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Evaluation of the Oxford cognitive screen Indonesian version (OCS-Ina) for assessing cognitive function disorders: validation and reliability study

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ABSTRACT

Background and objectives. The Oxford Cognitive Screen (OCS) is a valuable tool for assessing cognitive function, particularly in the context of aphasia and neglect. This study aims to assess the validity and reliability of the Indonesian version of OCS (OCS-INA), which has been adapted and translated following WHO guidelines.

Materials and methods. The adaptation and translation process of OCS, in accordance with WHO guidelines, preceded the validity and reliability testing of OCS-INA. The study included participants aged 18 years and above with normal cognitive function, as assessed by the Moca-INA. Data collection took place in social institutions and healthcare facilities that met the specified inclusion criteria.

Results. Among the 104 participants meeting the inclusion criteria, a majority were male (51.92%), with ages ranging from 20 to 87 years, and the highest age group being above 60 years (60%). Most participants had a high school education level (35.58%) and were not employed (62.5%). Validity testing, using the Spearman correlation coefficient formula, revealed that the majority of domains had calculated correlation coefficients (r values) exceeding the table values (0.1927). In terms of reliability, the kappa p statistic indicated very good agreement for six examination tasks: semantic (0.874), orientation (0.842), verbal memory (0.822), episodic memory (0.870), and visual field test (1.000). Good agreement scores were obtained for the picture naming test (0.774), sentence reading (0.726), and calculation (0.774).

Conclusions. In conclusion, OCS-INA demonstrates both validity and reliability as a screening tool for cognitive impairment. It serves as a valuable complement to existing instruments used for similar purposes.

Keywords: cognitive, Moca-INA, OCS, OCS-INA, reliability test, screening, validity test

Abbreviations (in alphabetic order):

MCI	– Mild Cognitive Impairment
MMSE	– Mini-Mental State Examination
MoCA	– Montreal Cognitive Assessment
OCS	– Oxford Cognitive Screen
Ocs-Ina	– Oxford Cognitive Screen Indonesian Version

INTRODUCTION

A systematic approach to identifying cognitive impairment is not just assessing the presence or absence of cognitive impairment, but also identifying the specific cognitive domains involved. Screening instruments often used for the assessment of cognitive function are the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA). The MoCA has better sensitivity compared to the MMSE, but both instruments have shortcomings in assessing cognitive domain-specific disorders such as neglect and apraxia [1–3]. Apraxia was found in many neurological diseases such as Alzheimer's dis-

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ease found in 52% of the patients, Mild Cognitive Impairment (MCI) was found to be smaller than Alzheimer's disease at 10%, and in stroke cases, it was 51% of the cases. Apraxia was also found in Parkinson's disease and other neurodegenerative diseases [4–7].

The Oxford Cognitive Screen (OCS) is an instrument that can complement the MMSE and MoCA as it can detect praxis and visuospatial domain disorders. The OCS was developed at Oxford University in the UK (United Kingdom) and has been validated by several countries. The OCS is easy to administer, only takes about 15 minutes, and can be administered at the subject's bedside. A study showed 35.3% of subjects who had cognitive impairment using MMSE, but using OCS obtained a greater value of 91.6%. OCS also when compared to MoCA, has a higher sensitivity of 88% compared to MoCA 78% [1–3].

The OCS screening instrument has not been validated and reliability tested in Indonesia, so this study will investigate the validity and reliability test as a reliable instrument for screening cognitive function disorders complementing previous instruments.

MATERIALS AND METHODS

This is a cross-sectional study to measure with a minimum sample size of 30-40 subjects for a cross-cultural health measurement instrument [8]. In This study we recruited 104 subjects from April - June 2022 from the Jakarta Social Service Center with inclusion criteria of normal cognitive function, age > 18 years old, using the Indonesian language as their main language, can read and write in Indonesian language and understand the examiner instruction and exclusion criteria of Subjects with severe visual impairment, namely on a visual examination using a Jaeger card [9] the subject cannot read the first line, subjects with severe hearing impairment, namely in the hearing examination with a 512 Hertz tuning fork, the subject cannot listen when the tuning fork is vibrated, subjects with History of psychiatric disorders or detection of psychiatric disorders by neurobehavior experts, and the subject is not cooperative. All patients gave informed consent after having the research procedure explained to them.

