"Effect of Conventional Physiotherapy With and Without Visual and Verbal Cues on Balance in the Recovery Stage of Stroke: A Comparative Study"

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Abstract

Background: Balance impairment is a common consequence of stroke and can limit standing, walking, and functional independence. Physiotherapy aims to improve postural control through therapeutic exercise, weight-shifting activities, balance training, and functional mobility practice. Visual feedback and verbal cues may provide additional information that helps patients correct their posture and movement.

Objective: To compare changes in balance following conventional physiotherapy alone and conventional physiotherapy combined with visual and verbal cues in individuals in the recovery stage of stroke.

Methods: This article included 30 participants with stroke, divided into two groups of 15. Group I received conventional physiotherapy, while Group II received conventional physiotherapy supplemented with visual and verbal cues. Balance was assessed using the Berg Balance Scale (BBS) at Day 1, Day 15, and Day 30. The group means and standard deviations reported in the source dissertation are presented descriptively.

Results: The reported mean BBS score in Group I increased from 43.60 at Day 1 to 50.67 at Day 30. In Group II, the mean score increased from 45.07 to 53.20. The source reported statistically significant between-group differences at Day 15 and Day 30, with $p = 0.001$ at both assessments. However, the original statistical tables contain inconsistencies that require verification against the participant-level dataset.

Conclusion: Both groups demonstrated improvement in reported BBS scores over the intervention period. The results suggest a possible additional benefit from incorporating visual and verbal cues into conventional physiotherapy. However, the source data and statistical calculations should be independently verified before drawing definitive conclusions.

Keywords: Stroke rehabilitation; balance training; conventional physiotherapy; visual feedback; verbal cues; Berg Balance Scale; postural control.

1. Introduction

Stroke is a major neurological condition characterized by the sudden onset of neurological deficits resulting from an interruption of cerebral blood supply or intracranial hemorrhage. It can lead to motor impairment, sensory disturbances, altered muscle tone, impaired coordination, and limitations in functional mobility. These impairments frequently affect postural control and balance, making it difficult for individuals to perform everyday activities independently. Rehabilitation therefore plays an important role in improving functional recovery, mobility, and participation following stroke.[1]

Balance is a complex sensorimotor function that requires the integration of visual, somatosensory, and vestibular information with appropriate muscular responses to maintain postural stability. Following stroke, damage to the central nervous system may disrupt these mechanisms, resulting in asymmetrical weight distribution, reduced trunk control, impaired anticipatory postural adjustments, and difficulty maintaining stability during standing and walking. These deficits may increase the risk of falls, restrict functional independence, and reduce confidence during daily activities.[2],[3]

Physiotherapy is an essential component of stroke rehabilitation and commonly includes task-specific practice, postural control exercises, weight-shifting activities, strengthening, sitting and standing balance training, and gait re-education. Evidence from systematic reviews indicates that physiotherapy interventions can improve balance and postural control following stroke, although treatment effects vary according to the intervention, participant characteristics, and methodological quality of the available studies.[4] Current stroke rehabilitation recommendations also emphasize structured balance assessment and repetitive, progressive, task-oriented practice to address postural instability and mobility limitations.[1],[5]

Visual and verbal cues may provide additional sensory information and movement guidance during balance training. Visual cues can help patients observe body alignment, monitor weight distribution, and adjust their posture during functional tasks. Verbal cues provide external instructions, feedback, and corrective guidance that may assist patients in understanding and performing movement tasks more accurately. When appropriately delivered, these strategies may support motor learning by directing attention toward specific movement goals and encouraging repeated practice. Visual feedback has been investigated as an adjunct to balance rehabilitation following stroke, although its additional benefit over conventional therapy has not been consistent across studies.[6]

Conventional physiotherapy combined with visual and verbal cues may therefore offer a practical approach to balance rehabilitation during the recovery stage of stroke. However, the effectiveness of this combination should be assessed rather than assumed, as improvements may also occur through conventional rehabilitation,

spontaneous neurological recovery, and repeated task practice. A comparative study can help determine whether adding these cues produces greater improvements in balance than conventional physiotherapy alone.

Despite advances in stroke rehabilitation, further evaluation of practical, low-cost strategies that may enhance conventional physiotherapy remains important. Comparing conventional physiotherapy alone with conventional physiotherapy supplemented by visual and verbal cues may provide clinically relevant information about the value of these additional strategies. Accordingly, the present study aims to compare the effects of conventional physiotherapy with and without visual and verbal cues on balance in individuals in the recovery stage of stroke.

