

Validity and Reliability of Modified Functional Ambulatory Classification Scale (MFAC) on Stroke Patients- An Observational Study

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Abstract

Background: Stroke is becoming an important cause of premature death and disability in low-income and middle-income countries like India, largely driven by demographic changes and enhanced by the increasing prevalence of the key modifiable risk factors. Therefore, recovering gait ability is an important treatment objective for independent living. Furthermore, the gait assessment must be reliable and valid to assess the gait disorder and treatment effects and establish a future treatment plan. However, few gait assessment tools have been described to date that can be used to comprehensively assess gait ability. The Modified Functional Ambulation Classification (MFAC) is an assessment tool designed to categorize functional ambulation ability [5]. The Functional Ambulation Category (FAC) is a common clinical gait assessment scale first described by Holden., *et al.* in 1984 [10]. The FAC distinguishes 6 levels of walking ability on the basis of the amount of physical support required. The FAC is a quick visual measurement of walking, is simple to use, easy to interpret, and cost-effective because only stairs and 15m of indoor floor are needed to administer the test.

Aims and Objectives: To assess the reliability and validity of Modified Functional Ambulation Classification Scale (MFAC) in stroke patients. To find out the reliability and validity of Modified Functional Ambulation Classification Scale (MFAC) in stroke patients. To find out the level of ambulation in stroke patient according to Modified Functional Ambulation Classification Scale (MFAC).

Methods: For checking the Intra rater reliability; subject will be asked to ambulate and their gait will be assessed according to Modified Functional Ambulatory Classification Scale (MFAC) by investigator through videotape from 4 directions. For checking the Interrater reliability 2 physical therapist will assess the ambulation by watching videotape at different times. After one day, raters will re-view the videotape for second time to establish intra rater reliability. Both therapists' score will be recorded for assessing reliability of the scale. Reliability will be considered to be good when ICC will be larger than 0.75, fair when it will be between 0.40 and 0.75, and poor when it will be less than 0.40. The validity of the Single item scales will be assessed as the same scale as with other scales. Validity will be measured by correlating single - item scale with a multiple item scale which should measure the same. Modified Functional Ambulatory Classification Scale (MFAC) will be compared with Modified.

Result: According to the scale by Bland and Altman Scale, shows excellent reliability. Concurrent Validity between The Modified Functional Ambulatory Classification Scale and The Modified Rivermead Mobility Scale was calculated by Spearman's rho Correlation Coefficient and showed positive correlation.

Conclusion: The Modified Functional Ambulatory Classification Scale is reliable since both intra rater reliability and inter rater reliability was positive and its validity was proved by positive correlation with The Modified Rivermead Mobility Scale.

Keywords: Modified Functional Ambulatory Classification Scale; Modified Rivermead Mobility Scale; Reliability; Validity; Intra Rater Reliability; Inter Rater Reliability

Introduction

Stroke is becoming an important cause of premature death and disability in low-income and middle-income countries like India, largely driven by demographic changes and enhanced by the increasing prevalence of the key modifiable risk factors. As a result developing countries are exposed to a double burden of both communicable and non-communicable diseases. The poor are increasingly affected by stroke, because of both the changing population exposures to risk factors and, most tragically, not being able to afford the high cost for stroke care. Majority of stroke survivors continue to live with disabilities, and the costs of on-going rehabilitation and long term-care are largely undertaken by family members, which impoverish their families. Studying the burden of stroke and the availability of health services will help the policy makers to tackle the rising burden of stroke. Recently there has been an increase in the epidemiology data on stroke from India. This review will address the changing burden of stroke and also the available stroke care services in India. The estimated adjusted prevalence rate of stroke range, 84 - 262/100,000 in rural and 334 - 424/100,000 in urban areas. The incidence rate is 119 - 145/100,000 based on the recent population based studies. Intravenous (IV) and intra-arterial thrombolysis (IA) are commonly used in India [1].

In 2011 - 2012, there were 26400 admissions of cerebrovascular disease or stroke in all public and private hospitals with 12.6% death (Hospital Authority, 2013). Remaining stroke survivors have different degree of mobility problems and ambulatory difficulty. Reliable, valid and responsive outcome measures are essential for assessment to set rehabilitation goals and evaluation of treatment progress and effectiveness [2].