OCS translation process

The researchers already got permission from Nele Demeyere and Oxford University Innovation as the developer of the OCS instrument for this research. OCS was forward translated by two sworn translators who did not know each other from two different official translation agencies to the Indonesian version and then discussed with two neurobehavioral consultants, and culturally appropriate sentences were selected by comparing the translations with the original versions. after that, the instrument was backward translated to English again by the two sworn translators, and then discussed with a neurobehavioral consultant to assess whether there was a change in the original meaning in English. After reassessment, the OCS-INA will be piloted with 10 doctors by explaining how to examine the instrument. Subjects were asked to rate each OCS point as understood, less understood, and did not understand. Subjects were asked to understand each statement and provide suggestions if there were sentences that were not understood. In this process, 8 out of 10 subjects understood all of the OCS points, and 2 subjects did not understand the heart crossing out and movement imitation tests. the final version of OCS-INA (Oxford Cognitive Screen Indonesian Version) can be seen in Figure 1.

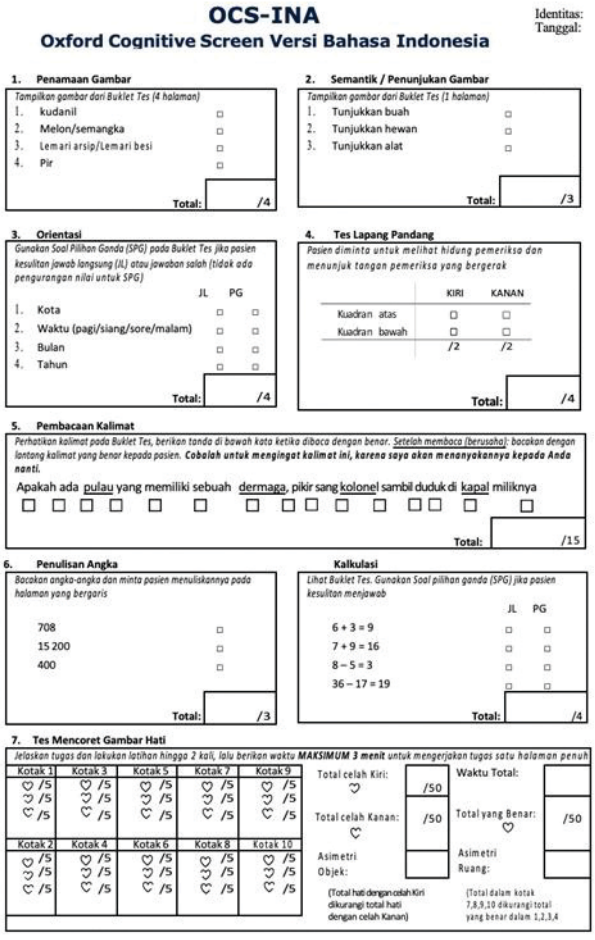
OCS-INA
Oxford Cognitive Screen Versi Bahasa Indonesia
Identitas:
Tanggal:
1. Penamaan Gambar
Tampilkan gambar dari Buklet Tes (4 halaman)
1. kudanil
2. Melon/semangka
3. Lemari arsip/Lemari besi
4. Pir
Total: /4
2. Semantik / Penunjukan Gambar
Tampilkan gambar dari Buklet Tes (1 halaman)
1. Tunjukkan buah
2. Tunjukkan hewan
3. Tunjukkan alat
Total: /3
3. Orientasi
Gunakan Soal Pilihan Ganda (SPG) pada Buklet Tes jika pasien kesulitan jawab langsung (JL) atau jawaban salah (tidak ada pengurangan nilai untuk SPG)
JL PG
1. Kota
2. Waktu (pagi/siang/sore/malam)
3. Bulan
4. Tahun
Total: /4
4. Tes Lapang Pandang
Pasien diminta untuk melihat hidung pemeriksa dan menunjuk tangan pemeriksa yang bergerak
KIRI KANAN
Kuadran atas
Kuadran bawah
/2 /2
Total: /4
5. Pembacaan Kalimat
Perhatikan kalimat pada Buklet Tes, berikan tanda di bawah kata ketika dibaca dengan benar. Setelah membaca (berusaha): bacakan dengan lantang kalimat yang benar kepada pasien. Cobalah untuk mengingat kalimat ini, karena saya akan menanyakannya kepada Anda nanti.
Apakah ada pulau yang memiliki sebuah dermaga, pikir sang kolonel sambil duduk di kapal miliknya
Total: /15
6. Penulisan Angka
Bacakan angka-angka dan minta pasien menuliskannya pada halaman yang bergaris
708
15 200
400
Total: /3
Kalkulasi
Lihat Buklet Tes. Gunakan Soal pilihan ganda (SPG) jika pasien kesulitan menjawab
JL PG
6 + 3 = 9
7 + 9 = 16
8 – 5 = 3
36 – 17 = 19
Total: /4
7. Tes Mencoret Gambar Hati
Jelaskan tugas dan lakukan latihan hingga 2 kali, lalu berikan waktu MAKSIMUM 3 menit untuk mengerjakan tugas satu halaman penuh
Kotak 1 Kotak 3 Kotak 5 Kotak 7 Kotak 9
Kotak 2 Kotak 4 Kotak 6 Kotak 8 Kotak 10
Total celah Kiri: /50
Total celah Kanan: /50
Asimetri Objek:
(Total hati dengan celah Kiri dikurangi total hati dengan celah Kanan)
Waktu Total:
Total yang Benar: /50
Asimetri Ruang:
(Total dalam kotak 7,8,9,10 dikurangi total yang benar dalam 1,2,3,4

