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Validity and reliability of hindi translated version of Montreal cognitive assessment in older adults

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ABSTRACT

To evaluate the validity and reliability of Hindi version of Montreal cognitive assessment (H-MoCA) as a screening tool to detect mild cognitive impairment among older adults of India. The study was conducted in three phases, namely content validation of H-MoCA reliability estimation, internal consistency and test- retest reliability. Qualitative and quantitative validation through expert review resulted in modification of H-MoCA which was tested on purposive sample of 30 subjects, and analysis was done for internal consistency reliability, then the scale was re-administered to the same group to establish test-retest reliability. Internal consistency was reported in terms of Cronbach's alpha (α) and test-retest reliability in terms of intra class correlation coefficient (ICC). Qualitative review and Content validation ratio (Lawshe) validate the content of H-MoCA with CVR of 0.99. The scale has good internal consistency, Cronbach's alpha (α) = 0.64 and high test-retest reliability, intra class correlation coefficient (ICC) = 0.87. Thus the Hindi translated version of MoCA is a valid and reliable tool for detecting mild cognitive impairment.

1. Introduction

Aging is commonly defined as the accumulation of diverse deleterious changes occurring in cells and tissues with advancing age that are responsible for the increased risk of disease and death (Tosato et al., 2007). In the last decades, aging has received a connotation and become synonymous of deterioration, approaching pathology, and death. Frequent changes takes place with aging, which are: physical, psychological, mental and social. As changes begin to happen in one area of a person's life, most likely the other three will be affected as well. (Andresen, 1989) There is decrease in Physical Strength, Endurance, and Flexibility, Slower Reflexes, taking Longer to Return to Equilibrium, problems in Communication and interaction with others, Perception of and response to the environment, difficulty in accomplishing tasks, intelligence, memory and learning. The advancing knowledge of hygiene and biomedicine has led to discover the aging process, which has lead to increase in life expectancy of elderly (Tosato et al., 2007). With clinical ageing one of the most relevant issues is cognitive impairment.

All aging humans develop some degree of decline in cognitive capacity as time progresses. According to the report by Life extension foundation 1995 the deterioration of the biological framework that underlies the ability to think and reason begins as early as the mid twenties and includes a drop in regional brain volume, loss of myelin integrity, cortical thinning, impaired serotonin, acetylcholine, and dopamine receptor binding and signaling, accumulation of neurofibrillary tangles, and altered concentrations of various brain metabolites. Cumulatively these changes give rise to a variety of symptoms associated with aging, such as forgetfulness, decreased ability to maintain focus, and decreased problem solving capability. The association between the increasing aging population and the wide ranging of neurological conditions has led to a high prevalence of cognitive impairment in the elderly, especially in the oldest. Cognitive impairment is when a person has trouble remembering, learning new things, concentrating, or making decisions that affect their everyday life. Cognitive impairment is not caused by any one disease or condition, nor is it limited to a specific age group. While age is the primary risk factor for cognitive impairment, other risk factors include family history, education level, brain injury, exposure to pesticides or toxins, physical inactivity, and chronic conditions such as Parkinson's disease, heart disease and stroke, and diabetes.

Cognitive impairment ranges from mild to severe. Although in the context of dementia, Mild Cognitive Impairment (MCI) may represent its incipient stage. MCI also refers to newly acquired cognitive deficits which are more severe than expected (based on age and educational background) and which do not as yet cause social or occupational

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impairment (Andrade and Radhakrishnan, 2009). MCI is considered as an intermediate clinical state between normal cognitive aging and mild dementia. Montreal cognitive assessment (MoCA) is the screening test specifically developed for screening of milder forms of cognitive impairment. MoCA has been translated into Hindi however, there is a need to establish psychometric properties of Hindi translated version of MoCA (H-MOCA), as this will further enhance the usage and strength of the scale.

