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RESEARCH ARTICLE

INTRA-RATER AND INTER-RATER RELIABILITY OF FUNCTION IN SITTING TEST IN ACUTE STROKE- A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Sitting balance is a valid predictor of functional recovery after stroke. Function in Sitting Test (FIST) is a performance based balance measure that aimed at comprehensive, specific, efficient and functional assessment of sitting balance, which has variety of steady state, proactive, and reactive postural control conditions which may describe and quantify sitting balance abilities to move and perform functional tasks in a seated position. **Objective:** The aim of the study was to evaluate the inter-rater and intra-rater reliability for FIST in acute stroke subjects.

Subjects: Twenty-six subjects with post-stroke duration of <3 weeks (15 male and 11 female with a mean age of 57.8 years) were recruited for the study. 2 testers (R1 and R2) rated subjects' live performances of FIST. Rater 1 physical therapist with an average of 8 years of clinical experience in Neuro-rehabilitation and Rater 2 was a post graduate physical therapy student.

Methods: All subjects carried out the FIST twice within 24 hour interval. Each subject was rated by 2 physical therapists in the first attempt for inter-rater comparison (Test 1) and by the R1 for intra-rater in the second attempt (Test 2). The reliability was calculated using the Intraclass correlation coefficient (ICC, 2.1) using SPSS.16.

Conclusion: Excellent ICC values (> 0.85) were found for FIST in Test 1 and Test 2. The Intraclass correlation coefficient (ICC) for intra-rater reliability was found be excellent (ICC =0.93; 95% confidence interval, 0.88-0.96) for inter-rater reliability (ICC=0.86; 95% confidence interval, 0.84-0.92). This results suggest that the FIST Test was found to have high inter-rater and intra-rater reliability for examination of individuals with post-acute stroke by physical therapists and physical therapy students.

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INTRODUCTION

Poor sitting ability is a common clinical problem after stroke.¹ Recovery of sitting ability is important because independent sitting is a prerequisite for most functional activities and multiple studies report that sitting balance is a valid predictor of functional recovery after a stroke.²⁻³ The significant predictors appear to be basic tasks performed in sitting that require trunk balance and stability.⁶⁻⁸ Post-stroke interventions to reduce falls, facilitate function, and improve quality of life rely in part on the identification and accurate and reliable quantification of balance deficits. Individuals with poor or impaired sitting balance are less likely to be discharged to home settings or to live independently after a stroke.⁹ One of the primary goals of physical therapy during the early phases of rehabilitation is to facilitate static and dynamic sitting balance.¹⁰ Accurate and Reliable measures of sitting balance, along with a capacity to detect a clinical change are also required in clinical practice and in research. There are a number of components considered essential when measuring sitting balance. These include the ability to (1) control sitting balance statically during quiet sitting (steady state control), (2) move oneself in sitting while maintaining seated postural control (proactive control), (3) maintain seated postural control during external environmental perturbations (reactive control), and (4) use the lower extremities to assist balancing the trunk, and to integrate (1) lateral

control reactions, (2) use of sensory inputs, and (3) proactive and reactive balance mechanisms to perform functional tasks while sitting.^{11,12} In addition to including these essential elements, to be of value standardized, balance tests must also have acceptable reliability and validity.¹³⁻¹⁵ Function in Sitting Test has been validated to be a sitting-specific balance test designed to document the seated posture control in persons with lower levels of functional activities in acute stroke. It is a performance based balance measure that aimed at comprehensive, specific, efficient and functional assessment of sitting balance. It is administered and scored by the therapist at the patient's bedside. This scale analyses the static, pro-active and reactive components in the sitting posture through its 14 items which comprehensively test the ability of the patient to maintain and challenge the limits of his balance in sitting.

Within each sub-test there are levels ranging from independent to complete assistance. Examining the sitting balance with such a functional tool enables a baseline to be established to which future performance can be compared. Gorman et al have developed and validated the test items with respect to the internal consistency, document content, construct, concurrent and face validity of the Function in Sitting Test in acute stroke. FIST was validated with respect to the construct validity (0.92-0.95), high internal consistency, and high concurrent validity with respect to modified Rankin Scale. The author has suggested further studies to examine the inter-rater and intra-rater reliability.^{16,17} A reliable, sensitive, and valid standardized outcome tool is needed for clinical research and practice.

