



TRANSLATION, CULTURAL ADAPTATION AND VALIDATION OF GUJARATI VERSION OF MONTREAL COGNITIVE ASSESSMENT (MOCA) IN OLDER ADULTS

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ABSTRACT

Context: Mild cognitive impairment (MCI) is a term used to describe a level of decline in cognition which is seen as an intermediate stage between normal ageing and dementia in older adults. The Montreal Cognitive Assessment (MoCA) is a useful screening tool validated for MCI. It has been translated in various languages other than English, including various Indian languages such as Hindi, Malayalam, etc. **Aims:** For the cognitive screening of Gujarati speaking older adults, the Gujarati version of MoCA is required. The present study, therefore, aimed to develop Gujarati version of the MoCA and investigate its validity and reliability for screening MCI in Gujarati speaking older adults. **Settings and Design:** It is a cross sectional study design. The scale was translated in Gujarati as per suggested guidelines and its psychometric properties were evaluated. Qualitative and quantitative validation through expert review was done and content validity Index (CVI) was calculated. Study participants were 30 older adults. Two estimators of reliability i.e., internal consistency reliability and test retest reliability were evaluated. **Statistical analysis and results:** The content validity was established through qualitative reviews and with I-CVI of each item on scale more than or equal to 0.78 and S-CVI/Ave = 0.93. The scale has good internal consistency, Cronbach's alpha (α) = 0.74 and high test-retest reliability, intra class correlation coefficient (ICC) = 0.87. **Conclusions:** The Gujarati translated version of MoCA is a valid and reliable tool for detecting mild cognitive impairment in older adults.

KEYWORDS

Mild cognitive impairment, Gujarati version Montreal cognitive assessment (MoCA), Older Adults

INTRODUCTION

Mild cognitive impairment (MCI) refers to a transitional state between the cognition of normal aging and mild dementia. It represents an intermediate state of cognitive function between the changes seen in aging and those fulfilling the criteria for dementia and often Alzheimer's disease. It is also defined as an objective impairment of cognitive abilities that does not affect the subject's functional independence⁽¹⁾. However, MCI does not necessarily convert to dementia.

MCI is classified into two sub types: amnesic and non amnesic.⁽³⁾ Amnesic mild cognitive impairment is clinically significant memory impairment that does not meet the criteria for dementia. Typically, patients and their families are aware of the increasing forgetfulness. However, other cognitive capacities, such as executive function, use of language, and visuo-spatial skills, are relatively preserved, and functional activities are intact, except perhaps for some mild inefficiency. Nonamnesic mild cognitive impairment is characterized by a subtle decline in functions not related to memory, affecting attention, use of language, or visuospatial skills.⁽⁴⁾ The overall prevalence of MCI in older adults is 2-20%.^(5,6) In one of the Indian study, the prevalence of MCI was found to be 14.89%⁽⁷⁾ Various screening tests are used to assess cognitive function are Mental State Examination (MMSE), the clock drawing test (CDT), Memory Impairment Screen (MIS)/MIS by Telephone (MIS-T), Mental Status Questionnaire (MSQ), Mini-Cog verbal fluency, 8-Item Informant Interview (AD8), Functional Activities Questionnaire (FAQ), 7-MinuteScreen (7MS), Abbreviated Mental Test (AMT), Montreal Cognitive Assessment (MoCA) etc.⁽⁸⁾

The Montreal Cognitive Assessment (MoCA) is a validated and considered as most sensitive screening tool for the screening of MCI.⁽⁹⁾ ^(10,11) The MoCA is a one page test with a maximum score of 30. One point is added if the person has 12 years of education or less. The scale consists following components: The short-term memory recall task (5 points) involves two learning trials of five nouns and delayed recall after approximately 5 minutes. Visuospatial abilities are assessed using a clock-drawing task (3points) and a three-dimensional cube copy (1 point). Multiple aspects of executive functions are assessed using an alternation task adapted from the Trail Making B task (1 point), a phonemic fluency task (1 point), and a two-item verbal abstraction task (2 points). Attention, concentration, and working memory are evaluated using a sustained attention task (target detection using tapping; 1 point), a serial subtraction task (3 points), and digits forward and backward (1 point each). Language is assessed using a three-item confrontation naming task with low-familiarity animals (lion, camel, rhinoceros; 3 points), repetition of two syntactically

complex sentences (2 points), and the aforementioned fluency task. Finally, orientation to time and place is evaluated (6 points). The score of <26 is considered for MCI.^(9, 12) The cut-off of 23 has optimally balanced sensitivity and specificity and provided the highest classification accuracy for diagnosing MCI.⁽¹³⁾ It has been translated in various languages other than English, including various Indian languages such as Hindi, Malayalam, etc.^(14,15,16)