The loss of gait ability after stroke becomes a lifetime disability in addition to social activity limitations. Therefore, recovering gait ability is an important treatment objective for independent living. Furthermore, the gait assessment must be reliable and valid to assess the gait disorder and treatment effects and establish a future treatment plan. However, few gait assessment tools have been described to date that can be used to comprehensively assess gait ability. Gait assessment tools currently range from those that use biomechanical and kinematic analyses to those with a simple clinical design that can be easily and swiftly applied. However, skillful clinicians and repeated tests are required to ease the difficulty of this technological application, save time, and collect accurate data [2]. In addition, impractical issues arise from day-to-day clinical applications due to the difficulty obtaining results and interpreting the data [1,3]. Gait restoration has LONG been recognized as a key goal in stroke rehabilitation, and considerable resources are spent to achieve it. In recent years, this emphasis has been extended to include the attainment of community ambulation as an important mobility and social outcome [4].

The Modified Functional Ambulation Classification (MFAC) is an assessment tool designed to categorize functional ambulation ability [5]. The Functional Ambulation Category (FAC) is a common clinical gait assessment scale first described by Holden, *et al.* in 1984. The FAC distinguishes 6 levels of walking ability on the basis of the amount of physical support required. The FAC is a quick visual measurement of walking, is simple to use, easy to interpret, and cost-effective because only stairs and 15m of indoor floor are needed to administer the test. Predictive validity and responsiveness to change (caused, e.g. by recovery) have not before been investigated for the FAC, although they are very important in decision making regarding treatment and for intervention trials therefore its necessary to evaluate these essential but unknown psychometric properties of the FAC in a population of initially non ambulatory patients with hemiparesis after stroke [6]. The purpose of the study is that very few studies have been done on this scale and hence it is necessary that this study is done to get a clear vision on this topic. It will be easy to estimate the ambulatory level of the stroke patients and hence proper interventions can be given, through this scale even the prognosis of the patient can be checked.

Aims of the Study

To assess the reliability and validity of Modified Functional Ambulation Classification Scale (MFAC) in stroke patients.

Objectives of the Study

- To find out the reliability and validity of Modified Functional Ambulation Classification Scale (MFAC) in stroke patients.
- To find out the level of ambulation in stroke patient according to Modified Functional Ambulation Classification Scale (MFAC).

Research Design and Methodology

Research design

The research design will use for the study is Observational study

Source of data

Vikhepatil memorial hospital, College of physiotherapy, Vilad Ghat.

Type of data

The type of data will be qualitative data.

Duration of study

The study will be conduct during the time period of one year.

Sample size

30participants will be included.

Hypothesis

- **Null hypothesis:** Modified Functional Ambulatory Classification Scale is not reliable and valid.
- **Alternative hypothesis:** Modified Functional Ambulatory Classification Scale is reliable and valid.

Criteria for sampling

Inclusion criteria:

- 1) First ever stroke patient
- 2) Age group - 35 - 70
- 3) Both male and female
- 4) Medically stable CVA patients
- 5) Patients able to walk with/without assistance.

Exclusion criteria

- 1) Medically unstable patients
- 2) Severe neurological deficit patient (mentally handicap)
- 3) Other system disorder (uncontrollable HTN, angina and other cardio- respiratory)
- 4) Recent surgery
- 5) Patients unable to walk.

Sampling design

Sample design for this study will be a Convenient Sampling

Materials: Material will use for this study is

- Record materials
- Consent Form
- Data collection sheet

Consent form: Will be a written application of the participants that means they were willingly participated in the study.

Data collection sheet: Will use to collect baseline and follow up outcome measures data of the participants.

Outcome measure: Modified Functional Ambulatory Classification Scale (MFAC).

Procedure

Ethical approval will be obtained from the institutional ethical committee. Subjects fulfilling inclusion criteria will be included in the study. Written consent from the subject will be obtained. Study procedure will be explained to the subjects. For checking the Intra rater reliability; subject will be asked to ambulate and their gait will be assessed according to Modified Functional Ambulatory Classification Scale (MFAC) by investigator through videotape from 4 directions. For checking the Interrater reliability 2 physical therapist will assess the ambulation by watching videotape at different times. After one day, raters will re-view the videotape for second time to establish intra rater reliability. Both therapists' score will be recorded for assessing reliability of the scale.

The inter-rater and intra-rater reliabilities will be calculated using the Inter- class Correlation Coefficient (ICC). Reliability will be considered to be good when ICC will be larger than 0.75, fair when it will be between 0.40 and 0.75, and poor when it will be less than 0.40.

The validity of the Single item scales will be assessed as the same scale as with other scales. Validity will be measured by correlating single - item scale with a multiple item scale which should measure the same. Modified Functional Ambulatory Classification Scale (MFAC) will be compared with Modified Rivermead Mobility Index to assess and co relate the validity.

Validity will be calculated using Spearman's rho Correlation Coefficient.

