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Research Article

Validation MAMSE: The Malian Adapted Mini Mental State Examination

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Abstract

Introduction: The mini mental state is a short and comprehensive evaluation test of all cognitive functions. This is a test of 12 items with a maximum score of 30/30. However, studies have shown that it is an age-sensitive test and even more so at the level of education. In developing countries where literacy rates are the lowest in the world, the use of this tool is severely limited, hence the need to adapt this test in accordance with the socio-cultural and educational realities of each country. OBJECTIVES This study aims to adapt and validate the MMSE in the Malian cultural and educational context (MAMSE) for the screening of potentially demented

subjects.

Methodology: A sample of 317 subjects aged 50 and over, apparently healthy, was recruited for 9 months of investigation. These subjects were divided into a subsample of 158 literate and 159 illiterate subjects. Both groups received both tests, first the standard test and, two weeks later, the modified test. The data obtained from these different assessments were

analyzed.

Results: A direct comparison of the two tests in the literate group allows to appreciate the nature of the association with the age [P- value = 0.04 (MAMSE) / 0.0006 (MMSE)] and the level of education [P-value = 0.22 (MAMSE)/0.02 (MMSE)] which is less for the modified test than for the standard test. The intrinsic characteristics of the modification in the evaluation of the totality of our sample find at a discriminating threshold of 24, a sensitivity at 0.93; a specificity at 0.97 and an accuracy at 0.90 with Kappa = 0.83. In addition, the evaluation of the illiterates found a general average of 26.79 with a general average of 27.45 for the entire sample.

Conclusion: These results suggest that in the socio-cultural context of Mali, MAMSE is a reliable test for detecting dementia in the elderly population.

Keywords: MMS; MAMS; Age; Education; Dementia; Validation

Introduction

With the improvement of living standards, we are witnessing a rise in life expectancy, with an increase in the elderly population [1].

Old age has always been associated with cognitive decline and dementia [1-4]. As the references in the field indicate, the question has already been widely studied in Western countries. The developing countries that we represent must anticipate the very great impact that these pathologies will have on our elderly populations in the years to come. The identification of potentially demented-populations is a necessity and this requires the use of a reliable screening tool.

The Mini Mental State Examination (MMSE) (Folstein., *et al*., 1975) [5] is a screening test to evaluate overall and brief cognitive functions (temporospacial orientation, memory, attention). , language skills and visio-spatial capabilities).

It is a test of 12 items with a maximum score of 30/30.

For a better understanding of this instrument, the work of Tombaugh and McIntyre (USA), (1995) [6] concluded the reliability of its tested parameters. Very early, studies found that age and socio-educational level had a strongly significant association with MMSE performance. Studies by Brayne and Calloway (USA) (1990) and Bravo and Hebert in USA (1997) have demonstrated a link between age, education level and MMSE performance. [7-9]. The MMSE presents several items requiring literacy skills, and it has been shown that this test is more strongly influenced by the level of education [10]. Thus, it becomes easier to understand how difficult it is for people in developing countries, most of whom are illiterate, especially in their older age group, to receive this test in order to detect a dementia syndrome [11].

In an effort to address this need for screening of the elderly population in developing countries, researchers have attempted to modify the MMSE so that it can be administered to illiterate populations. The first tests, like the Chinese version, which had brought a slight cultural change in addition to a transcription of the original instrument was not very conclusive. Studies have shown that it is accessible only to people who have received a minimum of literacy [12] . Another version, this time Korean, has proved a certain relationship with the level of literacy without much satisfaction [13] . In addition, substantial changes in the Nigerian version have shown a lesser association with the level of education than for the MMSE [11] . Finally, an Indian version [14] that tried to take into account both cultural and educational aspects, showed a weak association with the level of education. Although this version showed a correlation with the level of education, the most remarkable is that the individual difficulties per item were the same as those of the American populations.

