RESEARCH PAPER

Awareness and Utilisation of Balance Assessment Tools Among Budding Physiotherapists for Identifying Multisensory Integration Deficits and Their Correlation with Fall Risk: A Cross-Sectional Study

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ABSTRACT

Background: Postural control depends on the seamless integration of visual, vestibular, and somatosensory inputs. While standardized tools exist to assess these components, clinicians often utilize isolated elements rather than complete protocols, which may limit the accuracy of fall risk screening.

Aim: To evaluate the awareness and clinical utilization of standardized balance assessment tools among budding physiotherapists.

Method: A cross-sectional study was conducted among 155 physiotherapy interns and postgraduates using a validated, self-structured questionnaire. The study focused on four tools: Tinetti POMA, Mini-BESTest, m-CTSIB, and Dual-task TUG. Content validity (S-CVI = 0.95) and reliability ($\alpha = 0.511$) were established.

Results: Most participants were aware of multisensory integration (87.7%) and its clinical importance (93.5%). However, complete standardized tools were used less often than individual components such as eyes-closed standing (92.3%) and dual-task walking (72.3%). Awareness was significantly associated with utilization ($p = 0.005$) and moderately correlated with confidence ($r = 0.42$, $p < 0.001$).

Conclusion: Budding physiotherapists showed good awareness about balance assessment tools, but complete standardized tools were not used consistently in clinical practice, with more preference given to individual components.

Keywords: Balance assessment, Multisensory integration, Fall risk, Physiotherapy students, Standardized outcome measures, Postural control.

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Introduction

Falls are a major health concern among older adults worldwide and are defined as events in which a person unintentionally comes to rest on the ground or a lower level.[1] Approximately one in three adults aged 65 years and above experiences a fall annually.[2] Falls can lead to fractures, reduced

independence, fear of movement, decreased quality of life, prolonged hospitalisation, and increased healthcare costs.[1] Therefore, early identification of individuals at risk of falling is essential

Balance plays a crucial role in fall prevention and depends on the integration of information from the visual, vestibular, and somatosensory systems.[4] The process by which the brain combines and interprets these sensory inputs to maintain posture and stability is known as multisensory integration. With ageing, these systems become less efficient. Proprioception decreases, vestibular responses may become delayed, and vision may become less sharp, affecting the brain's ability to integrate sensory information effectively.[5,6] This condition is referred to as a multisensory integration deficit and may result in reduced stability, particularly under challenging conditions such as uneven surfaces or low-light environments.[6]

A related concept, sensory reweighting, describes the ability of the nervous system to adjust its reliance on different sensory inputs according to environmental demands.[4] When one sensory system provides insufficient information, the body compensates by relying more heavily on other available inputs. In older adults, this adaptation may be impaired, making balance maintenance more difficult. Previous studies have shown that impaired multisensory integration is associated with increased body sway, delayed postural responses, reduced stability, and a greater risk of falls.[5,6]

Several standardised tools are available to assess balance and fall risk in clinical practice. The Modified Clinical Test of Sensory Interaction in Balance (m-CTSIB) evaluates an individual's ability to utilise sensory inputs under different conditions.[7] The Performance-Oriented Mobility Assessment (POMA/Tinetti) assesses balance and gait performance.[8] The Dual-Task Timed Up and Go (DT-TUG) evaluates mobility while performing an additional cognitive or motor task.[9] The Mini-BESTest provides a comprehensive assessment of dynamic balance, postural responses, and gait abilities.[10]

Despite their clinical value, standardised balance assessment tools are not consistently used in physiotherapy practice.[13–16] Physiotherapists often rely on simpler or non-standardised methods because of time constraints, limited resources, inadequate training, or lack of confidence in administering and interpreting these measures.[14,18–20] Consequently, important balance impairments may remain unidentified during routine assessments. Furthermore, no single assessment tool can comprehensively predict fall risk. A combination of standardised assessments and clinical judgement is considered more effective for identifying multiple factors contributing to falls.[12] Therefore, it is important to understand how well physiotherapists are aware of these assessment tools and whether they utilise them in practice. This study investigates the awareness and utilisation of balance assessment tools among budding physiotherapists, with particular emphasis on multisensory integration deficits and fall risk. It also explores whether complete standardised tools or only selected components are used during assessment, as partial utilisation may influence assessment accuracy and clinical decision-making. Identifying gaps in knowledge and practice may help strengthen physiotherapy training and improve fall-prevention strategies.

Materials and Methodology

Study Design and Setting

This study was designed as a cross-sectional observational study conducted among budding physiotherapists in Chh. Sambhajinagar, Maharashtra, India. The duration of the study was one year.

Participants and Sampling

A total of 155 budding physiotherapists, including interns and postgraduate students, were included in the study. The sample size was calculated using Yamane formula. Participants were selected using purposive and snowball sampling methods from the eligible population.

Inclusion and Exclusion Criteria

Inclusion criteria:

Participants included physiotherapy students currently enrolled in compulsory rotatory internship and MPT students from colleges located in Chhatrapati Sambhajinagar who were willing to participate and provide informed consent.

