demented elderly consented to participate in the study. The CMMSE was administered to the subjects by either one of two investigators (HC and DC). Clinical diagnoses of the demented patients were made by the psychiatrists in charge of the patients according to the DSMIII R criteria. Subjects in the multiservice centre for the elderly were interviewed by an independent psychiatrist and were found to be free from dementia or psychiatric illness. Raters were not totally blind to the diagnosis as many subjects were severely demented and the diagnoses would be obvious to the raters during the interview.

A random subset of subjects (N=30) from the normal elderly sample was examined one week after the first interview and the CMMSE was administered again to assess the scale's test-retest reliability.

A random sample of 27 subjects was rated by the two investigators (HC and DC) simultaneously with one rater carrying out the test to assess the inter-rater reliability.

RESULTS

Statistical analyses of data included an examination of the reliability of the CMMSE, and the ability of the scale to discriminate between demented and non-demented subjects in their respective group memberships, and the determination of an optimal cut-off score for screening purpose.

RELIABILITY

The internal consistency of the scale was assessed and the CMMSE for all subjects emerged as internally consistent with the Cronbach's alpha = 0.86. As for the test-retest reliability, the reliability coefficient was acceptable, with alpha = 0.78, showing that the scale was reliable over a period of 1 week. The inter-rater reliability was excellent, with an intraclass correlation of 0.99.

DISCRIMINANT VALIDITY

An important test of the validity of the CMMSE as a measure of cognitive impairment is the ability of its scores to discriminate between normal and demented subjects. The canonical correlation was 0.94, which showed a strong correlation between the discriminant scores and group membership. The discriminant function correctly classified 75 (94.9%) of the cases in the demented group and 111 (100%) of cases in the normal group. Thus, the percentage of "grouped" cases correctly classified was very high, i.e. 97.9%.

SENSITIVITY AND SPECIFICITY

Table 1 below shows the rates of sensitivity and specificity for various cut-off scores of the CMMSE. A cut-off score of 19/20 yielded a high sensitivity rate of 97.5 and an equally good specificity of 97.3. This appears to be the best cut-off score for our sample of subjects.

Table 1. CMMSE Cut-off scores

Cut-off score	Sensitivity (%)	Specificity (%)
24/25	100	66.7
23/24	100	74.8
22/23	100	79.3
21/22	100	87.4
20/21	98.7	93.7
19/20	97.5	97.3
18/19	96.2	99.1
17/18	93.7	100
16/17	91.1	100
15/16	87.3	100
14/15	84.8	100

DISCUSSION

The findings of the present study show that the CMMSE is a reliable and valid instrument for use in assessing cognitive impairment in the Hong Kong elderly. The very high sensitivity and specificity rates may be due to the fact that the two groups of subjects are very discrete. The clinical

sample included patients with moderate to severe dementia and it is not surprising that they obtained very low scores on the MMSE (mean score = 9). The normal control subjects, on the other hand, have a mean score of 25. Based on our findings, we recommend that elderly with a CMMSE score of less than 20 need to be further evaluated for the possibility of dementia. Our cut-off score is higher than the score suggested by Fan (1992), namely, ≤ 17 . One possible reason is that in Fan's study, demented subjects were compared with psychiatric patients. It should be noted that cognitive deficits occur frequently among patients with major psychiatric disorders relative to their matched controls (Seidman, 1983). Moreover, Faustman et al (1990) found that the utility of MMSE in detecting cognitive deficits in a predominantly psychiatric population was rather limited.

A point of caution is that our cut-off score is derived from a sample consisting of moderate to severe dementia and normal controls and the results might not generalize to patients with early or mild dementia. Indeed, the discrimination between normal subjects and patients with mild dementia is not an easy one (Mowry and Burvill, 1988). Therefore further studies in the community are indicated.

Another finding is the very high illiteracy level (46.3%) of our elderly, which is higher than that reported in Shanghai (26.5%; Katzman et al, 1988) and Beijing (33.7%; Li et al, 1989). The mean educational level of our subjects was 3.5 years and there were very few subjects who achieved tertiary education. This made it difficult to further analyse the MMSE cut-off scores according to educational level. In the Shanghai study, it was found that education had a significant effect on the scores of MMSE. Different cut-off scores were used to select patients for further evaluation of dementia according to their educational level. For those with middle school or higher education, a cut-off score of < 25 was used whereas the values for those with elementary education and no schooling were < 21 and < 18 respectively.

In future local studies, it would be useful to examine the utility of the CMMSE as a screening instrument for cognitive impairment for elderly in the community and to investigate the effect of education on the scores.

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Appendix

簡短智能測驗

最高
分數 分數

- 5 () 依家係乜野日子(年份)(季節)(月份)(幾號)(星期幾)?
- 5 () 我地依家係邊嘅?
(九龍/新界/香港)(九龍/新界/香港既邊度)(醫院)(邊層樓)(病房)
或:(九龍/新界/香港)(九龍/新界/香港既邊度)(邊一科診所)(診所名字)
(邊層樓)
或:(九龍/新界/香港)(九龍/新界/香港既邊度)(邊條街)(邊一座)(邊層樓)
或:(九龍/新界/香港)(九龍/新界/香港既邊度)(邊個屋村)(中心名字)
(邊層樓)
- 3 () 依家我會講三樣野既名, 講完之後, 請你重複一次。
請記住佢地, 因為幾分鐘後, 我會叫你再講番俾我聽。
[蘋果]、[報紙]、[火車]。依家請你講番哩三樣野俾我聽。
(以第一次講的計分, 一個一分; 然後重複物件, 直至全部三樣
都記住。)
- 5 () 請你用一百減七, 然後再減七, 一路減落去, 直至我叫你停為止。
(減五次後便停) ()
或: 依家我讀幾個數目俾你聽, 請你倒轉頭講番出黎。
[4 2 7 3 1] ()
- 3 () 我頭先叫你記住既三樣野係乜野呀?
- 9 () 哩樣係乜野? (鉛筆)(手錶)。(2)
請你跟我講句說話 [姨丈買魚腸](1)
依家檯上面有一張紙。用你既右手拿起張紙, 用兩隻手一齊將
紙摺成一半, 然後放番張紙係檯上面。(3)
請讀出哩張紙上面既字, 然後照住去做。(1)
請你講任何一句完整既句子俾我聽。例如: [我係一個人]、
[今日天氣好好]。(1)
哩處有幅圖, 請你照住黎畫啦。(1)

總分: _____

拍手