Even though these results were encouraging, no study compared the performance of a modified version with that of the standard tool in a single sample before the Bangladesh version, which seems to us to be the adaptation model that offers the most of satisfaction [15].

The present study proposes to validate a Malian version of the MMSE, with a view to its use in the socio-cultural context of Mali.

Validate an adapted version of the MMSE (MAMSE) consistent with the sociocultural and educational context of Mali. More specifically it is about to determine the sensitivity, specificity and predictive values of the MAMSE.

Method

Population

These are adult subjects, aged 50 and over, male and female residents living in the study area and at the time of study. All individuals were classified into two literacy groups (subjects with at least seventh grade education) and illiterate (subjects who dropped out of school before completing the basic education certificate).

Sampling

The sampling technique was random and based on the areolar method. The subjects were recruited in the city or into their home (door to door) in the defined geographical area. Starting from the road along the river, we entered each adjacent lane to retain all seventh concessions located on the right side of the alley. Thus, during

the operation, we moved into concessions where there were zero eligible candidates and others who had more than one. However, the majority of the subjects who were absent for our first visit presented themselves at the time of the appointment for the second round of the first evaluated. This sampling technique allowed us to recruit 317 subjects in the said commune. The sample size was not calculated beforehand. The investigation concerned any subject of fifty years and more, well free from all affections potentially altering memory.

Study variables

The variables studied are: age, socio-educational level, demographic characteristics, medical history, and the score of the different items.

Interviews

The data were collected by a set of four interviewers with an average level of baccalaureate plus two years, who received training in the way of passing the tests and supervised by a student at the end of the cycle of medicine.

The interviewers went to meet the subjects and questioned them with both instruments. Before going into the actual interview, the interviewers were required to approach the topics as respectfully as possible, to explain to them the purpose and content of the tests.

Interrogation often took place in the presence of other people (it was the parents of the participant, who did not see any objection). The data was thus collected for each individual.

Material

At the time of administering the test, the examiner had a watch, a pair of shoes, 10 sticks, a sheet of paper, and a model of the figure to be reproduced.

The original English version of the MMSE has been replaced by the French GRECO version of the MMSE. For the MAMSE, some MMSE items have been modified (ref.1) to respond to the socio-cultural context of Mali. Table 1 makes a descriptive comparison between the two tests.

Proceedings

Both tests, the MMSE and the MAMSE were first tested on students from the Faculty of Pharmacy and Odontostomatology to evaluate the feasibility of the study, but also to familiarize interviewers with the administration of tests.

Item	MMSE Total score = 30	MAMSE Total score = 30
Orientation in time	Year, season, date, day, Month (5)	Season, month, time of day, day, date (5)
Orientation in space	Hospital, City, Department Floor, country (5)	Hospital/place, service/district, village/town, region/area, country (5)
The 3 objects	Hat, lemon, car (3)	Mango, car, fish (3)
Calculation	Subtract 7 from 100 to 5 times (5)	Subtract 3 from 20 up to 5 times (5)
Attention/days upside down	Spell the word world upside down (5)	Quote the 7 days of the week but upside down (5)
Reminder	three objects learned instead (3)	three objects learned instead (3)
Denomination	Pencil, watch (2)	Watch, shoe (2)
Repetition	“ no, no, no, and no “ (1)	“ the bird has laid its eggs on the sand» (1)
Language/comprehension	Read and do what is written : “ close your eyes »(1)	Watch me and do what I do : “ the examiner raises his right hand» (1)
Three-step stains	Each individual is asked To follow the orders : `take this leaf, fold it in half, throw it on the ground` (3)	Each individual is asked To follow the orders : `take this leaf, fold it in half, throw it on the ground` (3)
Sentence construction	Each individual is asked To write a sentence (1)	Each individual is asked to say a sentence about his house (1)
Copy of figure	Each individual is asked To copy the figure of two pentagons (1)	Each individual is asked to draw the figure using 10 sticks (1)

Table 1: Descriptive item comparison for both instruments (numbers in parentheses indicate the high score of the item).