Result

Data analysis was done using SPSS 16.0 version of IBM software, and statistical significance level was set at $p < 0.05$. There were 30 participants. The Bland and Altman Scale was used in classification of reliability values (≤ 0.20 poor; 0.21- 0.40 fair, 0.41 - 0.60 moderate, 0.61 - 0.80 good, and 0.81-1.00 excellent).

95% confidence intervals were seen for inter-rater reliability and two- way mixed model was used. Table 2 shows inter-class correlation coefficient.

According to the scale by Bland and Altman Scale, shows excellent reliability.

Concurrent Validity between The Modified Functional Ambulatory Classification Scale and The Modified Rivermead Mobility Scale was calculated by Spearman's rho Correlation Coefficient.

ICC	Lower limit	Upper limit	p-value	Cronbach's Alpha
1.000	1.000	1.000	0.000	1.000

Table 1: Shows Intra-class correlation coefficient.

ICC	Lower limit	Upper limit	p-value	Cronbach's alpha
0.988	0.974	0.994	0.000	0.988

Table 2: Shows inter-class correlation coefficient.

		Correlations	MFAC	RMMS
Spearman's rho	MFAC	Correlation Coefficient	1.000	.957**
		Sig. (2-tailed)		.000
		N	30	30
	RMMS	Correlation Coefficient	.957**	1.000
		Sig. (2-tailed)	.000	
		N	30	30

Table 3: Shows correlation between the modified functional ambulatory classification scale and the modified rivermead mobility scale.

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

The present study's findings corroborate the high inter- and intra-rater reliability of the mFAC. Such findings are in line with those of previous studies in which the inter-rater reliability of mFAC of patients with hip fractures had an ICC of 0.969), while the inter-rater reliability of the mFAC for acute stroke patients had a consistency ratio of 93% and a weighted kappa coefficient of 0.9710). The inter- and intra-rater reliability of the present study was very high, with an ICC > 0.98, kappa coefficient > 0.92 and a consistency ratio > 94%, all of which were measured by therapists who had worked in the field for at least 10 years [3]. The improvement in the functional gait performance of these research subjects (mFAC of 3 - 7 points) increased along with increased mRMI, which reflected the stable/maximum gait speeds and functional mobility. In general, healthy people can adjust their gait performance at different gait speeds. However, most patients with neurological diseases respond slowly to their surroundings because of limited outdoor walking and perform physical activities very passively. Therefore, improvements in the functional gait performance of stroke patients with gait disability are well-reflected in their gait speed and physical activity performance [3].

The FAC was developed at Massachusetts General Hospital in Boston as an instrument for categorizing functional ambulation ability. Gait was divided into six categories, ranging from no ability to walk or the ability to walk with the help of two or more people (FAC 0) to the ability to walk independently (FAC 5). Among the several ambulation classification systems, the FAC showed excellent reliability (test-retest reliability, Cohen k Z 0.950; and inter-rater reliability, k Z 0.905), good concurrent and predictive validity, and good responsiveness in patients with hemiparesis after stroke. Since FAC has been shown to be an appropriate assessment tool in the measurement of walking ability, we adapted it for local use. The original category of "non-functional ambulation" in FAC was expanded to two categories in MFAC to differentiate those patients who was able to sit unsupported from those who were unable. This discrimination of people with different

sitting balance abilities was considered to have significant clinical implications for patient care. It was thus suggested by a group of local experts to expand the “non-functional ambulation” category into two categories. In the present study, high inter-rater reliability and concurrent validity was demonstrated in MFAC, just as in FAC. The MFAC, being an easy-to-use and inexpensive outcome measure, can be readily incorporated into routine clinical practice in the management of patients with hip fracture. It provides a standardized and simple way to communicate an individual’s mobility status (e.g. category I to VII) to other professional staff [5].

The mFAC used in the present study can be a gait assessment tool for clinical research since its validity is proven, inter and intra-rater reliability are high, and it is relevant to gait speed and functional mobility. In addition, it is a sophisticated method that can reflect the clinical improvement of a patient’s gait ability, and it can be easily used to enhance gait speeds and clinical research designs. However, the present study has limitations; its findings cannot be generalized because the assessments are limited to a certain period in time, while an assessment to estimate the cut-off distance for outdoor walking was not performed. Future studies should include assessments to estimate the cut-offs for mFAC, distance, and other factors for outdoor walking [3]. And there should be increase in the number of participants for the study.

Conclusion

The Modified Functional Ambulatory Classification Scale is reliable since both intra rater reliability and inter rater reliability was positive and its validity was proved by positive correlation with The Modified Rivermead Mobility Scale.

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