

Original Research Article

Utility of Chedoke arm hand activity inventory in the Indian population: mixed method research sequential explanatory

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Received: 27 March 2019

Accepted: 03 May 2019

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ABSTRACT

Background: One of the most common manifestations of stroke is hand function affectation. This can have a negative impact on daily, social and leisure activities. A formal evaluation protocol will be able to identify specific needs of a patient. The objective was to find out the stability of the Chedoke arm hand activity inventory in sub-acute and chronic stroke patients in India Method.

Methods: This was an observational study with sample size 29 and the sampling was convenience sampling. Participant criteria were sub-acute and chronic stroke patients, male and female, patients who follow commands, stable vitals, CMSA score of hand and leg function with stage 3, foot with stage 2, postural control with 6 or 7 and ability to walk 25 meters indoor. Recurrent stroke and hand dysfunction due to any reason other than stroke were excluded. Twenty-nine stroke patients, sub-acute and chronic where CMSA score taken prior to administration of CAHAI. A score of 1-7 for each task in CAHAI 13, total score of minimum 13 and maximum 91 with other considerations where "unsafe for the patient" was considered as score 1. Data analysis were done using SPSS version 22.0 and Pearson's correlation coefficient.

Results: A total of 29 participants included where the test retest reliability was $r=0.98$ with significance <0.001 .

Conclusions: CAHAI found to be a highly reliable outcome measure.

Keywords: Chedoke arm and hand activity inventory, Epidemiology of stroke, Stroke, Outcome measures, Upper limb function

INTRODUCTION

Stroke is a rapidly developing clinical sign of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin.¹ It is seen in all age groups and is increasingly common in younger ages with huge economic costs in management.²⁻⁴ It has been estimated that there will be more than 1.67 million stroke survivors in India by 2020.^{5,6} One of the most common disabilities in stroke is upper limb dysfunction with

eighty-five percent of the survivors reported to experience hemi paresis immediately after stroke, fifty-five to seventy-five percent continue life with motor deficit which affects daily life and social life.⁷ In rehabilitation, keeping the priorities of a patient are always a key to successful treatment for which objective assessment is a helpful way in identifying the needs and requirements of patients.^{8,9}

There are many outcome measures for hand function that have high psychometric properties and among them is the

Chedoke arm hand activity inventory.¹ CAHAI meets the World Health Organization (WHO) definition of activity and it uses the materials required for activities of daily living.^{10,11} CAHAI are used for evaluating arm functions in stroke.^{8,10,14} CAHAI is a bilateral arm test having the criteria to assess all stages of stroke from acute to chronic. CAHAI uses real life functional tasks which are meaningful to the patient.^{12,10,13}

Validity and reliability of an instrument is population and condition specific.¹⁴ The requirements of functional use of the upper limb and especially the hand is considerably different in South Asian culture.¹⁵ Eating is an important difference. Eating is an activity performed with the fingers and the task of eating rice is complex with several components of in hand manipulation required to effectively achieve this function. Likewise grooming especially in women is often a complex task involving doing the hair into a bun or braiding long hair.^{15,16} With these differences in mind, we believe that the CAHAI must be tested for the Indian population prior to using it as an assessment tool. The design was sequential explanatory design.

The objectives were to find out the stability of the Chedoke arm hand activity inventory in sub-acute and chronic stroke patients in India.

METHODS

Inclusion criteria

Sub-acute and chronic stroke survivors who are medically stable with impairment in hand purely attributed to stroke. Patients who were able to follow commands. Chedoke McMaster Stroke Assessment: Impairment score of hand and leg function with stage 3, foot with stage 2, postural control with 6 or 7. Activity score includes ability to walk 25 meters scores 3.

Exclusion criteria

Patient who are not co-operative had lower motor neuron injury, pre-existing disability of arm and hand prior to stroke attack, global aphasia, apraxia, fatigue and recurrent stroke.

Procedure

Participants were identified from the hospital medical records and contact through phone calls. The study eventually started by the month of August 2016. At the time, there were very less patients meeting the inclusion criteria for the study. Participants were intended to be obtained from JSS Hospital, Mysuru, Karnataka, India. But, due to time constrains participants were also recruited from CSI hospital, Mysuru, Karnataka, India. Informed consent was obtained. Chedoke Mc Master Stroke Assessment was administered for selection of inclusion criteria for the study which was a decision

made through a pilot study. CAHAI 13 was administered to the selected participants. An in-depth interview was done to understand the validity of CAHAI through the participants. To test the stability of CAHAI, test retest reliability was established by administering CAHAI 13 again after 96 hours from the initial assessment (but not more than 144 hours). Following this, the tools used in CAHAI was compared to the top ten most important activities done in India that involves the upper extremity to establish the construct validity of CAHAI.