Validation

For this operation, is considered as sick (insane pathology) any subject having a total score lower than threshold discriminate that is to say 24, with a " gold standard That is to say, the diagnostic criteria from which one considered a subject as truly sick is: a total score of less than 24 with alteration in the recall test associated with a score less than 10 in the Dubois test.

Statistical analysis

Statistical analysis was performed using the SAS version 9.1 software. A value ≤ 0.05 was considered statistically significant. A chi-square test was used to compare proportions and evaluate associations between variables. To explore the data, we used univariant analysis in determining the distribution frequencies of the variables. Covariants included are the age of the patient, his level of study, and the different items of the MMSE. The student-t test was used to compare the averages of the continuous variables.

Results

Validation

Evaluation with the standard test

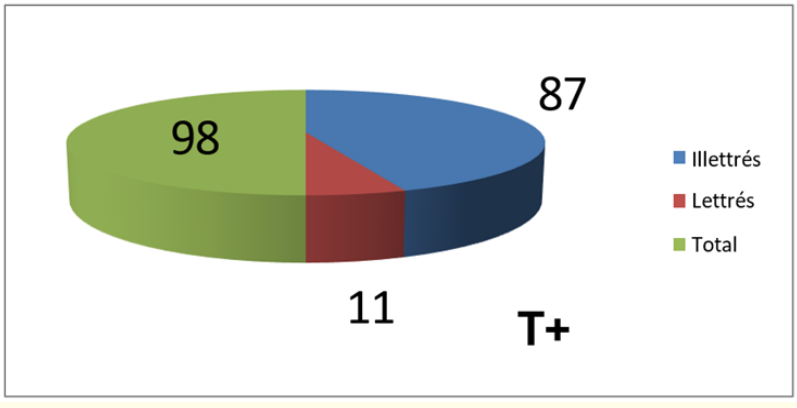

Figure 1: Number of subjects positive to the standard test.

Evaluation with the modified test

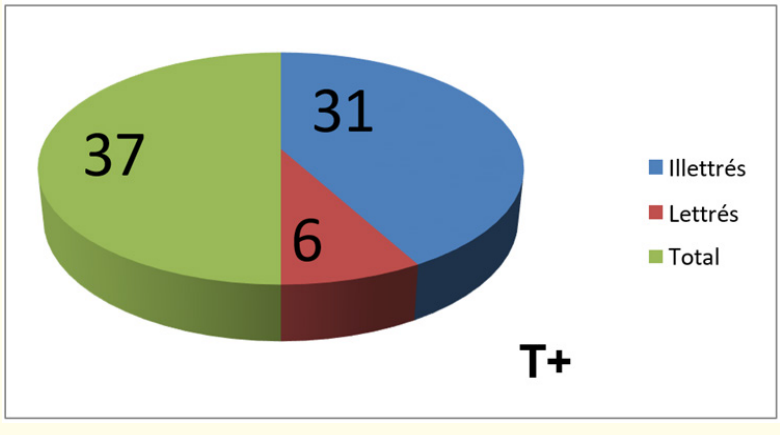

Figure 2: Number of subjects positive to the modified test.

The intrinsic characteristics of the standard test

MMS	M +	M-	Total
T +	17	81	37
T-	14	205	280
Total	31	286	317

Table 2: Intrinsic characteristics of the MMS.

Legend: T +: Positive Test; T-: Negative Test; M +: Real Sick; M- : Fake Patients

- Sensitivity : Se = 0.54
- Specificity : Sp = 0.71
- Positive predictive value : VPP = 0.17
- Negative predictive value : VPN = 0.93
- Youden index: y = 0.25
- Positive likelihood ratio : L = 1.86
- Negative likelihood ratio : λ = 0.64

Intrinsic characteristics of the modified test :

MAMS	M +	M-	Total
T +	29	8	37
T-	2	278	280
Total	31	286	317

Table 3: intrinsic characteristics of MAMS.

