International Journal of Multidisciplinary Research and Growth Evaluation.

Effectiveness of Proprioceptive Training Regimen Combined with Kinesiotaping to Improve Balance in Spastic Diplegic Children Using Pediatric Balance Scale: An Experimental Study

Snehal Ankush Rathod [1*], Dr. Krutika Ishwar Kale [2], Dr. Jaywant Nagulkar [3]

[1] Bachelor of physiotherapy, Dr. Ulhas Patil college of Physiotherapy, Jalgaon 425001, Maharashtra University of Health Science, India

[2] Assistant Professor, Department of Neuro Physiotherapy, Dr. Ulhas Patil college of physiotherapy, Jalgaon 425001, Maharashtra University of Health Science, India

[3] Professor, Department of Musculoskeletal Physiotherapy, Dr. Ulhas Patil college of physiotherapy, Jalgaon 425001, Maharashtra University of Health Science

* Corresponding Author: **Snehal Ankush Rathod**

Article Info

ISSN (Online): 2582-7138
Impact Factor (RSIF): 7.98
Volume: 07
Issue: 01
Received: 08-11-2025
Accepted: 10-12-2025
Published: 12-01-2026
Page No: 433-440

Abstract

Background: Cerebral palsy is a lifelong condition that affects how the brain controls movement, posture, and balance, though it doesn't get worse over time. The most common form is spastic diplegia, which mainly impacts the legs. Children with this condition struggle with balance because their muscles are too tight, they have difficulty sensing where their body is in space, and they find it hard to maintain good posture. Helping these children improve their balance is crucial for allowing them to move around more easily and do things independently.

Aim: To evaluate the effectiveness of a proprioceptive training regimen combined with Kinesiotaping in improving balance in children with spastic diplegic cerebral palsy using the Pediatric Balance Scale.

Methodology: This pre-post experimental study involved 11 children between 6 and 12 years of age with spastic diplegic cerebral palsy, categorized as Gross Motor Function Classification System levels I or II. The children underwent a four-week intervention program consisting of proprioceptive training exercises combined with Achilles–ankle Kinesiotaping, delivered three times weekly. The Pediatric Balance Scale was used to evaluate balance both before and after the intervention period, and the results were analyzed using paired t-test statistical methods.

Results: Post-intervention Pediatric Balance Scale scores showed a statistically significant improvement compared to pre-intervention scores ($p < 0.05$), indicating enhanced static and dynamic balance.

Conclusion: The study concludes that a proprioceptive training regimen combined with Kinesiotaping is effective in improving balance and postural control in children with spastic diplegic cerebral palsy and can be considered a beneficial intervention in Pediatric physiotherapy rehabilitation.

DOI: https://doi.org/10.54660/.IJMRGE.2026.7.1.433-440

Keywords: Balance, Kinesiotaping, Pediatric Balance Scale, Pediatric Physiotherapy, Proprioceptive Training, and Spastic Diplegic Cerebral Palsy

Introduction

Cerebral palsy (CP) is a motor disorder caused by a non-progressive (static) injury to the developing brain [1] It is one of the most common neurodevelopmental disorders affecting posture and movement, including gait. The prevalence of Cerebral palsy in the United States is estimated to be 3 to 4 per 1000 children. Children with Cerebral palsy commonly present with abnormal muscle tone, impaired postural reflexes, delayed motor development, co-contraction, muscle weakness or loss of movement control, sensory integration deficits, unsteady gait, and poor balance. They may also have associated impairments such as