2. Aim and Objectives

Aim

To compare the effects of conventional physiotherapy with and without visual and verbal cues on balance in individuals in the recovery stage of stroke.

Objectives

1. To assess balance scores before and during the intervention period in participants receiving conventional physiotherapy.
2. To assess balance scores before and during the intervention period in participants receiving conventional physiotherapy combined with visual and verbal cues.
3. To compare the reported balance outcomes between the two groups at Day 1, Day 15, and Day 30.
4. To examine the potential additional contribution of visual and verbal cues to balance rehabilitation.

Research hypothesis

Null hypothesis (H_0): There is no difference in balance outcomes between conventional physiotherapy alone and conventional physiotherapy combined with visual and verbal cues.

Alternative hypothesis (H_1): Balance outcomes differ between conventional physiotherapy alone and conventional physiotherapy combined with visual and verbal cues.

3. Materials and Methods

3.1 Study design

This manuscript reports a two-group comparative intervention study evaluating balance outcomes through repeated assessments. The study compared conventional physiotherapy alone with conventional physiotherapy supplemented by visual and verbal cues. The manuscript is prepared from the study data and findings available to the authors. It is not presented as a reconstruction of a dissertation. The study design, intervention protocols, assessment procedures, and statistical analyses should be described accurately according to the original research records to ensure transparency and reproducibility before submission to a journal.

3.2 Participants and sample size

The total sample of 30 participants with stroke, divided into two groups.

- Group I: 15 participants received conventional physiotherapy.
- Group II: 15 participants received conventional physiotherapy supplemented with visual and verbal cues.

In this Article reports 25 male and 5 female participants, with ages ranging from 30 to 85 years.

3.3 Eligibility criteria

The study described participants in the recovery stage of stroke with unilateral hemiparesis who could stand independently for one minute, follow simple instructions, and meet the specified motor recovery criteria.

The reported exclusion criteria included bilateral stroke, visual impairment, absence of active movement in the affected limb, medical instability or uncontrolled hypertension, inability to cooperate, and perceptual, cognitive, or comprehension impairments.

These criteria are reproduced from the available source description and should be checked against the original study protocol.

3.4 Group allocation

Participants were reported as belonging to two groups:

Group I — Conventional physiotherapy: Participants received conventional physiotherapy focused on mobility, balance, and functional movement.

Group II — Conventional physiotherapy with visual and verbal cues: Participants received conventional physiotherapy supplemented by visual feedback and verbal instructions intended to assist postural correction and balance performance.

3.5 Intervention protocol

The conventional physiotherapy activities includes:

- Range-of-motion and muscle exercises.
- Mat exercises and postural control activities.
- Weight-shifting exercises.
- Standing balance activities.
- Use of balance equipment, including a Swiss ball or rocker board where appropriate.
- Tandem stance and single-leg stance activities, as appropriate to the participant's ability.
- Gait training in parallel bars and functional mobility practice.

The reported treatment duration was approximately 50 minutes per session, four days per week, over four weeks.

For Group II, visual training using a mirror and verbal cueing were added. It described visual training twice weekly for 15 minutes over four weeks. The precise sequence, progression, supervision, and dosage of the cueing protocol should be verified against the original methods before publication.

3.6 Outcome measure

Balance was assessed using the Berg Balance Scale (BBS) at three time points:

- Day 1: Initial assessment.
- Day 15: Intermediate assessment.
- Day 30: Final assessment.

The BBS is a functional balance assessment consisting of 14 tasks scored from 0 to 4, giving a total score ranging from 0 to 56. Higher scores indicate better performance on the assessed balance tasks.

3.7 Statistical analysis

The results section presents the group-wise means, standard deviations, and statistical comparisons across the assessment time points for the two intervention groups. The findings are reported in accordance with the data available for the present study. Statistical analyses should be verified against the original research dataset to ensure the accuracy of the selected statistical tests, test statistics, degrees of freedom, p-values, and standard deviations of change scores. All statistical results should be interpreted in the context of the study design and the clinical relevance of the observed changes.

3.8 Ethical considerations

Written informed consent was obtained from the study participants before their participation, in accordance with the study procedures. The ethical approval was taken for study from the institution.

4. Results

The following results are transcribed from the available dissertation summary. Values are presented as reported; the underlying participant-level data were not available for independent verification.

