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A STUDY TO FIND OUT RELIABILITY AND CON-CURRENT VALIDITY OF FULLERTON ADVANCED BALANCE SCALE FOR ASSESSMENT OF FUNCTIONAL BALANCE IN POST INDEPENDENT AMBULATORY STROKE PATEINTS – AN OBSERVATIONAL STUDY

Physiotherapy

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ABSTRACT

BACKGROUND: Stroke or brain attack is a sudden loss of neurological function caused by an interruption of the blood flow to the brain. Fullerton Advanced Balance Scale is having ability to measure this. So purpose of this study was to find out reliability and concurrent validity of FAB Scale for assessment of functional balance in post ambulatory stroke patients.

OBJECTIVES: (1) To assess intra-rater and inter rater reliability of the Fullerton advanced balance scale for assessment of functional balance in post independent ambulatory stroke patients. (2) To assess concurrent validity of the Fullerton advanced balance scale for assessment of functional balance in post independent ambulatory stroke patients.

METHODS: After the ethical approval from committee and Written consent from patients who were willing to participate in study, 30 patients were selected based on inclusion and exclusion criteria. Both the male and female patients, with age group 50 to 65 years were taken for the study. The patients were assessed using FAB Scale by two rater for inter rater reliability and by same rater at different time (24 hours of duration) for intra rater reliability. The patients were also assessed by BBS to find out concurrent validity of FAB Scale.

RESULTS: Results was analyzed by using SPSS 20 version for windows software. Intra rater and Inter rater reliability of FAB Scale were assessed by Spearman's correlation coefficient (rs). Concurrent validity of FAB Scale and BBS was assessed by Spearman's correlation coefficient. Spearman correlation coefficient (rs) for intra rater reliability is 0.964** with $p < 0.01$ and for inter rater reliability Spearman correlation coefficient (rs) is 0.972** with $p < 0.01$. Spearman correlation coefficient (rs) between FAB Scale and BBS is 0.859** with $p < 0.01$ respectively.

CONCLUSION: This study concluded that this test can be useful to clinicians and also FAB Scale is quick to administer (10-12 min), and requires little space and less equipment, so it can be used in clinical setting to assess functional balance.

KEYWORDS

Stroke, Reliability, Concurrent validity, Fullerton Advanced Balance Scale (FAB), Berg Balance Scale (BBS)

INTRODCTION

The term Stroke or brain attack is defined as the sudden loss of neurological function caused by an interruption of the blood flow to the brain.[1] This cut off the supply of oxygen and nutrients, causing damage to the brain tissue.[2]The most common symptom of a stroke is Sudden weakness or numbness of the face, arm, or leg, most often on one side of the body, Occurring in 90% of the strokes.[2] These sites generally include bifurcations, constrictions, dilation, or angulations of arteries.[1] The effects of stroke depend on which part of the brain is injured and how severely it is affected. A very severe stroke can cause sudden death.[2]

Stroke is defined by World Health Organization (WHO) as a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal and at times global loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.[2,3]

Balance problems are thought to be common after stroke, and they have been implicated in the poor recovery of Activities of Daily Living (ADL) and mobility an increased risk of falls.[4] Balance control is a fundamental motor behavior in stance and gait that allows an individual to maintain and adopt various posture, react to external pertubances, and use automatic postural responses that preceded voluntary movements.[5]

Balance is achieved by the complex integration and coordination of multiple body systems including the vestibular, visual, auditory, motor, and higher level premotor systems. Information from sensory systems is interpreted in the central nervous systems (CNS) based on an internal body scheme, an appropriate response is formulated, and the postural muscle synergies are activated to perform the appropriate head, eye, trunk, and limb movements to maintain posture.[6]

Maintaining balance encompasses the acts of maintaining, achieving or restoring the body center of mass (COM) relative to the base of support (BOS), or more generally, within the limits of stability[6]. The functional goals of the balance system includes:[7]

1. Maintenance of a specific postural alignment, such as sitting or standing.
2. Facilitation of voluntary movement, such as the movement transitions between posture.
3. Reactions that recover equilibrium to external disturbances, such as a trip, slip, or push.