FIGURE 1. Oxford Cognitive Screen Indonesian Version

Statistical analysis

The validity and reliability of the variables on each scale item were tested using the SPSS 26.0 program. The correlation test used is the non-parametric Spearman coefficient because the data is not normally distributed, and the reliability test uses the Kappa coefficient statistical test between two interrater.

RESULTS

The study subjects consisted of 54 male subjects (51.92%) and 50 female subjects (48%). The study involved a diverse range of participants in terms of age. The age distribution within the sample ranged from 20 to 87 years. Notably, the majority of participants, accounting for 60% of the total, were aged above 60 years, totaling 62 subjects. A smaller proportion, comprising 20.19% of the sample, were below 50 years of age, accounting for 21 subjects. Furthermore, there were 17 subjects, representing 16.35% of the sample, whose ages fell between 50 and 59 years. Most of the subjects had a high school education, namely 37 subjects (35.58%). Most subjects did not work, namely 65 people (62.5%), with a history of brain disease 33 subjects (31.73%), and other diseases 32 subjects (30.77%). The characteristics of the research subjects can be seen in Table 1.

TABLE 1. Demographic characteristics of the research subjects

Demographic characteristics		N = 104	%
Sex	Male	54	51,92%
	Female	50	48,08%
Age	<50 years old	21	20,19%
	50-59 years old	17	16,35%
	>60 years old	62	59,62%
Job	Working	39	37,50%
	Retired/not working	65	62,50%
Education	No schooling	6	5,77%
	Elementary school	21	20,19%
	Junior High school	13	12,50%
	Senior high school	37	35,58%
	College	27	25,96%
History of disease	No history of disease	39	37,50%
	Diseases of the brain	33	31,73%
	Other disease	32	30,77%

Validity analysis of OCS-INA

The validity test in this study will use the Spearman correlation coefficient formula because the data used is not normally distributed. Validity is determined from the comparison of the product-moment correlation value (r) of the calculation results (r count) with the product-moment correlation table (r table). If the r count is greater than the r table, then the instrument used is said to be valid. R count will be obtained from the SPSS calculation, while the r table refers to the formula Degree of Freedom (df) = Number of subjects (n)-2 with a significance level of 0.05. The study involved 104 subjects, so df = 104 - 2 = 102, and obtained an r table value of 0.1927. The validity result can be seen in Table 2. The validity test obtained significant correlation values in the tasks of picture naming, semantics, reading, orientation, verbal memory, episodic memory, heart picture crossing test, object asymmetry, space asymmetry, executive function, writing numbers, calculation, and movement imitation,, while in the visual field test a non-significant correlation was obtained.