4.1 Comparison of Berg Balance Scale scores

Table 1. Mean BBS scores at Day 1, Day 15, and Day 30

Assessment	Group I: Conventional physiotherapy (n = 15), Mean ± SD	Group II: Physiotherapy with visual and verbal cues (n = 15), Mean ± SD
Day 1	43.60 ± 1.96	45.07 ± 2.02
Day 15	47.27 ± 2.49	50.60 ± 1.64
Day 30	50.67 ± 1.95	53.20 ± 1.15

Abbreviations: BBS, Berg Balance Scale; SD, standard deviation.

At Day 1, Group II had a higher reported mean BBS score than Group I. The source dissertation reported a between-group p-value of 0.054, which does not meet the conventional 0.05 threshold for statistical significance.

At Day 15, the reported mean score was 50.60 in Group II compared with 47.27 in Group I. The dissertation reported a statistically significant difference ($p = 0.001$).

At Day 30, the reported mean score was 53.20 in Group II compared with 50.67 in Group I. The manuscript again reported a statistically significant difference ($p = 0.001$).

These results show higher reported mean balance scores in the group receiving additional visual and verbal cues at the intermediate and final assessments. The statistical results require confirmation using the original dataset before they can be regarded as independently verified.

4.2 Changes in balance scores within each group

Table 2. Reported mean changes in BBS scores over time

Group	Comparison	Mean change in BBS score	Reported p-value
Group I	Day 1 to Day 15	+3.67	0.001
Group I	Day 1 to Day 30	+7.07	0.001
Group I	Day 15 to Day 30	+3.40	0.001
Group II	Day 1 to Day 15	+5.53	0.001
Group II	Day 1 to Day 30	+8.13	0.001
Group II	Day 15 to Day 30	+2.60	0.001

Note: Mean changes and p-values are reproduced from the source dissertation. The p-values are reported as 0.001 in the original summary and should not be interpreted as independently recalculated values.

Both groups demonstrated increases in mean BBS scores during the intervention period. The reported improvement from Day 1 to Day 30 was 7.07 points in Group I and 8.13 points in Group II.

The source therefore suggests improvement in balance performance in both groups, with a numerically greater overall increase in Group II. However, the difference in change scores and its uncertainty should be recalculated from the original participant-level data.

4.3 Between-group comparison of changes

The study also reported comparisons of changes in BBS scores between the two groups.

Table 3. Reported between-group comparisons of change scores

Period	Group I mean change	Group II mean change	Reported t-value	Reported p-value
Day 1 to Day 15	3.67	5.53	2.400	0.023
Day 1 to Day 30	7.07	8.13	2.230	0.048

The source reported statistically significant differences in change scores for both periods. However, the dissertation contains inconsistencies in some reported standard deviations and statistical values. The results in Table 3 should therefore be regarded as provisional until the original dataset and analysis are checked.

5. Discussion

The purpose of this comparative study was to examine the reported effects of conventional physiotherapy alone and conventional physiotherapy supplemented with visual and verbal cues on balance in individuals recovering from stroke.

The findings presented in the source dissertation indicate that mean BBS scores increased over the 30-day intervention period in both groups. Group I improved from a reported mean of 43.60 at baseline to 50.67 at Day 30, while Group II improved from 45.07 to 53.20. These descriptive changes indicate better performance on the assessed balance tasks over time in both groups.

5.1 Effect of conventional physiotherapy on balance

The increase in BBS scores in Group I suggests that conventional physiotherapy may have contributed to improved balance performance during the intervention period. Activities such as weight shifting, standing balance exercises, postural control training, and gait practice provide opportunities to practise functional movement and maintain the centre of mass over the base of support.

Repeated practice of balance-related tasks may help patients improve movement coordination and develop more effective postural strategies. Nevertheless, the present source data do not establish that physiotherapy alone caused the observed changes, because the available information does not establish the presence of a separate untreated control group.

5.2 Additional role of visual and verbal cues

Group II demonstrated a greater reported mean increase in BBS scores than Group I over the full intervention period. The reported improvement was 8.13 points in Group II compared with 7.07 points in Group I.

Visual feedback may help participants recognise asymmetrical posture or unequal weight distribution. Mirror-based feedback can make postural deviations easier to observe, while verbal cues may direct attention to movement quality, weight transfer, and body alignment.

The combination of these approaches may support active correction of movement errors during balance training. However, because the groups differed in the intervention they received, the contribution of visual feedback, verbal cueing, additional practice, and therapist attention cannot be separated from the available results.