Exclusion criteria:

Participants who were unwilling to participate, submitted incomplete responses, or were not physiotherapy interns or postgraduate students. Participants with specialized training in balance or vestibular rehabilitation were excluded from the study.

Outcome Measures

Awareness and utilisation of balance assessment tools were assessed using a self-structured questionnaire developed for the study. The questionnaire included items related to awareness, utilisation, and confidence regarding balance assessment tools used for identifying multisensory integration deficits and fall risk. The questionnaire included components related to the Modified Clinical Test of Sensory Interaction in Balance (m-CTSIB), Tinetti Performance Oriented Mobility Assessment (POMA), Mini-Balance Evaluation Systems Test (Mini-BESTest), and Dual-task Timed Up and Go (TUG).

Content validity of the questionnaire was established using the Scale Content Validity Index (S-CVI = 0.95), and reliability analysis showed internal consistency with Cronbach's alpha of 0.511 and McDonald's omega coefficient of 0.560.

Procedure

After obtaining approval from the Institutional Ethics Committee, participants were recruited through a Google Form containing the informed consent form, demographic details, and study questionnaire. The purpose and procedure of the study were explained to all participants before participation. Individuals who met the inclusion criteria and provided consent were included in the study. Participants completed the questionnaire online, and the collected data were analysed to assess awareness and utilisation of balance assessment tools and their association with confidence levels among budding physiotherapists.

Statistical Analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to summarise demographic variables and levels of awareness, utilisation, and confidence related to balance assessment tools. Chi-square test was used to analyse associations between variables, and Spearman's rank correlation coefficient was used to assess the relationship between awareness and confidence. Reliability of the questionnaire was assessed during the pilot study using Cronbach's alpha ($\alpha = 0.511$) and McDonald's omega ($\omega = 0.560$), while content validity was established using the Scale Content Validity Index (S-CVI = 0.95). A p-value of less than 0.05 was considered statistically significant.

RESULTS

Tables and Graphs

Table 1: Demographics

Gender	**Frequency (n)**	**Percentage (%)**
Female	122	79%
Male	33	21%
Academic Level	**Frequency (n)**	**Percentage (%)**
Interns	94	61%
Postgraduates	61	39%

Table 2: Overall Key Findings

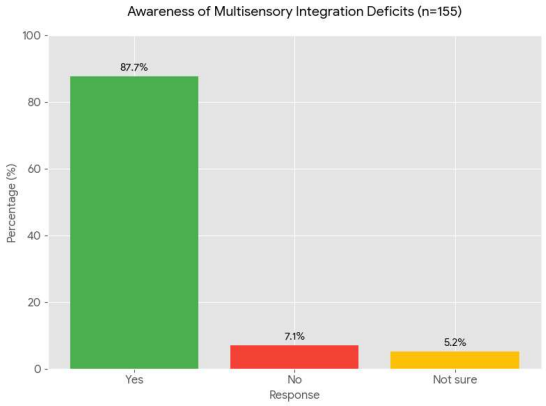
Parameter	**Observation**
Highest Awareness	Dual-task TUG
Lowest Awareness	m-CTSIB
Highest Usage	m-CTSIB tasks
Awareness vs Usage	Usage higher than awareness

The results of the present study are presented under demographic characteristics, awareness, utilisation, confidence, and statistical associations. The study population was predominantly female (79%) and mainly comprised interns (61%). A majority of participants demonstrated good awareness of multisensory integration deficits (87.7%) and recognised the importance of sensory-based balance assessment (93.5%).

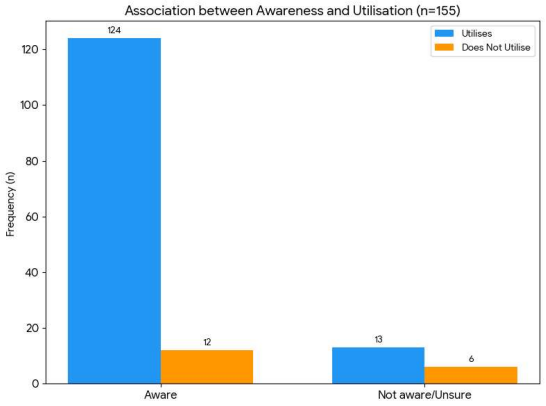
However, there was some variation in awareness of different balance assessment tools. Participants were more aware of dual-task Timed Up and Go components, while awareness was lower for m-CTSIB components. The use of balance assessment components was generally high, especially for eyes-closed testing (92.3%) and dual-task walking (72.3%), although some components were used less often.

It was also seen that certain components were used more frequently even when overall awareness of the complete tool was lower, showing a difference between knowing the full standardized tool and actually using its individual parts. A significant association was found between awareness and utilisation ($p = 0.005$), and a moderate positive correlation was observed between awareness and confidence ($r = 0.42$, $p < 0.001$), indicating that participants with better awareness were more likely to use the tools and felt more confident.