cognitive and behavioral difficulties, epilepsy, perceptual problems, visual and hearing deficits, urinary incontinence, and constipation, all of which limit their ability to perform basic activities of daily living [3] The clinical classification of Cerebral palsy is based on the predominant motor signs and includes spastic, hyperkinetic, ataxic, and mixed types. Spastic cerebral palsy comprises three subtypes: hemiplegic, quadriplegic, and diplegic [4] Among these, spastic diplegia occurs most frequently and presents with impairments in posture maintenance, balance, and walking ability. Furthermore, gait disturbances—including toe walking, foot drop, and atypical movement patterns—affect 30.6% of children diagnosed with cerebral palsy [2] Balance represents a multifaceted process that encompasses receiving and processing sensory input, followed by planning and carrying out the movements necessary to sustain an upright position.The control of balance relies on the integration of sensory and motor system inputs by the central nervous system [5] Balance impairments in children with Cerebral palsy vary in severity and presentation. These arise either directly from the brain injury or indirectly as compensatory mechanisms and include abnormal muscle tone, weakness, reduced muscle synergy, contractures, and altered biomechanics, all contributing to limited functional abilities. Sensory, cognitive, and perceptual deficits further influence the motor impairments seen in Cerebral palsy [5] Proprioception is a sense generated by sensory receptors that respond to pressure within the surrounding tissues. These receptors are also located in the bones, muscles, tendons, and joints, where they respond to stretch and send impulses through sensory nerve fibers to the brain. Proprioceptive feedback plays a critical role in the neural regulation of movement. When proprioceptive input is compromised, it can lead to dysregulation of muscle tone, disruption of postural control mechanisms, and significant deterioration in both the timing and coordination of voluntary movements. Proprioceptive training addresses these impairments by aiming to enhance or restore sensorimotor capabilities [5, 6]. Kinesiology taping has emerged as a widely adopted intervention in rehabilitation settings for both pediatric and adult populations. The tape itself is a lightweight, elastic therapeutic material applied directly to the skin, featuring a breathable, water-repellent cotton structure capable of elongating between 40% and 60% beyond its original length—properties that closely resemble those of human skin. The proposed mechanism suggests that kinesiology tape application may optimize muscle and fascial performance while modulating cutaneous mechanoreceptors through continuous afferent input. This allows more sensory information to flow to the central nervous system for integration in the presence of mechanical loads, resulting in improved voluntary control and coordination [7] Kinesiotaping is now increasingly used in the rehabilitation of children with CP. The tape's elasticity allows support of weak muscles without restricting soft tissue and permits full range of motion. It can influence the skin, lymphatic system, circulatory system, fascia, muscles, and joints, potentially enhancing proprioception, reducing pain and edema, decreasing muscle spasms, and improving muscle strength [8] These balance problems affect how well children with CP can do their everyday activities, so checking their postural control is very important to understand their difficulties, see their improvement during therapy, and plan better treatments. Because of this, simple clinical scales like the Pediatric Balance Scale (PBS) are more practical and affordable for routine use. PBS is a trustworthy tool to measure functional balance in children with neuromotor problems and helps assess the key balance skills they need for daily activities. Even though PBS has been validated for such children, only a few studies have used it to measure balance in children with CP or to compare PBS scores with GMFCS levels [9] Although both proprioceptive training and Kinesiotaping independently show benefits in children with CP, there is a lack of research evaluating their combined effect. Therefore, this study aims to investigate the effectiveness of combining taping with proprioceptive exercises in children with cerebral palsy.

Need of Study

Proprioceptors in the Achilles tendon play a crucial role in regulating muscle tone and postural control. Proprioceptive training targets these sensory pathways and enhances balance by improving joint position sense and neuromuscular coordination. When combined with taping—an external tactile stimulus known to facilitate sensory input and improve alignment—the intervention may produce synergistic effects on postural stability. The findings of this study have the potential to influence clinical practice by providing evidence-based guidance for optimized balance interventions in children with spastic diplegia. If successful, the combined intervention could support more efficient and functional rehabilitation outcomes, improve gait and postural control, and reduce long term disability. The result may support the use of combined interventions for more efficient rehabilitation outcomes compared to single technique treatments.

Aim

To see the effectiveness of a proprioceptive training regimen combined with Kinesiotaping to improve balance in spastic diplegic childrens.

Objectives

To determine the effectiveness of a proprioceptive training regimen combined with Kinesiotaping in improving balance among children with spastic diplegia using the Pediatric Balance Scale

Review of Literature

1. **Naglaa A. Zaky *et. al* (2019)**- Conducted study on "Role of two therapeutic interventions on balance in children with spastic diplegia and hemiparasis : A comparative study." This study compared the effects of kinesio taping and electrical stimulation on balance in children with spastic cerebral palsy. Sixty children aged 4–6 years received either KT or ES for six months. Both interventions significantly improved balance, with KT being more effective in diplegic children and ES showing better results in hemiparetic children.
2. **Zeinab A Hussein *et. al* (2019) -** Conducted a study on "Effect of simultaneous proprioceptive-visual feedback on gait of children with spastic diplegic cerebral palsy". This study evaluated the effect of combined proprioceptive-visual training on gait in children with spastic diplegic cerebral palsy. Thirty children aged 4–6 years followed an 8-week exercise program, with one group receiving proprioceptive-visual feedback and the other no feedback. Both groups showed improvements in

spatial and temporal gait parameters, but greater gains were seen in the feedback group. No significant changes were observed in kinetic gait parameters, suggesting that proprioceptive-visual training mainly enhances spatial and temporal aspects of gait.