For the cognitive screening of Gujarati speaking older adults, the Gujarati version of MoCA is required. The present study, therefore, aimed to develop Gujarati version of the MoCA and investigate its validity and reliability for screening MCI in Gujarati speaking older adults.

Subjects and Methods:

The permission was taken from the developers of Montreal Cognitive assessment to translate MoCA 7.1 version in English language into Gujarati language. Ethical approval was taken from Government Spine Institute, Ahmedabad, Ethics committee. Written consent was taken from the participants. The scale was translated according to translation and cross cultural adaptation guidelines given by Beaton and Guillemin⁽¹⁷⁾ was also tested for validity and reliability.

The translation process involved five steps⁽¹⁷⁾: (1) initial translation, (2) synthesis of the translation, (3) back translation, (4) expert committee, and (5) test of the pre final version.

Steps in Translation and Cross-Cultural Adaptation

Initial translation (T1 and T2)

(Two Bilingual translators whose first language was Gujarati were selected for producing the two independent translations. The first professional translator had a background of physiotherapy and the second professional translator had a background in Gujarati literature and education)

Synthesis of the translation (T-12)

(After the completion of forward translation by two independent translators, there was synthesis of a first copy of translation (T-12), with the consensus by both the translators and author)

Back translation (BT)

(The backward translations (BT1 and BT2) of first copy of translation (T-12) was produced by two bilingual translators whose first language was English)

Expert committee

(The expert committee comprised of physiotherapists and the forward

and backward translators. All the versions of the questionnaires were consolidated)

Test of the pre final version

The psychometric properties of Gujarati version of MoCA was estimated with the following:

For Validity: face validity and content validity was evaluated.

For Reliability: Internal consistency and test-retest reliability was evaluated.

1. Face validity:

Face validity was established by qualitative reviews by 10 older adults during testing of pre final version of Gujarati translated scale.

2. Content validity:

Content validity was undertaken to ascertain whether the content of the questionnaire was appropriate and relevant to the study purpose. Qualitative and Quantitative analysis of content validity was done by panel of 9 content experts that included neuro physiotherapists and neurologists. For qualitative analysis, expert's reviews were obtained for each item of the scale. After that, for Quantitative analysis, reviewers were requested to rate relevance of each item using a 4-point Likert scale (1=not relevant, 2=somewhat relevant, 3=relevant, 4=very relevant). The Content Validity Index (CVI) was used to estimate relevancy of the each item on scale (I-CVI). Scale level Content Validity Index, S-CVI/Ave was also computed as it gives the proportion of items on an instrument that achieved a rating of 3 or 4 by the content experts. I-CVI equal or higher than 0.78 was considered. (18,19,20)

Sample size calculation

A sample size of 30 older adults was determined based on the following parameters: hypothesized ICC = 0.50, with power = 80%, alpha = 0.05 and with 20% of attrition. (21)

Reliability

Once the validity procedure were completed, the final Gujarati version of MoCA was examined for its reliability. Cronbach's alpha was computed to examine the internal consistency. For test retest reliability, 30 older adults, 15 with normal cognition and 15 with mild cognitive impairment (E-MoCA<23), able to read and write and without any known neurocognitive disorder were recruited from community using convenient sampling. Socio-demographic data, history on cognitive symptoms were collected. The Gujarati version of MoCA was administered once at that time. The second observation was taken after 4 weeks for test retest reliability.

RESULTS:

Study participants were 30 older adults, comprising of normal cognition (n=15, 6 males and 9 females) and MCI (n=15, 8 males and 7 females). Table 1 shows demographic details and mean score of Gujarati version of MoCA of the participants. Content experts involved in validation had an experience of 7.3 ± 2.9 years.

