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Comparison of 2 Dementia Screeners, the Test Your Memory Test and the Mini-Mental State Examination, in a Primary Care Setting

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Abstract

Dementia is an important cause of morbidity but is often neglected in primary care settings. This relates, in part, to perceived difficulties with diagnosis and the need to focus on more pressing physical complaints. Screening provides a potential first-step solution. Existing screening measures are regarded as either too time consuming or insufficiently sensitive and specific. The Test Your Memory (TYM) questionnaire was recently developed in response to this problem. Its utility as a cognitive screener has not been assessed in primary care settings. In this study, we measured and compared the performance of an adapted English as well as Afrikaans translation of the self-administered TYM to the Mini-Mental State Examination, the current accepted standard screening instrument for dementia, in 100 older primary care patients in South Africa. We found a strong positive correlation of total scores between the measures, with a higher internal consistency for the TYM. The TYM was also easily self-administered. Our results, in conjunction with previous validation findings and diagnostic accuracy for the TYM, suggest that it has clinical utility and potential as a cognitive screener in this context.

Keywords

cognitive impairment, Test Your Memory test (TYM), Mini-Mental State Examination (MMSE)

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Introduction

Dementia is a common cause of morbidity, particularly among elderly patients, affecting over 24 million worldwide.[1] Data for developing countries suggest a prevalence of 5.3% for those older than 65 years.[2] Dementia, as defined by multiple cognitive deficits in addition to memory impairment,[3] is poorly diagnosed during routine history and physical examination.[4] This problem is all the more pertinent in resource-limited primary care settings, where time constraints and more pressing physical conditions often prejudice against a thorough mental status evaluation.[5]

Good screening instruments can help to provide a cost-effective way of improving the detection of dementia, by screening for cognitive impairment and thereby allowing for early referral of patients for formal evaluation. However, many of the currently used questionnaires have significant problems.[6] The Mini-Mental State Examination (MMSE) was initially developed to screen for cognitive impairment in elderly patients to evaluate the degree of impairment, and to monitor this impairment through serial testing. In general, a cutoff of 23 or less is regarded as indicative of cognitive impairment in adults with at least 8 years of schooling.[7] However, it is considered by many doctors to be too long for routine use in general practice.[8] Other criticisms include its limited score range, with resultant ceiling and floor effects and the lack of stable interrater reliability (see Nieuwenhuis-Mark[9] for a review of the problems with the MMSE). The utility of the MMSE in detecting cognitive change in general medical populations has also been questioned.[10] Despite this, its use in clinical practice remains widespread. Other brief cognitive rating scales suffer from problems of poor sensitivity and specificity.[11]

In response to this need, the Test Your Memory (TYM) was developed.[6] Initial data suggest that the TYM is highly

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sensitive and specific for detecting cognitive impairment and dementia due to Alzheimer disease, the most common cause of dementia, detecting 93% of cases. In non-Alzheimer dementias, it also performed well, with the TYM scores significantly correlated with those on the Addenbrooke Cognitive Examination—Revised. Also notable is the fact that this questionnaire can be administered in a short space of time under supervision of a trained nurse who can also reliably score the questionnaire. These factors make the TYM particularly appealing as a tool in primary care settings. In this study, we aimed to test the hypothesis that the TYM is a reliable and high-performance screening tool for the detection of cognitive impairment suggestive of dementia in older adult patients in a South African primary care setting, by administering it to 100 patients. To these same patients, we also administered the MMSE, which allowed us to compare these questionnaires in terms of internal reliability, ease of use, and correlation of scores. Data on effects of schooling, language, age, and gender were also assessed for each questionnaire. As the first study to assess the TYM in South Africa, it also allowed us to assess its feasibility as a screener in the South African population. A secondary aim was to assess the performance of an Afrikaans version of the TYM using the same indicators.

Methodology

The TYM contains 10 questions, assessing the cognitive domains of orientation, ability to copy a sentence, semantic knowledge, calculation, verbal fluency, naming, visuospatial abilities, and recall of a copied sentence. The 11th item rates the patient's overall ability to complete the test.

The English version of the questionnaire was subjected to 2 modifications. Specifically, we adapted the sentence that had to be copied—"All good citizens wear stout shoes"—to contain more appropriate English for our context—"All good children wear clean shirts." Furthermore, the questions assessing semantic knowledge were changed to be less specific to the United Kingdom—instead of asking the date when the second world war began, it asked when South Africa held its first democratic elections. The words "prime minister" were substituted for "president," in accordance with recommendations made by the original authors.[7] The questionnaire was translated into Afrikaans by one of the coauthors. A blinded expert then back translated this translation into English and necessary modifications were implemented. An existing, validated translation of the MMSE was used for Afrikaans participants.

Participants

The study was approved by the institutional review board of the Faculty of Health Sciences, Stellenbosch University. Informed consent was sought from all patients older than 50 years attending an outpatient primary health care clinic at a hospital in Wynberg, Cape Town (South Africa). In all, 91% of people approached consented to participation. The total sample was 100. None of the participants had an established diagnosis of cognitive impairment. Participants were asked to provide basic demographic details, after both the TYM and the MMSE were administered. In all cases, the TYM was administered before the MMSE.