3. **Iran J Neurol (2016) -** Conducted study on "The impact of Kinesio taping technique on children with cerebral palsy." Cerebral palsy is a common childhood movement disorder causing lifelong motor impairments, where early, age-appropriate rehabilitation is essential. This review found that Kinesio taping, when used as part of a multimodal therapy program, can improve gross and fine motor skills, particularly dynamic activities, with greater benefits seen in children at higher developmental levels.
4. **Joshua E. Aman *et. al* (2015) -** Conducted study on "The effectiveness of proprioceptive training for improving motor function: a systematic review" This systematic review of 51 studies found that proprioceptive training significantly improves sensorimotor function, with an average improvement of 52%. The greatest benefits were seen with joint position training and muscle vibration, particularly using active and passive movements with visual feedback. While effects were not disease-specific, early evidence suggests proprioceptive training may also promote cortical reorganization.
5. **Raewyn L. Taylor BOccThy *et. al* (2014) -** Conducted study on "A scoping review of the use of elastic therapeutic tape for neck or upper extremity condition" Elastic therapeutic tape is increasingly used for neck and upper extremity conditions, but evidence remains limited. A scoping review of 14 studies showed short-term pain reduction in some cases, while fewer studies reported improvements in range of motion. Overall, elastic therapeutic tape may help relieve short-term pain, but more high-quality research is needed.
6. **Kuki Bordoloi *et. al* (2012) –** Conducted study on "Proprioceptive training is more effective than strength training for helping children with cerebral palsy who have poor balance." The effects of proprioceptive training and strength exercises on enhancing balance in children with cerebral palsy was investigated in this experimental study using a same-subject approach. Thirty male and female CP patients with poor balance were split into two groups at random: Group B received 12 weeks of strength training, whereas Group A received proprioceptive training. At the beginning and end of the 12-week period, both groups were evaluated using the Pediatric Balance Scale and the Timed Up and Go test. The TUG and PBS scores for Group A (proprioceptive training) significantly improved, according to statistical analysis, with t-values of 4.747 and p-values of 0.003.
7. **Adel A A Alhusaini *et.al* (2010)-** Conducted study on "Mechanical properties of the plantarflexor musculotendinous unit during passive dorsiflexion in children with cerebral palsy compared with typically developing children" was the subject of the study. In order to rule out reflexive muscular activity, this study examined the passive length-tension behavior of the myotendinous structures of the plantarflexor muscles in children with and without cerebral palsy. Passive ankle torque-angle data were obtained from full plantarflexion to each participant's full available dorsiflexion in 26 independently ambulant children with cerebral palsy (CP) (11 females, 15 males; mean age 6 years 11 months, range 4 years 7 months–9 years 7 months) and 26 age-matched typically developing children (18 females, 8 males; mean age 7 years 2 months, range 4 years 1 month–10 years).
8. **Melinda Franettovich *et.al* (2008)-** Conducted a study on "Anti-pronation taping is widely used to manage lower-limb pain and injury, but its underlying mechanisms are not fully understood. This review examined mechanical, neurophysiological, and psychological explanations through a structured analysis of experimental studies. Most evidence supports mechanical effects, showing increased navicular and arch height, reduced tibial internal rotation and calcaneal eversion, and changes in plantar pressure during static and dynamic tasks. Reductions in pronation ranged from a 5% increase in arch height during jogging to a 33% decrease in calcaneal eversion during walking. Limited evidence also suggests neurophysiological effects, including reduced lower-leg muscle activity, with one study reporting a 45% reduction in tibialis posterior activation.
9. **Mohammed M. S. Jan (2006) -** Conducted a study on "Cerebral palsy (CP) is a common pediatric condition affecting about 2–2.5 per 1000 live births, caused by a non-progressive injury to the developing brain, often during the first year of life. Prematurity is the most common risk factor, although the cause remains unknown in nearly half of cases. Children with CP may have associated conditions such as intellectual disability, epilepsy, feeding difficulties, and sensory impairments, making early screening essential. Management requires an individualized, family-centered, and goal-directed approach, with a multidisciplinary team focusing on improving function, managing spasticity, preventing contractures, and enhancing overall comfort and quality of life.
10. **Richard Tang-Wai MD, CM *et. al* (2006)-** Conducted a study on "A Clinical and Etiologic Profile of Spastic Diplegia" This retrospective study of 54 children with spastic diplegia found that 57.4% were born preterm, with periventricular leukomalacia being the most common identified cause, especially in preterm infants. However, nearly half of the cases had no identifiable etiology, indicating that the cause of spastic diplegia remains unknown in many children.