2. Materials and methods

The study was approved by the Research Review committee and Institutional Ethics Committee of Indian Spinal Injuries Centre. The study strictly followed the standard ethical principles adopted by World Medical Association which includes, the medical research involving human subjects, Helsinki declaration, 2013, and the ethical guidelines adopted by the Council for International Organizations of Medical Sciences (CIOMS), the International ethical guidelines for health-related research involving humans (Revised, 2016). As the study was conducted in India, the study also adopted the ethical guidelines followed the National ethical guidelines for biomedical and health research involving human participants by Indian Council of Medical Research (ICMR), 2017. The study adopted the methodological research design and study was conducted in three phases namely, Phase 1: Estimation of content validity; Phase 2: Data collection and Phase 3: Reliability estimation.

2.1. Phase 1: content validation

Content validity refers to the degree to which the items of the data collection instrument "is the representative sample of the universe of content and/or behavior of the domain being expressed". The content validation of Hindi version of Montreal cognitive assessment (H-MoCA) was established using three phases as described by Mckenzie and colleagues (McKenzie et al., 1999).

2.1.1. Selecting a review panel to review the scale

10 experts were there in expert panel to establish content validity and qualitative review of the scale was done by them. Experts were requested to give their valuable feedback through a feedback form as given by Mckenzie. For computing content validity quantitatively, content Validity Ratio (CVR) was calculated by process described by Lawshe.(Lawshe, 1975) Then modifications according to the suggestions of experts were done and second review was taken from the experts. Thus the modified version was used for next phases. Hindi version of Montreal cognitive assessment (H-MoCA) is displayed in Fig. 1.

2.2. Phase 2: Data collection and reliability evaluation

After establishment of content validity, the next phase for the study was field trial of the scale. A sample of 30 older adults were included both males and females, with age 55 and above, medically stable, must understand and speak English and Hindi both, with presence of MCI screened through English version of MoCA (E-MoCA < 26)[10]. Subjects were recruited from community. Subjects fulfilling the selection criteria were purposively sampled. The participants were explained about the objectives of the study and their consent were obtained (duly signed).They were asked for their demographic details including age, sex, employment status, address, and contact number.

2.3. Phase 3: reliability estimation

After the time gap of one month of the administration of English version MoCA, the revised H-

MoCA as suggested by expert panel was administered to the screened subjects for estimating internal consistency reliability, again after period of one month scale was re-administered in order to collect data for test retest reliability. Data was then statistically analyzed.

2.4. Data analysis

Content Validity Ratio (CVR) was calculated by process described by Lawshe (Lawshe, 1975) using the formulae, CVR = (Ne-N/2) / (N/2). Calculated CVR, (Lawshe, 1975) were then compared to the levels required for statistical significance. A minimum CVR value of 0.62 was necessary at $p < 0.05$ based on 10 panelists. Internal consistency of H-MOCA was reported in Cronbach's alpha (α) and test-retest reliability by Intra class correlation coefficient (ICC). The data was analysed using statistical software, statistical package for social science (SPSS), IBM SPSS version 20.0 (Armonk, NY: IBM Corp.). The p-value ≤ 0.05 was considered to be statistically significant.

3. Results

For the content validation of H-MOCA, the scale was given to experts for both qualitative and quantitative reviews, on the basis of which content validity ratio was calculated for each item, from which qualitative review of experts were taken which suggested certain changes in the scale. Hence the scale was modified and after that second review was taken for each item. As at significance level of $p < 0.05$, the items having content ratio more than 0.62 were retained[9]. In total, all items was found to be content wise valid and thus have the scale had excellent content validity (Table 1).

3.1. Content validation

In phase 1 content validity was established for H- MoCA, during qualitative review some changes were recommended by experts as:

1) Simplification of title of item 1.

2) Simplification of Title and instruction of Item 5 (memory) to be simplified, since the Hindi word for church is not very commonly used in Hindi language thus this word was replaced by Mandir = temple.

