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A STUDY TO FIND OUT RELIABILITY AND CONCURRENT VALIDITY OF FULLERTON ADVANCED BALANCE SCALE FOR ASSESSMENT OF FUNCTIONAL BALANCE IN SCHOOL GOING CHILDREN: OBSERVATIONAL STUDY

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ABSTRACT

Context: For the purpose of this study, functional balance in children is defined as the ability to maintain the center of mass with respect to the base of support during typical childhood activities of daily living, school, and play.

Aim: To find out reliability and concurrent validity of Fullerton advanced balance scale in school going children.

Settings and Design: The observational study was carried out in Shri U.S.B College of physiotherapy, Aburoad.

Method and Material: After the ethical approval from committee and written consent from guardian who were willing to participate in study, 52 schools going children were selected based on inclusion and exclusion criteria. Both the boys and girls, with age group 5 to 15 years were taken for the study. The children 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 PBS to find out concurrent validity of FAB Scale.

Stastical analysis: Data was analysed by using SPSS Version 20. Intra and inter rater reliability and concurrent validity of FAB Scale were assessed by Spearman's correlation coefficient.

Results: Spearman's correlation coefficient value for Intra rater reliability is 0.782 , Inter rater reliability is 0.738 and concurrent validity is 0.751 which show moderately positive correlation of Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatrics Balance Scale.

Conclusion: The Fullerton Advanced Balance Scale appears to be reliable and valid test to independent school going children 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 reliability for assessment of functional balance in school going children.

KEYWORDS : Inter rater reliability, Intra rater reliability, Concurrent validity, Fullerton Advanced Balance Scale (FAB), Pediatrics Balance Scale (PBS)

INTRODUCTION

Balance is the ability to maintain one's projected center of mass with respect to one's base of support to orient and align the body in space.[1] Balance is a requisite component for successful completion of functional activities including locomotor and manipulative skills. For the purpose of this study, functional balance in children is defined as the ability to maintain the center of mass with respect to the base of support during typical childhood activities of daily living, school, and play.[1]

Examination of balance is an important element of a physical therapy evaluation for a school-age child. The clinician must predict the ability of the child to safely and independently function in a variety of environments (i.e. home, school, and community).[2] Valid and reliable functional balance measures are of critical importance if the pediatric physical therapist is to justify that intervention is warranted and demonstrate that improved balance function has occurred as a result of intervention.[2]

Traditionally, pediatric physical therapists have examined balance through the observation of the underlying elements of the balance response, timed measures of static postures, and standardized developmental measures of gross motor function.[3-6]

Distinguishing among varying levels of balance ability and identifying patterns of impairment as part of early intervention require valid screening tools. There are several existing balance assessment tools for use with clinical populations; however, a prospective study of five clinical balance tests, including the Berg Balance Scale (BBS), 4 timed up-and-go (TUG), and Dynamic Gait Index (DGI), concluded that factors contributing to falls may interact differently at different ages and activity levels; current tests are not as successful in predicting fall risk in active older adults as they have been found to be in more frail populations.[7]

The Fullerton Advanced Balance (FAB) Scale is a relatively new multi-item balance- assessment test designed specifically to measure balance in higher-functioning active older adults. Content validity is based on theoretical analysis of components of static balance and dynamic balance control, sensory reception and integration, and anticipatory and reactive postural control. The test is composed of 10 items.[7]

The Pediatric Balance Scale (PBS), modified by based on Berg Balance Scale (BBS) has been used in several studies to assess balance ability in children, especially those with balance problem[8]

The FAB scale is a performance-based measure that was developed to identify the subtle changes in balance and comprehensively approach the multiple dimensions of balance (Rose et al, 2006). It includes items that are specifically designed to assess the balance abilities in higher functioning individuals and to assess the multiple dimensions of balance including both static and dynamic environments, and reactive postural control. PBS is easy to use and requires minimal equipment, it has been widely applied and therefore, translated into at least nine different languages (Darr et al, 2015). However, the PBS has several limitations. First, it does not include items that assess dysfunction of the multiple sensory systems such as the visual and vestibular systems associated with balance function during gait. [9]

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 (eg, sensory, musculoskeletal, neuromuscular) that might be contributing to balance problems.

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.[10]

NEED FOR THE STUDY

There are already many ways of measuring balance, but very less are suitable for use in the clinical setting to assess functional balance, the effects of individual rehabilitation interventions or to measure change over a short term and balance assessment in school going children is mos important for physical assessment.

The Fullerton Advanced Balance Scale is convenient, quick, more challenging, easy to access with periodically and simple to administer for functional balance evaluation in school going children.

There is no study which finds the reliability and con-current validity of Fullerton Advance Balance Scale with pediatrics balance Scale. 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 school going children.

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 school going children.

OBJECTIVES OF THE STUDY

1. To assess inter and intra-rater reliability of the Fullerton advanced balance scale for assessment of functional balance in school going children.
2. To assess concurrent validity of the Fullerton advanced balance scale for assessment of functional balance in school going children.