Validity:

Face validity: All the respondents understood the items and appearance and layout was acceptable to all older adults.

Content validity:

In the qualitative review of content validity analysis, few changes were suggested and based on that modifications were done (Table 2). After qualitative review, the scale underwent quantitative analysis by the experts and Item level CVI (I-CVI) and Scale level CVI(S-CVI/Ave) was computed. I-CVI: 6 items (item no- 1,2,3,7,8,9) had I-CVI=1.00, and one item (no-4) had score of 0.88, two items (no- 5,6,) had a score 0.78. Scale level CVI (S-CVI/Ave) was 0.93.

Reliability:

The Cronbach's alpha for Gujarati version of MoCA was 0.74 which shows good internal consistency. There was also excellent test- retest reliability, ICC= 0.87 for the total score of Gujarati version of MoCA, as well as for the individual items (Table 3).

Table 1: Social demographic profile of Participants

Variables	Normal cognition mean $\pm$ SD	MCI mean $\pm$ SD
Age (years)	67.5 $\pm$ 5.9	69.1 $\pm$ 4.5

Years of Education	10.3 $\pm$ 4.4	7.02 $\pm$ 2.3
MoCA Score	25.5 $\pm$ 1.9	20.9 $\pm$ 1.2

Table 2: Changes in Gujarati version of MoCA

Item	MoCA original English Version	MoCA Gujarati Version
Memory	Daisy	Rose
Language	Sentence repetition: "I know that John is the one to help today".	Revisions were made in sentence repetition without changing its meaning, and use of "Ram" instead of "John" was done.
	Fluency: Name maximum number of words beginning with letter with letter "F"	Letter 'F' was replaced with the letter 'K' of Gujarati Language.

Table 3: Test-retest reliability of Gujarati Version of MoCA

Items	Pearson's r value	p value
Visuospatial	0.89	<0.01
Clock Drawing	0.71	<0.01
Naming	0.84	<0.01
Attention	0.81	<0.01
Sentence Repetition	0.70	<0.01
Verbal Fluency	0.61	<0.01
Abstraction	0.84	<0.01
Delayed Recall	0.79	<0.01
Orientation	0.60	<0.01

DISCUSSION:

The objective of this study was to develop the Gujarati version of the MoCA and investigate its reliability and validity as a brief screening tool for MCI among Gujarati speaking older adults. The Gujarati version demonstrated high content validity, good test-retest reliability (ICC=0.87) and good internal consistency (Cronbach's α = 0.74). The results of this study are much in line with previous studies. (14,15,16)

The mean score of G-MoCA is 25.5 ± 1.9 in cognitively normal older adults and 20.9 ± 1.2 of older adults with MCI. The mean score of Hindi version of MoCA is 20.46 ± 2.30 and Tamil version is 26.4 and 21.2 for cognitively normal and older adults with MCI respectively.

In Content validity, after modifications as per qualitative reviews, item level content validity index (I-CVI) was calculated. It is calculated by the number of experts giving a rating 3 or 4 to the relevancy of each item, divided by the total number of experts. Items with I-CVI equal or higher than 0.78 and Scale level CVI, S-CVI/Ave $\geq$ 0.90 is considered having excellent content validity. (19, 20) All the items of Gujarati version of the MoCA had I-CVI value of equal or more than 0.78 and S-CVI/Ave = 0.93, which suggests that the scale has good content validity.

Cronbach's alpha values between 0.7 and 0.9 show good internal consistency (22). The Gujarati version of MoCA has Cronbach's α = 0.74 which establishes its good internal consistency. Test retest reliability, was found to be good for the scale (ICC= 0.87). Gupta M (2019) found Cronbach's α = 0.64 and ICC = 0.87 for Hindi version of MoCA.

Thus, the Gujarati version of MoCA was found to be content valid and reliable.

CONCLUSION

This study found Gujarati version of MoCA to be valid and reliable tool for screening of MCI in older adults. It will allow health care professionals to evaluate and plan treatment for older adults effectively. Further research with the use of this scale in other neurocognitive disorders can be conducted.

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