3) Simplification of title of item 7 (Abstraction).

Modifications and simplification in language was also suggested by few of the expert members to make it more comprehensible for older adults. Thus these changes were made and scale was further reviewed for CVR. In order to make the scale easy to administer English version of each item title which was previously mentioned in Hindi was added. This was done for all the items, as the evaluators mostly were more comfortable with English. In Administration and instruction sheet simplification of word memory in Hindi i.e 5th point in instruction and 9th instruction i.e Abstraction was done.

The modified version reveals that the CVR ratio of all 11 items was 0.99 (significant) and thus more than 0.62

A total of 30 subjects were purposively sampled for reliability analysis of the study with mean age of 64.40 ± 7.89 years. Mean with standard deviation (SD) of H-MOCA is 20.46 ± 2.30 while of E-MOCA is 20.03 ± 1.67.

3.2. Internal consistency reliability

Internal consistency was evaluated by calculating Chronbach's alpha. Chronbach's alpha for H-MoCA was found out to be, Cronbach's alpha (α) = 0.642, which indicates acceptable internal consistency of H-MoCA (Hafiz and Shaari, 2013; Jago et al., 2009; Ostermann et al., 2004).

3.3. Test-retest reliability of H-MoCA

In order to evaluate test-retest reliability H-MoCA was re- administered after one month. The test –retest reliability was calculated using Carl Pearson Correlation coefficient for the items of the scale, as