MATERIAL AND METHODS

STUDY SETTING: Shri U.S.B college of Physiotherapy, Aburoad

STUDY DESIGN: An Observational study

METHOD OF COLLECTION OF DATA:

Source of data collection: Ummed international school, ABUROAD.
Study population: school going children
Sampling method: Purposive sampling
Sample size: 52 subjects

Materials to be used: **FIG: 1 (a - b)**

- Consent form , Measurement form, Pencil and Pen
- 12 inch ruler
- 6 inch high stool
- Stop Watch
- Measure tape
- Chair
- Foam Surface
- Mini Mental Status Examination Scale
- Fullerton Advanced Balance Scale
- Pediatrics Balance Scale

FIG: 1(a) Material used in the study FIG: 1(b) Foam Surface and 6 inch High stool used in the study

CRITERIA FOR SELECTION:

Inclusion Criteria:

- School going children between 5–15 years of age ➢ Independent standing(more than 4 sec)[7]
- Able to ambulate independently without assistive devices.

Exclusion Criteria:

- Subjects who have under gone medical procedures likely to affect motor function
- Severe abnormalities such as seizure, Mental retardation
- No participation in other therapeutic programs
- Orthopaedic surgery
- Use of assistive device.
- Learning disability

MEASUREMENT PROCEDURE

- The subjects have been selected on the basis of inclusion and exclusion criteria.

Before starting the study, brief assessment has been done by Mini Mental State Examination and consent was taken from the subjects as well as principal of the school.

subjects were then explained about the test and procedure to be conducted Fullerton Advanced Balance Scale conducted to check Functional balance in school going children. The FAB Scale was conducted twice by same rater (Rater A1 and Rater A2) at different time (after 24 hours of duration). PBS was taken to find out concurrent validity by rater A1.

RESULTS

All the statistical analysis was done by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0 for windows.

Intra rater, inter rater reliability and concurrent validity of FAB Scale were assessed by Spearman's correlation coefficient. Level of significance (p value) was set to 0.01 level.

Table 1 - Age distribution of children (years)

AGE (YEARS)	NO OF SUBJECTS
5 - 7	13
8 -10	14
11 - 13	23
14 - 16	2
TOTAL	52

Table 2:- Mean value and Standard Deviation of Fullerton Advanced Balance Scale and pediatric balance Scale in children

Outcome Measure Rater	Mean	Standard deviation
Fullerton Advanced Balance Scale	A1	A1 38.750 ± 1.266
Fullerton Advanced Balance Scale	B	39.096 ± 1.142
Fullerton Advanced Balance Scale	A2	39.150 ± 0.894
Pediatrics balance scale	A1	55.653 ± 0.653

Table 3:- Spearman correlation coefficient showing Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatric Balance Scale of children

Measure Spearman		P Value
Correlation Coefficient ® Value	Reliability	0.000
	Inter Rater Reliability	0.000

Intra Rater Reliability **0.782 0.000
Inter Rater Reliability **0.738 0.000
Concurrent Validity **0.751 0.000
** Correlation is significant at the 0.01 level (p value <0.01)

Interpretation: table shows moderate positive correlation of Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatric Balance Scale.

DISCUSSION

This study was conducted to check Inter, Intra Rater reliability and con-current validity of the Fullerton advanced balance scale for assessment of functional balance in school going children. In the above study the results for intra, inter rater reliability and concurrent validity suggested moderate positive correlation with Rater A1 and Rater A2 both which suggest that functional balance can reliably and validly be measured in school going children by using Fullerton Advanced Balance Scale.

Balance impairments increase fall risk, resulting in high economic costs and social problem. Decreased muscle strength, range of movement, abnormal muscle tone, motor coordination, sensory organization, cognition, and multisensory integration can contribute balance disturbances at different levels.[6]

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 olde adults residing in the community.[7]

Item 10 (reactive postural control) was found to measure a balance-control mechanism different from that measured by the other nine FAB scale items. 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.[8]

During the study it was observed that in FAB Scale Item 5 (Tandem walk), Item 6 (Stand on one leg) and Item 8 (Two footed jump) are more difficult in subjects. It is more challengeable items to perform in children.

Penelope J. Klein et al, (2009), conducted a study on research analysis of the Fullerton advanced balance scale and concluded that the scale appears to be a reliable and valid tool to assess balance function in older adults. The test was found to discriminate among participants of varying balance abilities. It also determine the test is for diagnostic prescriptive utility.[8]

The present study finding suggests that Fullerton Advanced Balance

scale is reliable and valid scale to measure Functional balance in school going children.

Limitation of the study

Small sample size, specific age criteria for study population was not taken in to consideration.

Further recommendation

Study can be performed in specific age criteria and Physiotherapist with different years of experience can be taken to check inter rater reliability.

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CONCLUSION

The Fullerton Advanced Balance Scale appears to be reliable and valid test to school going children 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 reliability for assessment of functional balance in children.

Conflict of Interest: Nil.
Source of Fund: No fund was needed.
Ethical Clearance: From Shri U.S.B college of Physiotherapy, Aburoad.

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