Legend: T +: Positive Test; T-: Negative Test M +: Real Sick; M- : Fake Patients

- Sensitivity : Se = 0.93
- Specificity : Sp = 0.97
- Positive Predictive Value : VPP = 0.78
- Negative predictive value : VPN = 0.99
- The youden index : Y = 0.90
- Positive likelihood ratio: L = 31
- Negative likelihood ratio: λ = 0.07

Comments and Discussions

The main objective of this study was to adapt and validate a Malian version of MMS (MAMS) that can be used by the illiterate Malian population. To do this we compared the two instruments first, in a sample of literates to test the parameters of the modified instrument. And secondarily we appreciated the performance of the modification by using it on illiterate elderly people. So the results obtained allowed us to make the following deductions :

The validity of MAMS

Our results comply with all the criteria of a good screening test

- Sensitivity : = 0.93
- Specificity : = 0.97
- Positive Predictive Value : = 0.78
- Negative predictive value : = 0.99
- Accuracy : = 0.90
- Positive likelihood ratio: = 31
- Negative likelihood ratio: = 0.07
- The reproducibility Kappa = 0.87: excellent agreement .

These characteristics are better than those of the Chinese version, which even by moving the discriminating threshold (20 for the illiterate and 22 for the literate), finds an SE at 83.87%, an SP at 84, 48% aVPP at 0.75 and a VPN at 0.94 [16].

This test is acceptable and preferable according to the criteria of Galen and Gambino [19].

This best performance may have several reasons among which we propose to discuss the most likely

- In terms of the item evaluating the orientation in time, the sub-item * year * was replaced by the sub-item * time of day * because for the majority of the Malian population who was not at the school, the years are identified in relation to the major events that took place during the latter rather than any reference to the calendar. The ranking order of the sub items (season, month, time of day, day and date) corresponded more to the profile of our population. These two reasons seem to me the most likely to explain the larger score of the MAMSE than the MMSE in this item.
- In terms of the item assessing the orientation in space, the modifications made to correct the difficulties of the population as to their way of finding oneself which does not correspond at all to a geographical division according to the Western model which is unknown to many of our older subjects which refers rather to a local model.

- At the level of calculation, placing the operation in a context of their daily life, aroused the interest of the subjects, who thus gave their attention to the question with a sufficient concentration, that the abstract operation proposed by the original test.
- The high score in the recall and naming tests is probably due to the use of the words commonly used in the everyday life of the population as the words used in the original test and therefore easier to remember. In any case, the choice of words coming directly from the local vocabulary also contributed to raising the score. The fact also to choose sub items of the same semantic nature (here names) favors the memorization and at the same time raises the score to the recall.
- At the level of the item of repetition, the choice of a sentence belonging to the local vocabulary greatly facilitated this repetition.
- In terms of the sentence construction and figure copy items, the changes made these tests of the schooling skills required by the original test, in addition to the embarrassment of the original version in making blunders in front of students. spectators.

Conclusion

The elderly population is now a very important part of the medical consultation. The proper management of their health problems is a necessity that requires a better understanding of the phenomena surrounding old age. In the case of dementia, the first is the use of a reliable tool leading to diagnosis. The qualities of a tool like the MMS, which has been proven all over the world, motivated our choice to adapt it to our socio-educational context.

The comparison of the MAMS parameters with those of the MMS allowed us to say that the two tools have the same properties. The intrinsic characteristics of the modified test (MAMS) are those of a good screening test. And in the end, the best performances are those of the evaluation with the MAMS.

Thus, in the light of the results and discussions of this study, it appears that MAMS can be considered as a reliable and valid instrument for a cognitive assessment of the populations in Mali. In conducting this study, it was proposed to provide the Malian practitioner with a cognitive assessment instrument adapted to the socio-cultural context of the Malian populations, and our results suggest that this objective is achieved.

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