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FIST success will depend on how clinically useful it is in assisting therapists to assess sitting balance problems, document patient progress, and direct treatment interventions based on individual functional sitting balance limitations. In any country, a rehabilitation set-up has multiple therapists working together. Hence, a measure of intra-rater and inter-rater reliability for every outcome measure is essential to allow the results to be generalised to all the therapists and enable its use as an outcome measure in day to day practise.^{18,19} The usefulness of FIST in clinical research and decision-making would be questionable without a good score in intra-rater and inter-rater reliability. Thus, the aim of the study was to assess the inter-rater and intra-rater reliability of the FIST in acute stroke population.

METHODS

Subjects

This study was conducted in Department of Physiotherapy, Kasturba Medical College, Mangalore, Manipal University, India. Institutional Ethical Committee approved to conduct this study and the study duration from January 2012-February 2013. Twenty-six individuals with a diagnosis of acute Stroke [meanage = 57.8years; 15 males, 11 females] subjects who referred for physiotherapy were screened for inclusion and exclusion criteria. The inclusion criteria are acute stroke subjects who can able to sit without support for more than 10 minutes. Subjects were excluded if any other neurological condition which limiting their sitting balance and those subjects with communication problems. Written informed consent was given by each subject before study participation.

Raters

Rater 1 (R1) is a member of a multidisciplinary team at the Department of Physical Therapy who had 8 years of experience treating individuals with neurological impairments and the other rater (R2) was a post graduate in master's degree program in physical therapy. Both the raters had some experience in administering the FIST Test on a few stroke subjects prior to the initiation of the study as a part of their clinical evaluation and also by pilot testing of procedures in 3 to 5 subjects before the start of the study.

Test 1: Inter-rater Reliability

Rater 1 was designated the administering rater (AR), as he instructed the subjects on how to perform the maneuvers, guarded the subjects, and scored each subject's performance as per the instructions in FIST Manual.¹⁷ Rater 2 was designated the observing rater R2 as their role was to watch at a distance of less than 6 feet from the subject and score each subject's performance. The R2 had a lateral view of the subject and the R1 never stood between the R2 and the subjects during testing. The scores of each rater were blinded from those of the other to avoid bias. It was assumed that both the raters had equal knowledge about the demographic data and the relevant history of the patient's condition. Prior to the test, it was mandatory that all the raters reviewed the test items, grading criteria and the instructions for administering the test. To further minimise the recall bias, the raters filled in the score sheet but did not add up the scores. Raters did not speak to each other during testing. This design was used in our study because many subjects could not tolerate performance of repetitive tests on a single day due to fatigue or better performance in second trial due to learning effect.

Test 2: Intra-rater Reliability

Intrarater reliability and were examined by having each subject perform the FIST twice within 24 hour interval, by R1 at the hospital. The short interval between the first and the second attempt was chosen to avoid a change in the subject's functional level. Each testing session was carried out in the same quiet facilities and the same standard verbal instruction was given to all subjects. The entire

testing and administrating procedure took approximately 20-30 minutes. Rest intervals were provided for the subjects between maneuvers for both Test 1 and Test 2 if necessary. Subjects were instructed that they could refuse to perform any maneuver if they felt unsafe. If the subject refused or was unable to perform any maneuver, each rater assigned a score of 0 for that maneuver. In our study all subjects completed the 14 items of the FIST Test without falling to the ground or complaining of fatigue in both Test 1 and 2.

Data Analysis

Data was collected from all raters and analyzed using SPSS Version 16.0 software. Descriptive statistics were calculated for demographic data. Intrarater reliability and Interrater reliability between pairs of raters were analyzed by calculating by using the Intraclass correlation coefficient (ICC, 2.1; 2-way random, absolute agreement, single measure) with the corresponding 95% CI, as it allows findings to be generalized to other raters within the same population. The inferred reliability from the ICC values was classified as follows: > 0.85 = excellent; $0.75 - 0.85$ = good; < 0.75 = fair.²⁰

RESULTS

Table 1 shows the demographic data of the study participants. The mean post-acute stroke duration was 10 days and interestingly most of our study participants were better motor recovery with mean Brunstorm upper extremity recovery score of 3 which may contribute to a better performance in many items of FIST and similarly in FIST score with mean value of 39. Table 2 shows the ICC values for intra-rater reliability at 95% CI ranges from .86-1 and for inter-rater reliability at 95% ranges from .84-.98 respectively. The Intraclass correlation coefficient (ICC) for intra-rater reliability was found to be excellent (ICC = 0.93; 95% confidence interval, 0.88-0.96) for inter-rater reliability (ICC = 0.86; 95% confidence interval, 0.84-0.92).