TABLE 2. OCS-INA Validity test with Spearman Coefficient

Cognitive Domain	Task	r interrator 1	r interrator 2	r Tabel
Language	Picture Naming	0,551	0,510	0,1927
	Semantic	0,208	0,239	0,1927
	Reading	0,476	0,405	0,1927
Memory	Orientation	0,524	0,506	0,1927
	Verbal Memory	0,705	0,667	0,1927
	Episodic Memory	0,580	0,588	0,1927
Attention	Visual Field	0,099	0,131	0,1927
	Heart	0,831	0,829	0,1927
	Object asymmetry	-0,424	-0,316	0,1927
	Space asymmetry	-0,242	-0,216	0,1927
	Executive Function	-0,344	-0,271	0,1927
Number	Number writing	0,370	0,339	0,1927
	Calculation	0,467	0,477	0,1927
Praxis	Movement Imitation	0,447	0,451	0,1927

Reliability analysis of OCS-INA

The reliability test obtained a range of values from 0.23 to 1. The lowest value was obtained in the heart crossing-out test (0.23) and the highest value was obtained in the visual field test (1) with an average value of 0.709. This value will be compared with the kappa value interpretation to show the degree of reliability. The recommended interpretation of Kappa value agreement is: less (<0.20), moderate (0.21-0.40), moderate (0.41-0.60), good (0.61-0.80), very good (0.81-1.00). The reliability test results can be seen in the Table 3.

DISCUSSION

The OCS-INA assesses the cognitive domains of language (naming, semantics, reading), memory (orientation, verbal memory, episodic memory), attention (visual field test, neglect), number writing, calculation and praxis (movement imitation). The instruments were translated following a cross-cultur-

TABLE 3. OCS-INA Kappa Reability test

Cognitive Domain	Task	value	Interrator Cohen's Alpha
Language	Picture Naming	Total	0,774
	Semantic	Total	0,874
	Reading	Total	0,726
Memory	Orientation	Answer directly and Multiple choice	0,842
	Verbal Memory	Recall and Recognition	0,822
	Episodic Memory	Recognition	0,870
Attention	Visual Field	Total	1,000
	Heart	Total	0,230
		Object Asymmetry	0,562
		Space Asymmetry	0,423
	Executive Function	Executive	0,507
Number	Number Writing	Total	0,927
	Calculation	Total	0,774
Praxis	Movement Imitation	Total	0,601

al adaptation process including forward translation and backward translation conducted by a sworn translator from an independent agency. The Indonesian version of the instrument was designed to be suitable for the Indonesian region following the original English sentence design principles, including word count. The verbal memory test items were customized following the design principles of the English OCS with multiple-choice items consisting of the correct word, an exception word, which could be a word with a similar or related meaning, or a word related to the previous test and one unrelated word. The same rule has also been applied to the Dutch version and several other versions [1,10,11].

The picture naming consisted of four pictures namely hippopotamus, watermelon, filing cabinet, and pear and the picture pointing task included four pictures namely tool, fruit, vegetable, and animal. All picture categories were familiar to the Indonesian population so no word substitution was required. During the orientation check, UK city names were replaced with Indonesian city names namely Jakarta, Semarang, Bandung, and Depok. The OCS developer recommends replacing cities based on the conditions that the first choice is the correct answer (current city); the second choice is a known city of the same size; the third choice is a nearby city of the same size; and the fourth choice is a known city located near the current location city. For the year orientation option, the first option was chosen based on the following conditions 199x where "x" is the last number of the current year; the second choice is this year plus 1; the third choice is this year minus 1 and the fourth choice is the current year. So, if the interview was conducted in 2022, the options are 1992, 2023, 2021, and 2022 [1,11].

The visual field test examination has no difference with the original version of the OCS. The sentence reading task has 15 words according to the original version of the OCS which will be scored for each word the subject reads. score each word that the subject reads. The phrase "cruise ship" or "kapal pesiar" in Indonesia was replaced with the word "ship" or "kapal" only in Indonesia which contains 1 syllable. In the number writing and calculation task, the numbers used were unchanged. The crossing out the picture of a heart test was designed as a visual attention test, the picture used was the same as the original OCS version, and there were no modifications for this test. Subjects were instructed to cross out a complete picture of a heart, or a heart without gaps. Clear instructions were required for this test. Likewise, in the praxis test, the movement imitation on the OCS-INA is no different from the original version, which is a series of hand movements and finger positions [1,10,11].