Methodology

1. Sample size-calculated by using formula - Z12pq n=11

P	Your guess of Population P (any value<1)	0.86
Q	1-p	0.14
1-α	Confidence level set by you	0.95
Z	Z value associated with confidence	1.96
D	Absolute precision	0.21
N	Minimum sample size	11

2. Study design- Pre-post experimental study.
3. Study setting- Jalgaon.
4. Sampling method- Convenient sampling
5. Duration- 6 month.
6. Target Population- Spastic diplegic children.

Materials

1. Pen
2. Paper
3. Parents' Consent Form
4. Kinesiotape.
5. Towel roll
6. Balance Assessment Tool - Pediatric Balance Scale (PBS)

Inclusion Criteria

1 Children diagnosed as spastic diplegic cerebral palsy.
2 Age between 6-12 years
3 Both gender
4 Gross motor function level 1and 2
5 Written consent from their parents
6 Spasticity range between 1 and 1+ grade according Modified Ashworth scale in Gastrosoleus muscle [5]

Exclusion Criteria

1. Uncooperative children's
2. Unstable medical condition (epilepsy, cardiovascular disease)
3. Sensory processing disorders that may interfere with taping Interventions.
4. Recent surgery or injury affecting mobility.
5. Recent Fracture [5]

Outcome Measure

1. Pediatric Balance Scale

The Pediatric Balance Scale is a modified version of the Berg Balance Scale that is used to assess functional balance skills in school-aged children.

The scale consists of 14 items that are scored from 0 points (lowest function) to 4 points (highest function) with a maximum score of 56 points.

Easy to administer and score.

The PBS demonstrated good test-retest reliability (intraclass correlation coefficient

(ICC) model 3,1 = 0.998) with no significant difference in total test scores or individual items measured by one therapist on two occasions. Spearman rank correlation coefficients for individual items ranged from 0.89 to 1.0, further supporting consistent scoring. Similarly, no significant difference was found among ratings by different physical therapists on the PBS for total test scores (ICC 3,1 = 0.997).In another study that focused on how reliable the PBS is for children with spastic cerebral palsy, researchers found the PBS to be highly reliable, with consistent scores between different examiners (inter-rater) and when the same examiner tested children twice (test-retest). These results suggest that PBS is a dependable measure of balance in children with this condition (Alimi *et.al*., 2019) These findings support the PBS as a dependable tool for clinical assessment and monitoring of balance function in the pediatric population [5].

Interpretation:

The maximum score is 56, higher total test scores indicate that the school-aged child is more capable of maintaining balance and has little to no motor impairments. Lower total test scores indicate moderate balance problems (or severe if the scores are extremely low or 0), motor impairment, and negatively impacted balance function.

Procedure

1. For conducting following study, approval was taken from institutional ethical committee (IEC) of Dr. Ulhas Patil College of Physiotherapy, Jalgaon.
2. All participants were screened as per the inclusion and exclusion criteria.
3. A written informed consent was obtained from their parents.
4. Demographic information was collected from all participants.
5. Screening was done using GMFCS and Modified Ashworth Scale.
6. Pediatric balance score was administered to assess balance in participants before the intervention
7. Implement proprioceptive training regimen combined with tapping (4-week interventions)
8. Pediatric balance score used to assess balance in participant post intervention.
9. The collected data were analyzed by using statistical tests and results were generated.
10. Outcomes are recorded.

Statiscal Analysis

All data was collected and entered into Microsoft Excel & Minitab 17. All the results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly. All the data was analysed using paired- T for intra group analysis.