Data analysis was done using descriptive analysis.

RESULTS

Figure 1 shows the selection of participants. The sample for the present study was 29, the data collection was as follows.

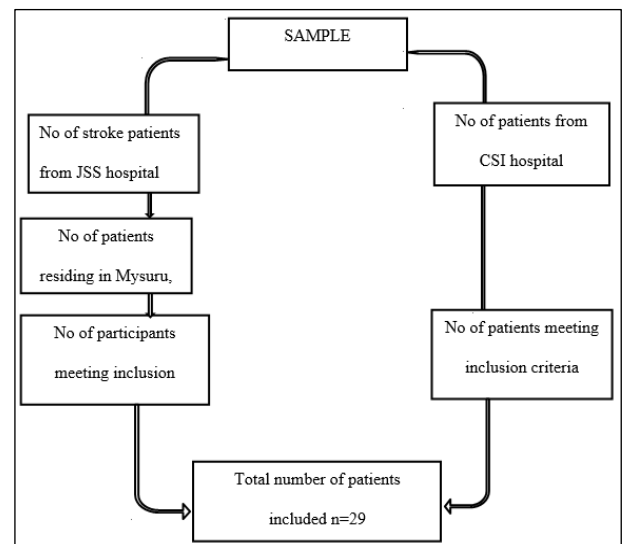


Figure 1: Flow chart participants.

A total of twenty-five males and four females were included in the study. The demographic results are in Table 1.

Table 1: Demographic data.

Variables	Male	Average	Female	Average
Total	29	25	4	
Age (yrs)	37-71	37-71	56.08	40-65 49.5
Chronicity in months		10.8 months		9 months

The total number of patients was 29, in that 25 were male and 4 were female patients. The average age for male patients was 56.08 years and female patients were 49.5 years. Average number of months in Stroke chronicity for male was 10.8 months and for female 9 months. The time taken in minutes for an average period of 27±4.27 minutes for test and for it was re-test 17±4.5 minutes.

The duration of time taken for the test was calculated using the mean and standard deviation. The average time taken for test mean±SD was 23.17±4.5 and the average time taken for retest mean±SD was 19.27±4.27 shown in Table 2.

Table 2: The table indicates the time duration taken for test completion.

Time taken	Test	Retest
Average: Mean±SD	27±4.27	17±4.5

The correlation between the test and retest was found by using Pearson’s correlation coefficient where below 0.50 represents poor reliability, 0.50 to 0.75 gives moderate reliability and above 0.75 represents excellent reliability with p value ≤0.05 as shown in Table 3 and the correlation between the test and retest of CAHAI is shown in Figure 2.

Table 3: Result analysis.

Measures	Mean±SD	COV	SEM	r	P value
Test	68.55±23.54	0.34	4.37	0.98	0.000
Retest	67.06±23.03				

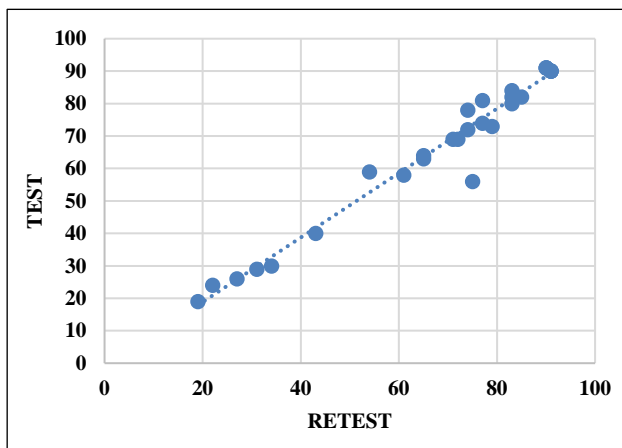


Figure 2: Correlation between test and retest of CAHAI. Positive and excellent correlation between test and retest of the CAHAI 13.

Phase 1

An in-depth interview

Face validity done by interview between the client and the administrator of the tool- reports of the clients.

- Dialling 911 did not predict the ability to act in emergency situation in India,
- Did not require a telephone box as they mostly use mobile phones,
- Did not use fork or knife for eating,

- Did not use high table and chair for doing any activities.

Phase 2

The result of the test retests reliability of the Chedoke Arm Hand Activity Inventory.

Table 3 shows the correlation between test and retest of the study. The mean and standard deviation and SEM of the tests and retests and the correlation between the two tests with the significant value.

The results show that the mean test result was 68.55 and the retest was 67.06 and standard deviation of 23.54 and 23.03 respectively, standard error of mean being 4.37, coefficient of variation was 0.34.