Table 1: Demographic data of study participants

Variables	n = 26
Age in years	57.85 ± 9.82*
Gender	
Male/female	15/11
Paretic side	
Right/left	9/17
Type of lesion	
Ischemic/hemorrhagic	14/12
Post stroke duration in days	10.12 ± 2.08*
Brunstorm stage of UE recovery	3.3 ± 1.2*
Total FIST Score	39.21 ± 7.56*

*values are in Mean ± SD

Table 2: ICC values of intrarater and interrater reliability of FIST score

FIST items	Intrarater (R1)	Interrater (R1, R2)
1. Anterior Nudge	0.89	0.90
2. Posterior Nudge	0.92	0.92
3. Lateral Nudge	0.94	0.88
4. Static Sitting	1*	0.98
5. Sitting move head side to side	1*	0.98
6. Sitting eyes closed	1*	0.98
7. Sitting lift feet	0.96	0.90
8. Turning and pick up object from behind in preferred direction	0.86	0.84
9. Reach forward with uninjured hand outstretched at shoulder height	0.95	0.90
10. Lateral reach with hand at shoulder height	0.96	0.88
11. Pick object up off the floor	0.84	0.86
12. Posterior scooting	0.92	0.90
13. Anterior scooting	0.90	0.94
14. Lateral scooting	0.88	0.94

*95% CI cannot be estimated due to total agreement between the first and second test.

DISCUSSION

This current study analyzed reliability of FIST Test scores when administered by physical therapist and physical therapy student in acute stroke subjects and found to be excellent with ICC value >.85 for both inter-rater and intra-rater reliability. The relatively low ICC value obtained for the item 8 (Turning and pick up object from behind in preferred direction) and in item 11 (pick object up off the floor) may attribute to difficult or dissociate upper and lower trunk movements and also poor trunk muscle control results in variety of compensatory strategies for functional task.²¹⁻²⁴ One advantage of this study is that it tested rater reliability on subject performance of the FIST Test on administering the test. As discussed previously, the reliability for raters that both administer the test and simultaneously assess subject performance may be different because of the greater number of tasks performed. The study findings warrants caution when interpreting and generalizing the results as differences in the way that the test is administered such as verbal instructions to the patient as the participants were multi-lingual in our community, the chair style or height of the bed, could substantially change the patient's ability to reach and pick up objects from the chair or behind (items 8 and 11) that could affect the patient's performance. Items 1-3 of the FIST the examiners may apply the nudge with different amounts of force, time between applications (ie, rapid succession or pause between nudges to allow the patient to recover), or rate of applications (ie, quickly versus slow) would also influence the performance. Many studies have compared the reliability of ratings between students and experienced clinicians/therapists for a variety of tests to determine whether clinical experience has an effect on reliability.²⁵⁻²⁷ Student raters may have lower reliability compared to experienced therapist because of greater uncertainty about how to rate a subject's performance, inconsistent application of the test, or because they are more influenced by conditions or distractions in the testing environment. Alternatively, reliability might be higher for the student raters because they are more attentive to details than experienced clinicians. Knowledge about differences in reliability on outcome measures between student or novice and experienced clinician raters is important for clinicians working with patients, for researchers designing clinical trials, and for clinical instructors evaluating student performance on clinical experiences. A limitation of combining student and experienced clinician raters in our study is that the small numbers of raters R1 and R2 decreases the generalizability of the results to the entire populations of physical therapy students and physical therapists.

Conclusion

The intra-rater and inter-rater reliability of FIST in acute stroke is found to be excellent in our study. Thus FIST is recommended as a reliable, inexpensive, and quick instrument to evaluate and can be used as an outcome measure to assess sitting functional balance impairments in acute stroke subjects.

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