It is important to remember that intact balance control is required not only to maintain postural stability but also to assure safe mobility-related activities during daily life, such as standing while performing manual tasks, rising from a chair, walking and turning. Disorders of balance can be as a result of pathologies, such as neurological disease, sensory deficits or muscle weakness.[6]

Fullerton Advanced Balance (FAB) Scale was developed by Debra Rose. FAB scale to develop a new balance assessment tool that could be used to identify balance problems of varying severity in functionally independent older adults and also evaluate more of the system(s) (eg, sensory, musculoskeletal, neuromuscular) that might be contributing to balance problems. More difficult static and dynamic balance tasks were included in the scale that would not only make it less prone to ceiling effects when used with more active older adults but also a more sensitive instrument when used to evaluate the effectiveness of an intervention conducted with this segment of the older adult population.[8]

One of the advantages of the FAB scale is that it is quick to administer, requiring approximately 10 to 12 minutes. In contrast to the BBS, which is comprised of 14 test items, the FAB scale has only 10 test items. Each item is scored from 0-4. The maximum score is 40 points.[8]

NEED OF STUDY

There is no study which finds the reliability and con-current validity of Fullerton Advance Balance Scale with Berg balance Scale in stroke patients. It is an important tool for evaluation of the risk of falls in patient with stroke. So, the purpose of this study was to find concurrent validity and reliability of The Fullerton Advanced Balance Scale for assessment of functional balance in post stroke patients.

AIM OF THE STUDY

The aim of the study was to find out reliability and con-current validity of Fullerton advance balance scale for assessment of functional balance in post independent ambulatory stroke patients.

OBJECTIVES OF THE STUDY

1. To assess intra-rater and inter rater reliability of the Fullerton advanced balance scale for assessment of functional balance in post independent ambulatory stroke patients.
2. To assess concurrent validity of the Fullerton advanced balance scale for assessment of functional balance in post independent ambulatory stroke patients.

HYPOTHESIS

- **Null hypothesis:**

Fullerton Advanced Balance Scale is not a reliable and valid measure in measuring functional balance in post independent ambulatory stroke patients.

- **Experimental Hypothesis:**

Fullerton Advanced Balance Scale is a reliable and valid measure in measuring functional balance in post independent ambulatory stroke patients.

MATERIALAND METHODOLOGY

- **Study Setting**: Shri K.K.Sheth Physiotherapy College, Rajkot.
- **Source of data**: Various physiotherapy centers in Rajkot.
- **Study population & size**: 30 Post stroke patients.
- **Sampling method**: Convenient sampling.
- **Study Design**: An Observational study.

Criteria for selection:

Inclusion Criteria:

- Age - 50 to 65 years.[3]
- Males and females.
- Subjects with normal cognitive function (MMSE >23)
- Ischemic and hemorrhagic types of stroke.
- Independently Ambulatory patient without use of assistance device.(Modified Functional Ambulation Classification : Stage – 5 to 7)[9]

Exclusion Criteria:

- Subjects with history of any recent surgeries in low back and lower limbs.
- Subjects with history of any recent musculoskeletal injuries
- Subjects with other form of neurological impairments.
- Blurred vision, vestibular system dysfunction.
- Subjects with severe contractures due to spasticity.
- Hemodynamically unstable patients.
- Uncooperative or not willing to participate.

MEASUREMENT PROCEDURE

- Patients were selected on the basis of inclusion and exclusion criteria.
- Before the study consent forms were signed with a pre-participation evaluation form consisting of basic neurological assessment chart was filled. The data measured were recorded in the measurement for which included name, age, gender, occupation, address, dominance, affected side, post stroke duration, investigation, scale total.
- Patients were then explained about the test and procedure to be conducted Fullerton Advanced Balance Scale conducted to check Functional balance in post stroke patients. The Fullerton Advanced Balance Scale was conducted twice by same rater (Rater A1 and Rater A2) at different time (after 24 hours of duration) and also by different rater (Rater B) at same time to find out intra rater (test-retest) and inter rater reliability.