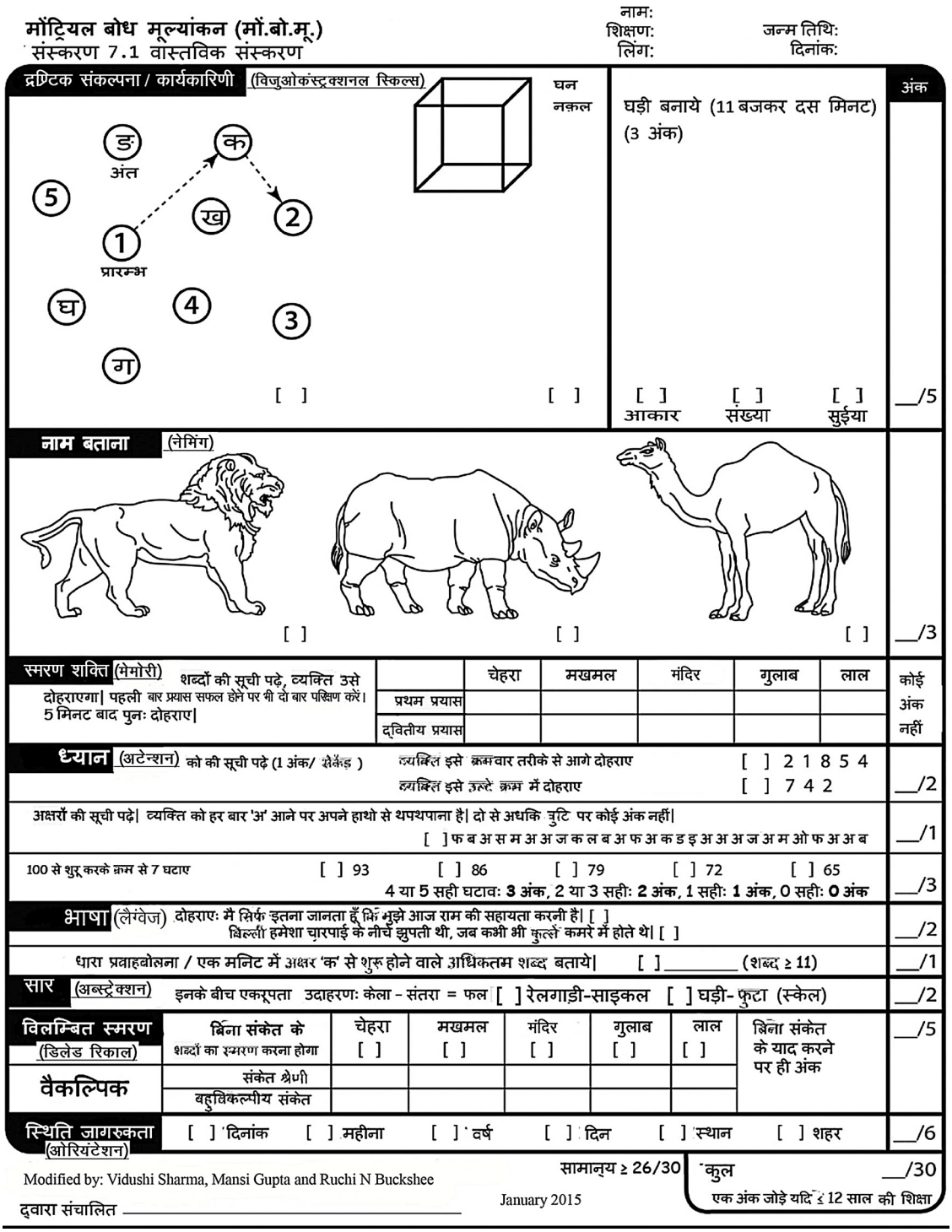

Fig. 1. Hindi version of Montreal cognitive assessment (H-MoCA).

well as for the overall scale. The test-retest value of H-MOCA is ICC = 0.87, which indicates good test-retest reliability.

4. Discussion

The objective of the study was to examine the psychometric characteristics of the Hindi translated version of MoCA (H-MOCA) among older adults. The H-MoCA demonstrated high content validity (CVI = 0.99), good test-retest reliability (ICC = 0.87) and acceptable internal consistency (Cronbach's $\alpha = 0.642$). The good test- retest reliability implies that there is not a significant change in the construct that we are measuring first and second times, it reflects the extent to which similar scores are obtained when the scale is administered on different occasions separated by a relatively brief interval.

The mean H-MoCA is 20.46 ± 2.30 and is lesser than the Sinhala version of the Montreal Cognitive Assessment (S-MoCA) with mean S-MoCA scores between normal controls is 26.71 ± 2.4 and Alzheimer's disease group 16.8 ± 5.9 which were significantly different ($t = 10.8$, $p < 0.001$) (Karunaratne et al., 2011). The internal consistency of S-MoCA is, Cronbach's alpha of 0.82 and is greater than H-MoCA. But H-MoCA is of acceptable value (Karunaratne et al., 2011). Even the internal consistency of Pilot testing of the Filipino version of the MoCA

Table 1
Content validity ratio of 11 items of H-MoCA.

S.No	Domain	Item number	CVR
1	Visuospatial	**Item1**	**0.99***
2		**Item2**	**0.99***
3	Draw clock	**Item3**	**0.99***
4	Naming	**Item4**	**0.99***
5	Memory	**Item5**	**0.99***
6	Attention	**Item6a**	**0.99***
7		**Item6b**	**0.99***
8		**Item6c**	**0.99***
9	Language	**Item7**	**0.99***
10	Fluency	**Item8**	**0.99***
11	Abstraction	**Item9**	**0.99***
12	Delayed recall	**Item10**	**0.99***
13	Orientation	**Item11**	**0.99***

* At 95% confidence interval, items having minimum CVR of 0.62 were significant.

(MoCA-P) expressed in terms of Cronbach's α as 0.94 (Dominguez et al., 2013). Even the internal consistency value of MoCA-P is higher than H-MoCA.

On additional findings it as found that employed participants performed better than unemployed and the difference was found to be statistically significant at 0.05 level in independent *t*-test Similar findings are supported by the literature that regardless of IQ, people who worked at complex jobs had a slightly higher chance of being better thinkers as they age and job might help them protect cognitive ability later in life.