Data Analysis

The TYM was marked by 2 of the authors using the provided memorandum and marking instructions. Data were analyzed using SPSS version 18. All statistical tests were 2-tailed at the .05 significance level. Gender differences were assessed on the TYM and MMSE using Student *t* tests. Two-tailed Pearson correlation coefficients were used to assess the correlation between total scores and age. Patients were categorized into 4 age groups (50-59, 60-69, 70-79, and 80 years and older), and analysis of variance (ANOVA) for the MMSE and TYM was conducted with post hoc analysis (Bonferroni tests) to assess for significant group differences. Internal consistency of the TYM and MMSE was examined using Cronbach α. Two-tailed Pearson correlation coefficient was also used to assess the correlation between total scores on the MMSE and TYM for both English and Afrikaans translations.

Results

Of the 100 participants, 50 were male and 50 were female, with a mean age of 64.59 $\pm$ 9.45 years. Sixty-two were English speaking and 38 were Afrikaans speaking. The mean number of years of education was 11.01 $\pm$ 2.26. The mean score on the TYM was 41.32 $\pm$ 6.82 (range 17-50), while the mean score on the MMSE was 27.24 $\pm$ 2.33 (range 18-30). Gender differences in total scores were not evident for either the TYM or MMSE. There was a significant negative correlation between MMSE scores and increasing age (Pearson $r = -.315$, $P = .001$). However, this was not significant for the TYM (Pearson $r = -.0.72$, $P = .479$). The ANOVA of MMSE scores revealed a significant effect of age ($F = 4.409$, degrees of freedom = 3, $P = .006$), with post hoc analysis showing significant between-group differences for the 80 years and older and 50- to 59-year groups (mean difference = -2.854, standard error = 0.835, $P = .006$), with lower mean scores in the former group. Again, there were no significant group differences for age on the TYM. This is in contrast to the results from the original study, which found a significant difference for age when comparing the >80 age group to all other age groups except the 71 to 80 age group. Our inability to detect this difference can likely be attributed to the sample size. However, our results are in concordance with the original study in finding no statistically significant differences across age for the TYM across any of the other age categories.

The value of Cronbach α for the TYM was .713, which is considered acceptable. The Cronbach α for Afrikaans-speaking participants (.752, N = 38) was comparable with that for English-speaking participants (.687, N = 62). The Cronbach α for the MMSE was .440, which is considered low. Total scores for the Afrikaans TYM and MMSE were strongly

positively correlated (Pearson $r = .747$, $P < .001$); while for the English adaptation, there was a moderate positive correlation (Pearson $r = .455$, $P < .001$). Overall, the Pearson correlation coefficient was .548 ($P < .001$).

Using a cutoff of 23 or less for the MMSE, 10 participants screened positive for cognitive impairment. Using the suggested cutoff of 42 for the TYM[5] yielded 41 participants who screened positive; while a cutoff of 32 for the TYM resulted in 10 participants who screened positive.

Discussion

The TYM was easily administered with minimum supervision, with the vast majority of participants requiring no assistance at all. This is an important consideration in resource-limited primary care settings, where doctors are often not available or lack sufficient time to administer the MMSE. Further research into patient experiences of these 2 instruments in developing countries could therefore be of great value.

Our data suggest that the TYM has acceptable internal consistency in our context. The reasonably good internal consistency of the Afrikaans version suggests that it is an acceptable translation. The internal consistency was superior to that of the MMSE, indicating a greater precision in measuring the construct of cognition in our sample. Scores of the TYM and MMSE showed a strong positive correlation, suggesting good concurrent validity.

In their initial study, Brown et al[6] found that the TYM possessed a greater sensitivity for detecting cognitive impairment than the MMSE. However, while we do not have a similar gold standard, in our own study, we found that their recommended cutoff would have screened too many patients (41%) as positive. It is unclear whether this benefit would apply with a downward adjusted cutoff score.

Of note, the mean TYM scores for the sample was 5 to 6 points lower than in a group of healthy controls with the same mean age who were evaluated in the aforementioned study. Brown et al did not report on the educational status of their controls. It is possible that TYM scores are sensitive to the effects of education, culture, race, and socioeconomic status. In the absence of data elucidating the effects of these variables on TYM scores and the lack of norms (particularly education-based norms), it is difficult to gauge to what extent these variables may have affected TYM scores.[9] However, given the good internal consistency of the TYM, the strongly positive correlation with the MMSE (which is the current instrument of choice for screening cognitive impairment), and the practical advantages of a self-administered questionnaire, it is important that such research is conducted in order to help establish appropriate cutoffs for this promising tool.

A limitation of our study was the fact that our relatively small sample size may have diminished the power to reliably assess the accuracy of the TYM. Short cognitive screeners such as the TYM need to be systematically assessed in heterogeneous and culturally diverse patient populations and settings, as accurate detection of early stage dementia is crucial for early pharmacological and sociobehavioral interventions. Another limitation was the fact that neurocognitive testing was not used to confirm cognitive impairment in patients who screened positive.

We have shown that an adapted version of the TYM, as well as the Afrikaans translation, was easy to administer, had acceptable internal consistency, and total scores that correlated positively with those on the MMSE, suggesting that the TYM could be a valuable screening instrument for cognitive impairment in the South African population. The clinical application of these preliminary findings is that a well-validated self-administered screening measure is of particular appeal in primary care, where clinicians do not have sufficient time to administer a detailed diagnostic interview.

More research is needed to validate it against a gold standard and derive population-specific cutoffs, as well as assess its performance in detecting dementia due to HIV, which is highly prevalent in South Africa. Furthermore, it would be beneficial to examine the performance of the TYM in tracking cognitive decline over time. Finally, this questionnaire could be translated and validated in other language groups that are common in South Africa.

Authors' Note

Gerrit van Schalkwyk and Hugo Botha contributed equally as first authors.

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