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Phase 3

Establishing construct validity

The top ten most important use of dominant hand of both male and female Indian were listed through interview of normal population of the middle- and low-class community.

They were male eating, brushing, combing hair, buttoning, toilet activities, writing, putting on socks and shoes, bathing with mug and bucket of water, drying with towel, washing cloths and wringing, mobile phone uses.

For female it was eating, combing, tie/braiding hair, sweeping, cooking, pinning sari, toilet activities, bathing with mug and bucket, washing and wringing clothes, use of mobile phone.

The items that were considered useful by the participants included in the CAHAI were buttoning, brushing, drying back with towel, wringing clothes.

The items not included in CAHAI were braiding hair, pinning sari, wearing socks and shoes. Other items that were included but needed alterations were eating, use of mug for bathing (pouring from jug may somewhat mimic the use of mug, writing (drawing a line is not sufficient to predict ability to write).

DISCUSSION

The study eventually started by the month of August. At the time, there were very less patients meeting the inclusion criteria for the study. Participants were intended to be obtained from JSS Hospital, Mysuru, Karnataka,

India. But, due to time constraints participants were also recruited from CSI hospital, Mysuru, Karnataka, India. The main inclusion criteria in the study were that the participants must have isolated wrist extension even of the mildest. Among the participants, only one person had less than half a range of wrist extension and the rest had half to full wrist extension. The Chedoke McMaster Stroke Assessment score was full for three of the patients and most of the participants had good CMSA scores.

Although the lower limits were set for the selection of inclusion criteria, the upper limits were not set. Patients were contacted through telephone and asked about their recent state of activity level but an 'on observation' was made by either visiting the stroke patients in their residence, for those who were already discharged from hospital. Some patients were observed during their hospital stay and others in the JSS hospital outpatient department. Information about the study was given to them with informed consent and appointment dates were given to them for the tests. Test and retest were done using the required height table and chair recommended for the test. All retests were done after 3 days to 5 days of test according to the availability of the patients. There was a difference of about 4 to 8 minutes between the test and retest due to learning effect, on taking the mean of it on 29 participants the mean difference was 10 minutes.¹⁰ Therefore, familiarization before administration of test is required which will reduce the difference in time of test and retest. At times, on observation, many did not meet the inclusion criteria. Some of the tests and retests were done in patient's residence.

This study was done by a novice practitioner and found to have excellent reliability, proving that although it is culture based it can still assess the extent to which the arms and hands are useful for normal living. It shows the missing components of hand function which can be easily noticed and detected. It also gives a feedback to the participant and gives them an idea of their abilities and disabilities in performing hand functions. It helps clients to help themselves understand their strength and weaknesses in daily living activities and work done in public places. Since, it gives a clear picture of whether they can perform activities like pouring water, dialing on a phone, carrying objects around which are mandatory for daily living, it encourages them to perform the exercises to improve the hand function. Novice practitioners can use it effectively and achieve good results.^{6,9}

According to the author of CAHAI, the psychometric properties of the CAHAI-13, and the following measurement properties have been reported to be of the following i.e. test-retest reliability, intraclass correlation coefficient 0.98, standard error of measurement is 2.8 CAHAI-13 points, minimal detectable change score MDC is 6.3.¹⁰ This research was done in Canada which highly correlates with this present study.

When selecting the ten most important activity of an Indian population, there were a lot of difference between the middle and lower class of people. For example, when it was not important for a farmer to write, a medical student requires using laptop and penning every day. An office going person needs to wear socks and shoes while a retired farmer barely wears slippers.

The strength was the sample size was completed for the study. Test and retest were done at time insisted to complete, interview was done adequately through language translator. The limitations were many patients included in the study who were having very high CMSA score which may give ceiling effect as only lower limits were assessed for inclusion criteria in CMSA score, but no upper limits were made. Although CAHAI 13 gives an excellent report on reliability, the use of fork and knife does not predict the ability for an Indian person in eating.¹⁵ since larger number of people in India use mobile phones, the use of a telephone box was not so appropriate. Dialling 911 does not predict the ability to function in emergency situations.

Research implication of CAHAI shows reliability in motor activity of the hand function, but some activities of daily living are culture based like dialling 911 for emergency, use of fork and knife for eating, using a telephone box rather than a mobile phone. This area can be addressed for future research study.

CONCLUSION

Chedoke Arm Hand Activity Inventory 13 proves to be reliable to assess the functional level of the hand although it does not have accuracy to assess the activities of daily living in an Indian population.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Zaucha H, Thomas A. Utility of Chedoke arm hand activity inventory in the Indian population: mixed method research sequential explanatory. *Int J Res Med Sci* 2019;7:2273-7.