Results

Table 1: Age Distribution

Frequency Distribution

Sr. No.	Variable	Groups	Frequency	Percentage
1	Age (in years)	6–7	4	36.36
		8–9	1	9.09
		10–11	3	27.27
		12	3	27.27

Variable	Mean	SD
Age	9.18	2.44

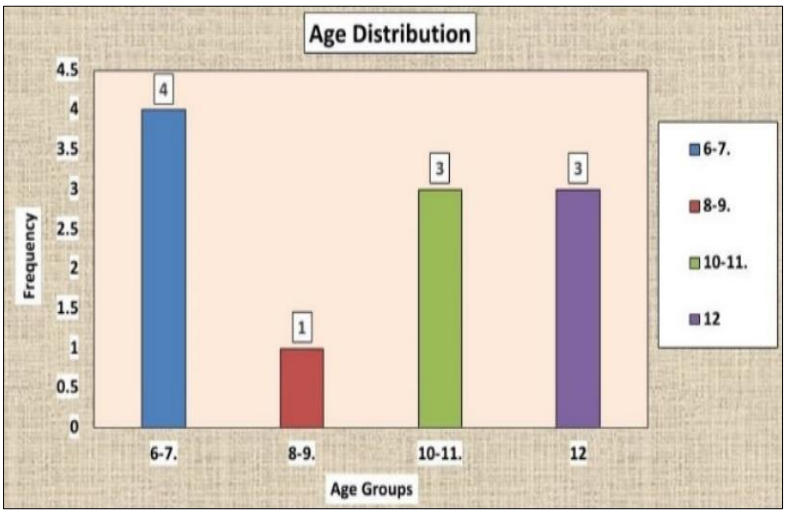

Fig 1: Age Distribution

Interpretation:
From the table 1-. The study included participants aged between 6 and 12 years. the highest proportion of participants belonged to the 6-7 years age group, with 4 children (36.36%). Only 1 participant (9.09%) was in the 8-9 years age group. The 10-11 years and 12 years group each included 3 participants (27.27%) The accompanying graph 1 clearly demonstrates that the majority of children were concentrated in the younger age group (6-7 years), with lower representation in the 8-9 years group, and equal distribution in the 10-11- and 12-years categories.

Table 2: Gender Distribution

Sr. No.	Variable	Groups	Frequency	Percentage
1	Gender	Male	6	54.55
		Female	5	45.45

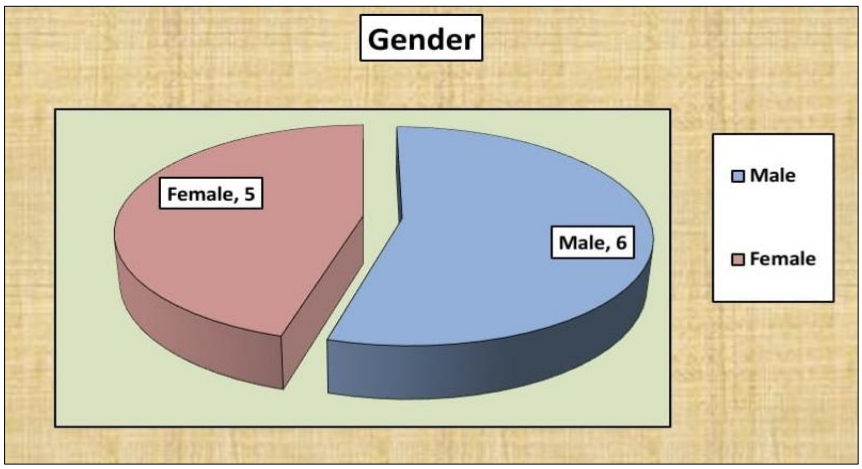

Fig 2: Gender Distribution

Interpretation:
From the table 2- Total 11 subjects were included in the study. Out of 11 subjects 6 are male and 5 are females with mean age of subject was 9.18 years. evaluating effect of gender-the study sample consisted of 11 participants, of whom 6 were male (54.55%) and 5 were female (45.45%). This indicates a slightly higher representation of male children compared to female children in the study. The chart visually demonstrates this distribution, showing that males formed a marginally larger portion of the sample than females

Table 3: Comparison of Pediatric Balance Scale Mean of Pre- & Post Comparison of PBS

	Test	Mean	S.D.	t value	P value	Significant
Pediatric Balance Scale	PRE	26.36	7.24	8.19	0.000	Significant
	POST	37.91	8.22			