The memory examination modified some word translations, namely the words pirate, nurse, and asphalt, and in the episodic memory task, the pictures of bear, moon, and cloud. The words or pictures were modified and adapted to be able to trump the correct answer because they have similar meanings or similar pronunciation and avoid phrases consisting of two words. Examination of executive function showed no difference between the original OCS version and the OCS-INA.

Content validity was done during the translation process and reviewed by a panel. The instrument was reviewed by a panel team consisting of neurobehavior consultants and then tested. The validity test in this study used the Spearman correlation coefficient formula because the data was not normally distributed. The OCS-INA validity test obtained valid values on almost all items with a calculated r value greater than r table (0.1927), except for the visual field test. The calculated r value is smaller than r table, so it is considered invalid. The results of the visual field test examination of all subjects in this study were found to be almost all the same value of 4, except for 1 subject obtained a value of 2 because hemianopsia was found. This constant value causes this item to be invalid. This was also found in several studies that could not conduct a correlation test on the visual field test because the research data was constant [12].

The reliability test is useful to show the extent to which the variables in a research instrument provide a constant and consistent measurement value and this is closely related to the extent to which the questionnaire measurement results can be trusted or not. The OCS-INA reliability test was carried out using the kappa coefficient, namely comparing the assessment

results obtained by two interrators. Interpretation The recommended Kappa value agreement is: less (<0.20), sufficient (0.21-0.40), moderate (0.41-0.60), good (0.61-0.80), and very good (0.81-1.00) [13].

Six examination items were subjected to the Kappa p reliability test, yielding highly favorable dominant agreement interpretations. These items included semantic tasks (0.874), orientation (0.842), verbal memory (0.822), episodic memory (0.870), and the visual field test (1.000). The visual field test obtained a high-reliability value of 1 because the examination data with constant results without visual field disorders except in only 1 subject with a history of stroke and homonymous hemianopsia disorder. Several tests yielded commendable scores, including picture naming (0.774), reading (0.726), and calculation (0.774). In addition, the tasks of object asymmetry, space asymmetry and executive function obtained moderate scores. Meanwhile, a moderate score was obtained from the heart crossing-out test examination with a score of 0.23. The mean score was 0.709.

This study was not conducted specifically for stroke subjects like the initial study from the developer and several other countries that have also conducted validation and reliability tests. Although in some other writings the developer said that this instrument is not limited to stroke cases only.

CONCLUSION

OCS-INA has undergone a cross-cultural adaptation process according to the guidelines of WHO and some adjustments are tailored to the local culture of Indonesia. OCS-INA is valid and reliable so it can be used as an instrument to assess cognitive impairment and as a complement to previously used cognitive function screening instruments. Based on the results of this study, it is recommended that the OCS-INA be used by doctors in Indonesia to screen for cognitive function disorders so that early management can be carried out on the subject.

Conflict of interest:
There is no conflict of interest

Author's contributions:
Conceptualization: Ilham Nurdin, Yetty Ramli, Pukovisa Prawiroharjo, Diatri Nari Lastri, Adre Mayza; Methodology: Ilham Nurdin, Yetty Ramli, Pukovisa Prawiroharjo, Diatri Nari Lastri, Adre Mayza; Software: Ilham Nurdin; Validation: Ilham Nurdin; Formal analysis: Ilham Nurdin; Investigation: Ilham Nurdin; Resources: Ilham Nurdin; Data curation: Ilham Nurdin; Writing—original draft preparation: Ilham Nurdin; Writing—review and editing: Ilham Nurdin, Yetty Ramli, Pukovisa Prawiroharjo, Diatri Nari Lastri, Adre Mayza, Visualization: Ilham Nurdin; Supervision: Yetty Ramli, Pukovisa Prawiroharjo, Diatri Nari Lastri, Adre Mayza; Project administration: Ilham Nurdin; All authors have read and agreed to the published version of the manuscript.

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