Components of Fullerton Advanced Balance Scale:

1) Stand with feet together and eyes closed
2) Reach forward to retrieve an object held at shoulder height without stretched arm
3) Turn 360 degree in right and left directions
4) Tandem walk
6) Stand on one leg
7) Stand on foam with eyes closed
8) Two-footed jump
9) Walk with head turns
10) Reactive postural control

Component of Berg Balance Scale:

1. Sitting to standing
2. Standing unsupported
3. Sitting with back unsupported but feet supported on floor or on stool
4. Standing to sitting
5. Transfer
6. Standing unsupported with eyes closed
7. Standing unsupported with feet together
8. Reaching forward with outstretched arm while standing
9. Pick up object from the floor from a standing position
10. Turning to look behind over left and right shoulders while standing
11. Turn 360 degrees
12. Place alternate foot on step or stool while standing unsupported
13. Standing unsupported one foot in front
14. Standing on one leg

RESULTS

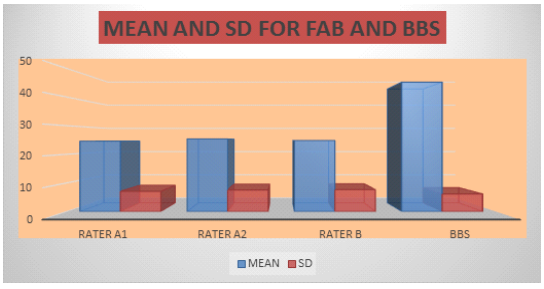
All the statistical analysis was done by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0 for windows. Microsoft excel was used to generate graphs and tables

Table 1 -Age distribution of post stroke patients (years)

AGE GROUP (YEARS)	NO Of PATIENTS
50-55	4
56-60	13
61-65	13
TOTAL	30
MEAN	60.500
SD	± 3.919

Table 2:- Mean value and Standard Deviation of Fullerton Advanced Balance Scale And Berg Balance Scale in post stroke patients

Outcome Measure	Rater	Mean	Standard deviation
Fullerton Advanced Balance Scale	Rater A1	24.600	± 7.059
	Rater A2	25.366	± 7.531
	Rater B	24.800	± 7.640
Berg Balance Scale	Rater A1	45.200	± 6.144



Graph 1:- Mean value and Standard Deviation (SD) of Fullerton Advanced Balance Scale and Berg Balance Scale of post stroke patients

Table 3:- Spearman correlation coefficient showing Reliability of Rater A1 of Fullerton Advanced Balance Scale with Berg Balance Scale

Measure	Spearman Correlation Coefficient	p value	No. of Patients
Rater A2 (Intra rater reliability)	0.964**	0.000	30
Rater B (Inter rater reliability)	0.972**	0.000	30
FAB Scale	0.859**	0.000	30
BBS	0.859**	0.000	30

** Correlation is **significant** at the 0.01 level **(p value <0.01)**

Interpretation:

Spearman correlation coefficient between **Rater A1 and Rater A2** is **0.964** with **p =0.000** Spearman correlation coefficient between **Rater A1 and Rater B** is **0.972** with **p =0 .000** Above table shows **High correlation Coefficient** between **Rater A1and Rater A2; Rater A1 and Rater B**. Spearman correlation coefficient between **Fullerton Advanced Balance Scale and Berg Balance Scale** is **0.859**with **p = 0.000.** Above table shows **High correlation Coefficient** between **Mini-Balance Evaluation System Test and Berg Balance Scale.**

DISCUSSION

In the above study the results for intrarater and interrater reliability suggested High positive correlation with Rater A1 and Rater A2 and

Rater A1 and B both which suggest that functional balance can reliably be measured in post ambulatory stroke patients by using Fullerton Advanced Balance Scale.

Result for concurrent validity showed High positive correlation between Fullerton Advanced Balance Scale with berg balance scale which suggests that Fullerton advanced balance Scale is a valid tool to assess functional balance in various directions in post ambulatory stroke patient.