*p<0.05 i.e. significant difference in the average

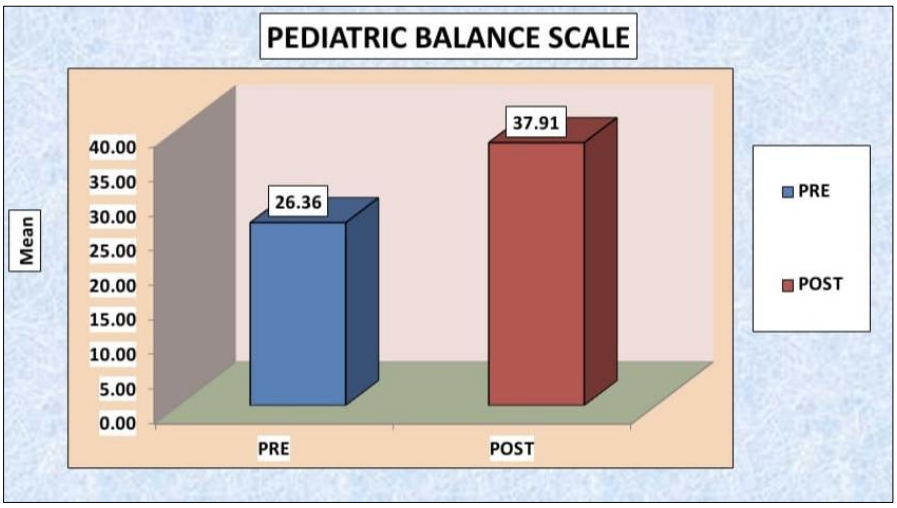

Fig 3: Comparison of PBS

Interpretation

Comparison of Pediatric balance scale Mean of pre and post comparison of PBS-The main results table contained the mean, standard deviation (SD), t-value, and p-value for PBS scores before and after the intervention**.**

The comparisons of average PEDIATRIC BALANCE scores of pre and post-test was done by paired t test. The pre- test average score was 26.36 with standard deviation of 7.24. The post-test average score was 37.91 with standard deviation of 8.22.

The test statistics value of paired t test was 8.19 with p value 0.00. The p value less than 0.05, concludes that there is significant difference in average PEDIATRIC BALANCE scores at the time of pre and post- test.

Discussion

The study aimed to demonstrate that a combined proprioceptive training regimen with Achillis-ankle Kinesiotaping produced a significant improvement in balance among children with spastic diplegic cerebral palsy. Our findings reveal that the significant improvement in PBS scores observed in the present study- from 26.36 pre-intervention to 37.91 post – intervention- indicates a notable enhancement in both static and dynamic balance in children with spastic diplegia. According to PBS scoring guidelines, scores in the mid-20s usually reflects moderate balance impairments, while scores approaching 40 demonstrate functional improvement in standing, reaching, stepping, and transitional movements. Therefore, the post-intervention increases of over 11 points suggests that the combined proprioceptive training and Kinesiotaping protocol meaningfully improved the childrens ability to perform functional balance activities

The mean increase of 11.55 points on the PBS (from 26.36 to 37.91) indicates- Improved postural stability, better ankle control, Enhanced sensory-motor integration, Reduced spasticity impact during functional tasks. The results of the present study demonstrated a statistically significant improvement in pediatric balance scale scores after 4 weeks of proprioceptive training combined with Kinesiotaping.

Our findings align closely with Bordoloi and Sharma (2012)**,** who demonstrated that proprioceptive training is more effective than strength training in improving balance in children with cerebral palsy. Their study emphasized the critical role of sensory feedback in postural organization and balance control. The present study extends these findings by demonstrating that proprioceptive training, when combined with Kinesiotaping, produces even greater functional improvements [5]

Aman *et.al*. (2015) conducted a systematic review on proprioceptive training effectiveness and reported average improvements of 52% across various measures, with joint position training yielding up to 109% improvement. They concluded that proprioceptive training with visual feedback produces optimal sensorimotor outcomes. The present study incorporated similar principles through exercises requiring visual-proprioceptive integration (such as balance beam activities and hurdle step-overs), which likely contributed to the significant PBS improvements observed [6]

Hussein *et.al*. (2019) investigated simultaneous proprioceptive-visual feedback on gait in children with spastic diplegia and found significant improvements in spatial and temporal gait parameters. Their findings support the mechanistic basis of our intervention—that integrated sensory feedback enhances motor control and functional performance in this population [2]

Zaky *et.al*. (2019) compared Kinesiotaping with electrical stimulation in children with cerebral palsy and found that Kinesiotaping was particularly effective for diplegic children in improving balance. Their results corroborate our findings that Kinesiotaping applied to the ankle and gastrosoleus muscle complex can facilitate improved postural control in spastic diplegia [3]