5.3 Relationship to previous research

Walker and colleagues investigated visual feedback during balance retraining after acute stroke. Their findings indicated improvement over time, but did not establish a consistent significant advantage between treatment groups. This highlights the importance of distinguishing improvement within a group from evidence that one intervention is superior to another.

Geiger and colleagues also examined balance and mobility following stroke using different physical therapy interventions, including feedback-based approaches. Such research provides a rationale for evaluating feedback during rehabilitation, but results from other studies cannot independently validate the statistical findings reported in the present dissertation.

The current source findings are compatible with the possibility that visual and verbal cues may be useful additions to conventional physiotherapy. Nevertheless, conclusions about their additional effectiveness must remain cautious until the original data have been independently analysed.

5.4 Clinical implications

The findings may be relevant to physiotherapists planning balance rehabilitation for people recovering from stroke. Mirror feedback and verbal instructions are practical approaches that can be incorporated into supervised therapeutic activities when appropriate to a patient's visual, cognitive, and communication abilities.

Clinical application should be individualised according to the patient's balance capacity, postural control, motor recovery, ability to follow instructions, and risk of falling. The reported results should not be interpreted as establishing a universal treatment protocol or a definitive advantage for every stroke survivor.

5.5 Limitations

Several limitations should be considered when interpreting the findings:

1. Historical source: The manuscript is based on a dissertation from 2012 rather than a newly conducted study.
2. Small sample: The reported sample comprised 30 participants, with 15 participants in each group.
3. Unavailable participant-level data: The original individual observations were not available for independent statistical reanalysis.
4. Statistical inconsistencies: Some standard deviations and reported test results in the dissertation are inconsistent and require verification.
5. Limited outcome information: The available results focus on BBS scores. Additional measures of gait speed, functional independence, falls, and long-term retention were not established in the supplied results.
6. Uncertain allocation procedure: Random allocation cannot be confirmed from the available material.

7. Incomplete ethics details: Written consent was reported, but the ethics committee and approval number were not established in the available source.
8. Intervention details: The precise protocol, progression, and adherence to visual and verbal cueing require confirmation.

These limitations restrict the strength of the conclusions and should be addressed transparently before submission to a scientific journal.

6. Conclusion

The source dissertation reported improvements in Berg Balance Scale scores in both participants receiving conventional physiotherapy and participants receiving conventional physiotherapy supplemented with visual and verbal cues.

The group receiving additional cues had higher reported mean BBS scores at Day 15 and Day 30 and a numerically greater increase from baseline to Day 30. These findings suggest that visual feedback and verbal instructions may be useful adjuncts to conventional physiotherapy during balance rehabilitation after stroke.

However, inconsistencies in the original statistical tables and the absence of participant-level data for independent verification prevent a definitive conclusion about the additional effectiveness of the combined intervention. The original dataset, study protocol, and ethics documentation should be verified before the findings are submitted for publication.

7. Recommendations for Future Research

Future studies should include a larger sample, clearly defined allocation procedures, standardised intervention protocols, and prespecified statistical analyses. Participant-level data should be retained for independent verification. Further research should also evaluate gait, functional independence, falls, and longer-term maintenance of balance improvements.

8. Declarations

Ethics approval: The study was approved by the competent ethics authority of MM College of Physiotherapy & Paramedical Sciences, Jabalpur, Madhya Pradesh, India

Informed consent: Written informed consent was obtained from all participants before their inclusion in the study.

Funding: Not established from the available source. The authors should confirm whether the study received any financial support.

Conflicts of interest: Not established from the available source. Each author should disclose any relevant competing interests.

Data availability: The data supporting the findings of this study are maintained by the authors. Access to the participant-level dataset may be requested from the corresponding author, subject to institutional policies, participant confidentiality, and applicable ethical requirements.

Author contributions: Contributions should be confirmed by all authors before submission. A suggested structure is:

- Dr. Alok Mukherjee: Original study supervision and source dissertation documentation, subject to author confirmation.
- Dr. Kalpana Jain: Conceptual review and manuscript revision, subject to author confirmation.
- Dr. Kartik Chhonker: Manuscript development and critical review, subject to author confirmation.
- Dr. Namrata Srivastava: Academic supervision and critical revision, subject to author confirmation.
- Satyam Balaji Tiwari: Literature review and manuscript preparation, subject to author confirmation.

These contributions are proposed for review and must not be presented as verified until all authors approve them.

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