The limitation of the study are that the consideration of socio-economic status, culture, diet are not considered in the study despite of different backgrounds of subjects and it can cater only those older adults clients who can understand English.

Future researches are required to establish other psychometrics such as construct, criterion related validity, intra–rater reliability, and application on larger sample of Indian older adults to extract convincing conclusion about the occupation related and gender specific results are recommended.

The scale modified will help the healthcare professionals to assess the cognitive impairment among older adults which was otherwise difficult to assess and quantify. The measuring data by H-MoCA can help rehabilitation team to get an insight regarding the efficacy of intervention, course and progress related to Mild cognitive impairment in older adults. H-MoCA is easy and freely available, since no training is required it can be readily used. By evaluation with H-MoCA, we will get to know the exact component of cognition which is affected which can be further intervened. Better evaluation of cognition does not only magnify the assessment of the healthcare professionals but also helps clients to get evaluated for a holistic rehabilitation. The testing is not only useful for patients with Mild cognitive impairment but even it could be used in the later stages. If the neurocognitive disorder is more advanced, then it would be an essential tool to know the deficits in order to plan the future interventions.

5. Conclusion

The study concluded that H-MoCA is well adapted and valid and reliable tool to assess Mild cognitive impairment in older adults. H-MoCA could help the healthcare professionals and other clinicians in documenting and deciding an intervention plan for clients with Mild cognitive impairment.

Declaration of Competing Interest

None of the authors have competing interest declared

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References

Andrade, C., Radhakrishnan, R., 2009. The prevention and treatment of cognitive decline and dementia: an overview of recent research on experimental treatments. Indian J. Psychiatry 51, 12–25. https://doi.org/10.4103/0019-5545.44900.

Andresen, G.P., 1989. A fresh look at assessing the elderly (continuing education credit). RN 52, 28–40.

Dominguez, J.C., Orquiza, M.G.S., Soriano, J.R., Magpantay, C.D., Esteban, R.C., Corrales, M.L., Ampil, E.R., 2013. Adaptation of the montreal cognitive assessment for elderly filipino patients. East Asian Arch. Psychiatry 23, 80–85.

Hafiz, B., Shaari, J.A.N., 2013. Confirmatory factor analysis (CFA) of first order factor measurement model-ICT empowerment in Nigeria. Int. J. Bus. Manage. Adm. 2, 81–88.

Jago, R., Fox, K.R., Page, A.S., Brockman, R., Thompson, J.L., 2009. Development of scales to assess children's perceptions of friend and parental influences on physical activity. Int. J. Behav. Nutr. Phys. Act. 6, 67. https://doi.org/10.1186/1479-5868-6-67.

Karunaratne, S., Hanwella, R., de Silva, V., 2011. Validation of the Sinhala version of the Montreal Cognitive Assessment in screening for dementia. Ceylon Med. J. 56, 147–153. https://doi.org/10.4038/cmj.v56i4.3892.

Lawshe, C.H., 1975. A quantitative approach to content validity. Pers. Psychol. 28, 563–575. https://doi.org/10.1111/j.1744-6570.1975.tb01393.x.

McKenzie, J.F., Wood, M.L., Kotecki, J.E., Clark, J.K., Brey, R.A., 1999. Establishing content validity: using qualitative and quantitative steps. Am. J. Health Behav. 23, 311–318. https://doi.org/10.5993/AJHB.23.4.9.

Ostermann, T., Bussing, A., Matthiessen, P.F., 2004. [Pilot study for the development of a questionnaire for the measuring of the patients' attitude towards spirituality and religiosity and their coping with disease(SpREUK)]. Forsch. Komplementarmed. Klass. 11, 346–353. https://doi.org/10.1159/000082816.

Tosato, M., Zamboni, V., Ferrini, A., Cesari, M., 2007. The aging process and potential interventions to extend life expectancy. Clin. Interv. Aging 2, 401–412.