Result of present study suggested that Fullerton advanced Balance Scale is reliable and valid tool to asses balance in post stroke patients and this is supported by a study done by **Debra J. Rose in 2006** et al; Development of a Multidimensional Balance Scale for Use With Functionally Independent Older Adults and concluded that Preliminary results suggest that the FAB scale is a valid and reliable assessment tool that is suitable for use with functionally independent older adults residing in the community.[13]

From the present study it can be said that in FAB Scale reactive postural control item score is affect after first performance this is supported by a study did by **Penelope J. Klein et al, (2009)** and concluded that Item 10 is intended to measure an individual's ability to respond quickly to an unexpected loss of balance using a protective and involuntarily controlled righting response.[21]

The present study finding suggests that Fullerton Advanced Balance scale is reliable and valid scale to measure Functional balance in post ambulatory stroke patients.

LIMITATIONS OF THE STUDY

- Type and site of lesion was not considered.
- Specific Duration of stroke was not taken into consideration
- Fullerton advanced Balance scale performance might involve multiple determinants not measured in present study, such as lower limb proprioception, tactile sensation, and level of spasticity, muscle strength, movement plan and level of fear of falling.

FURTHER RECOMMENDATION

- Future research can be conducted by taking control group.
- Study can be performed to compare if there is any difference in recovery among acute, sub acute and chronic patients.
- Physiotherapist with different years of experience can be taken to check inter rater reliability.
- Study can be done by taking different arterial inclusion e.g. Anterior Cerebral Artery where lower limb is more affected and also Posterior Cerebral Artery affection where perception and cognition is likely to be altered.
- Study can also be done by taking different outcomes in relation with balance like, proprioception, sensation etc.

CONCLUSION

The Fullerton Advanced Balance Scale appears to be reliable and valid test to examine how people with stroke affect movement to walk over obstacles, anticipatory control, dynamic gait and reactive postural control in various directions. The FAB Scale is an easy-to-administer, less equipment use and less time consuming clinical test with concurrent validity, intra rater and interrater reliability for assessment of functional balance in post ambulatory stroke patients.

CLINICAL IMPLICATION

The present study finding suggests that in post ambulatory stroke patients FAB Scale is valid and reliable to measure functional balance and ability to detect change in anticipatory, reactive postural control, sensory orientation and dynamic gait component this characteristic makes this test unique from other balance tests.

Also rehabilitation can be planned according to component of score. So this test can be useful to clinicians and also FAB Scale is easy to score, quickly to administer (10-12 min), and requires little space and less equipment.

REFERENCES

1. Susan B O' Sullivan, Thomas J Schmitz; Physical rehabilitation; 5th Edition; Jaypee Brothers 2007.
2. Manjari Tripathi and Deepti Vibha: Review Article Stroke in Young India. Hindawi Access to Research Stroke Research and Treatment 2010; Volume 2011.
3. Jeyaraj Durai Pandian, Paulin Sudhanb, Stroke Epidemiology and Stroke Care Services inIndia. Journal of Stroke 2013; 15(3):128-134.
4. Sarah F Tyson, Marie Hanley, Jay Chillala, Andrea Selley and Raymond C Tallis. Balance Disability after Stroke. PhysTher 2006; 86:30-38.
5. Alison J Orrell, Frank F Eves and Rich SW Masters. Motor Learning of a Dynamic Balancing Task after Stroke:Implicit Implications for Stroke Rehabilitation, PhysTher 2006; 86:369-380.
6. Martina Mancini and Fay B Horak, The relevance of clinical balance assessment tools to differentiate balance deficits, Eur J Phys Rehabil Med 2010; June;46(2) 239–248.
7. Carolyn Kisner, Lynn Allen Colby: Theraputic exercise: Foundation & technique; fifthedition.2007.
8. Debra J. Rose, Nicole Lucchese, Lenny D. Wiersma ; Development of a Multidimensional Balance Scale for Use With Functionally Independent Older Adults, American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation 2006.
9. Mei Wa Rosanna Chau, Suk Ping Chan, Yee Wah Wong, Mo Yee Polly Lau; Reliability and validity of the Modified Functional Ambulation Classification in patients with hip fracture; Hong Kong Physiotherapy Journal (2013) 31, 41-44.