Shamsoddini *et.al*. (2016)**,** in their review on the impact of Kinesiotaping in children with cerebral palsy, concluded that Kinesiotaping is most effective when integrated into multimodal therapy programs. This directly supports the rationale of the present study, which combined taping with structured proprioceptive exercises rather than using either modality in isolation [8]

Taylor *et.al*. (2014) noted in their scoping review that elastic therapeutic tape may not produce long-term improvements unless combined with appropriate therapeutic techniques. This observation validates the present study's approach of pairing Kinesiotaping with targeted proprioceptive exercises to maximize functional outcomes [1]

Amin *et.al*. (2019) reported that children receiving both therapeutic exercises and Kinesiotaping showed greater PBS improvements than those performing exercises alone. This finding directly parallels our results and reinforces the

concept that combined interventions produce superior outcomes compared to single-modality treatments [27]

The present study's improvement of 11.55 points exceeds the 5-7 point change identified by Franjoine *et.al*. (developers of the PBS) as clinically meaningful, further establishing the robust clinical significance of the combined intervention. According to Alhusaini *et.al*. (2010)**,** children with cerebral palsy exhibit increased stiffness in plantarflexor muscles. The Kinesiotaping technique, applied with 30% stretch, may have provided mechanical support that reduced excessive muscle tone while facilitating dorsiflexion, thereby improving overall lower limb mechanics during balance tasks [24]

Franettovich *et.al*. (2008) demonstrated that anti-pronation taping produces measurable biomechanical changes including increased arch height, reduced calcaneal eversion, and altered plantar pressure patterns. Similar biomechanical effects in the present study likely contributed to improved foot and ankle alignment during standing and dynamic balance activities, reducing compensatory movement patterns and enhancing stability [24]

The present study contributes to the growing body of evidence supporting multimodal interventions for children with cerebral palsy. As noted by Jan (2006) in his comprehensive review, the most effective approach to caring for children with cerebral palsy involves individualized treatment plans incorporating a range of interventions. The combination of proprioceptive training and Kinesiotaping represents such a multimodal approach, targeting both sensorimotor integration and biomechanical alignment simultaneously [20]

Tang-Wai *et.al*. (2006) established that spastic diplegia often involves both identifiable etiologic factors and complex neuromuscular impairments. The present intervention addresses the functional consequences of these impairments through targeted, evidence-based techniques [28]

Conclusion

The present study concludes that a proprioceptive training regimen combined with Kinesiotaping is effective in improving balance in children with spastic diplegic cerebral palsy.

Significant improvement was observed in Pediatric Balance Scale (PBS)scores after the 4-week intervention, indicating enhanced postural control, ankle stability, and functional balance.

Thus, the combined approach can be considered a beneficial clinical tool for improving balance and functional mobility in spastic diplegic children.

Limitations

The follow-up period was limited-Balance changes were assessed immediately after the intervention period. the study did not evaluate whether improvements were retained after weeks or months.

Lack of controlled group-Without a comparison group it is difficult to determine how much improvement resulted specifically from the combined intervention.

Future Scope

Long term follows up studied- Balance improvements were assessed immediately after weeks of intervention. Future studies should include long term follow up.

Studies in other conditions such as Down Syndrome, Autism Spectrum Disorder future research can apply the same training and taping protocol to these populations.

Declaration by Author

Ethical Approval: Ethical clearance for this study was obtained from the Institutional Ethics Committee. Informed consent was collected from all participants prior to their involvement and prior to publication of the findings.

Acknowledgements: I sincerely express my gratitude to my guide, Dr. Krutika Kale, for her valuable guidance, support, and encouragement throughout the study. I also extend heartfelt thanks to all the study particapants for their cooperation and active involvement in the research process, as well as to the stastisticians and institutional authorities who contributed to the successful completion of this work.

Source of Funding: Nil.

Conflict of Intrest: None declared.