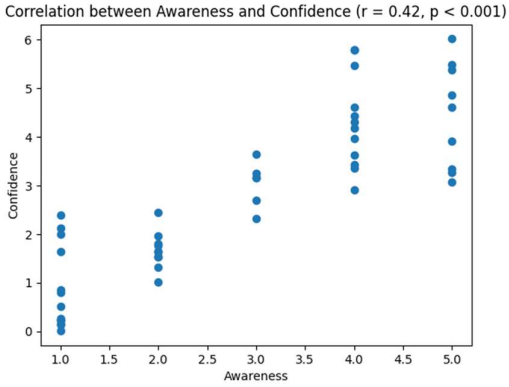
Graph 1: Awareness of Multisensory Integration Deficits



Graph 2: Awareness vs Utilisation



Graph 3: Correlation Between Awareness and Confidence



Discussion

The present study assessed the awareness and utilisation of balance assessment tools among budding physiotherapists, with a focus on multisensory integration deficits and fall risk. Falls remain a significant clinical concern because of their association with injury, loss of independence, and increased healthcare burden.[1,2] Since postural control depends on the integration of visual, vestibular, and somatosensory inputs, impairments in these systems can substantially increase fall risk.[3–7]

The findings revealed good awareness of multisensory integration and its role in balance control among most participants. This is consistent with previous studies reporting adequate theoretical knowledge of balance assessment and fall prevention among physiotherapists, although the

translation of knowledge into clinical practice remains variable.[14,16] Similar discrepancies between knowledge and implementation of standardised outcome measures have also been reported previously.[15,19,20]

Awareness was highest for the Dual-Task Timed Up and Go (DT-TUG), particularly cognitive-motor tasks. This finding is supported by previous research demonstrating its usefulness in identifying mobility impairments and predicting falls.[10] In contrast, awareness of m-CTSIB components, including foam and eyes-closed conditions, was comparatively lower despite evidence supporting their role in detecting sensory dependence and vestibular dysfunction.[8,12] This may reflect limited emphasis on multisensory assessment during early clinical training.

Although awareness of standardised balance assessment tools varied, components such as eyes-closed standing and dual-task walking were frequently utilised. This finding suggests that participants often employed individual assessment components without recognising their association with complete standardised tools, a pattern also reported in previous studies.[15,16,20]

Utilisation was greater for components derived from the Tinetti POMA and Mini-BESTest, particularly gait and functional task assessments. These findings align with evidence supporting their reliability and usefulness in identifying balance impairments and fall risk.[9,11] However, sensory integration and confidence-related components were used less frequently, indicating that vestibular and psychological factors influencing balance may not be adequately assessed.[13,17]

A significant association between awareness and utilisation ($p = 0.005$) was observed, suggesting that greater familiarity with balance assessment tools promotes their clinical application. Similar findings have highlighted the importance of education and training in improving the use of outcome measures.[19,21] Furthermore, postgraduate students demonstrated higher awareness than interns, likely reflecting greater clinical exposure and experience.

A moderate positive correlation between awareness and confidence ($r = 0.42$, $p < 0.001$) was observed, suggesting that increased knowledge may enhance self-reported clinical confidence. However, utilisation remained inconsistent, indicating that confidence alone does not ensure implementation of standardised tools. Barriers such as limited exposure, time constraints, and insufficient curricular emphasis may contribute to this gap.[15,20]

Previous evidence indicates that no single balance assessment tool is sufficient for accurately predicting fall risk, emphasising the need for a multifactorial assessment approach.[13,17,18] The present findings support this concept, as participants relied more on selected assessment components than complete standardised tools, potentially limiting comprehensive evaluation of multisensory integration deficits.

The novelty of this study lies in its focused evaluation of awareness and utilisation of multiple balance assessment tools in relation to multisensory integration deficits among budding physiotherapists. Unlike previous studies that primarily examined practicing clinicians or individual assessment tools, this study provides insight into early-stage clinical behaviour and highlights the tendency to use isolated assessment components rather than complete standardised measures during training.

This study has certain limitations, including recruitment from a specific geographic region and reliance on self-reported responses, which may limit the generalisability of the findings.

Overall, the findings indicate that budding physiotherapists possess good theoretical knowledge of multisensory integration and balance assessment. However, a gap remains between awareness and the use of complete standardised assessment tools. Strengthening structured clinical training and promoting comprehensive balance assessment protocols may improve identification of multisensory integration deficits and enhance fall-risk evaluation in physiotherapy practice.

Conclusion

Budding physiotherapists demonstrated good awareness of multisensory integration and balance assessment tools. However, utilisation of complete standardised assessments remained inconsistent. Many participants reported using individual components of balance assessments rather than the full standardised tools. Awareness was significantly associated with utilisation, highlighting the importance of knowledge and training in promoting evidence based assessment practices. Strengthening structured clinical education and emphasising comprehensive balance assessment may improve identification of multisensory integration deficits and fall risk evaluation in physiotherapy practise.

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