References

1. Jan MM. Cerebral palsy: comprehensive review and update. Ann Saudi Med. 2006;26(2):123-32.
2. Hussein ZA, Salem IA, Ali MS. Effect of simultaneous proprioceptive-visual feedback on gait of children with spastic diplegic cerebral palsy. J Musculoskelet Neuronal Interact. 2019;19(4):500.
3. Zaky NA, Thabet NS, Banoub MB. Role of two therapeutic interventions on balance in children with spastic diplegia and hemiparasis: a comparative study. Phys Ther Rehabil. 2019;6(1):2.
4. Mahesan A, Jauhari P, Singhal M, Gulati S, Chakrabarty B, Sirolia V, *et.al*. A relook at cerebral palsy beyond motor pathology: a cross-sectional study of sensory processing abilities. Neurol India. 2024;72(3):590-6.
5. Bordoloi K, Sharma N. Effectiveness of proprioceptive training over strength training in improving the balance of cerebral palsy children with impaired balance. Sci Res J India. 2012;1(1):23-36.
6. Aman JE, Elangovan N, Yeh IL, Konczak J. The effectiveness of proprioceptive training for improving motor function: a systematic review. Front Hum Neurosci. 2015;8:1075.
7. Unger M, Carstens JP, Fernandes N, Pretorius R, Pronk S, Robinson AC, *et.al*. The efficacy of kinesiology taping for improving gross motor function in children with cerebral palsy: a systematic review. S Afr J Physiother. 2018;74(1):459. doi: 10.4102/sajp.v74i1.459
8. Shamsoddini A, Rasti Z, Kalantari M, Hollisaz MT, Sobhani V, Dalvand H, *et.al*. The impact of Kinesio taping technique on children with cerebral palsy. Iran J Neurol. 2016;15(4):219.
9. Pavao SL, Barbosa KA, de Oliveira Sato T, Rocha NA. Functional balance and gross motor function in children with cerebral palsy. Res Dev Disabil. 2014;35(10):2278-83.
10. van der Heide JC, Hadders-Algra M. Postural muscle dyscoordination in children with cerebral palsy. Neural Plast. 2005;12(2-3):197-203.
11. Bax M, Goldstein M, Rosenbaum P, Leviton A, Paneth N, Dan B, *et.al*. Proposed definition and classification of cerebral palsy, April 2005. Dev Med Child Neurol. 2005;47(8):571-6.

12. Bohannon RW, Smith MB. Interrater reliability of a modified Ashworth scale of muscle spasticity. Phys Ther. 1987;67(2):206-7.
13. Kalantari M, Khamene SM, Tabatabaee SM. Effects of Tone-reducing AFO in Spastic Diplegic Cerebral Palsy Patients Aged 2-8 years. Pajoohandeh J. 2010;15(3):95-9.
14. Shamsoddini A. Comparison between the effect of neurodevelopmental treatment and sensory integration therapy on gross motor function in children with cerebral palsy. Iran J Child Neurol. 2010;4(1):31-8.
15. Wong EC, Man DW. Gross motor function measure for children with cerebral palsy. Int J Rehabil Res. 2005;28(4):355-9.
16. Lee SH, Shim JS, Kim K, Moon J, Kim M. Gross motor function outcome after intensive rehabilitation in children with bilateral spastic cerebral palsy. Ann Rehabil Med. 2015;39(4):624-9.
17. Moghaddam SR, Lajvardi L, Amiri A, Zadeh TG, Lohrasbi S. Investigating the effects of wrist Kinesio Taping on hand function of children with spastic diplegic cerebral palsy. Mod Rehabil. 2012;6(1).
18. Iosa M. The application of kinesio taping in children with cerebral palsy. Dev Med Child Neurol. 2015;57(1):11-2.
19. Şimşek TT, Türkücüoğlu B, Çokal N, Üstünbaş G, Şimşek İE. The effects of Kinesio® taping on sitting posture, functional independence and gross motor function in children with cerebral palsy. Disabil Rehabil. 2011;33(21-22):2058-63.
20. Footer CB. The effects of therapeutic taping on gross motor function in children with cerebral palsy. Pediatr Phys Ther. 2006;18(4):245-52.
21. Palisano RJ, Rosenbaum P, Bartlett D, Livingston MH. Content validity of the expanded and revised Gross Motor Function Classification System. Dev Med Child Neurol. 2008;50(10):744-50.
22. (Note: Reference 22 is a duplicate of reference 11 and has been omitted.)
23. Carlberg EB, Hadders-Algra M. Postural dysfunction in children with cerebral palsy: some implications for therapeutic guidance. Neural Plast. 2005;12(2-3):221-8.
24. Franettovich M, Chapman A, Blanch P, Vicenzino B. A physiological and psychological basis for anti-pronation taping from a critical review of the literature. Sports Med. 2008;38:617-31.
25. Alhusaini AA, Crosbie J, Shepherd RB, Dean CM, Scheinberg A. Mechanical properties of the plantarflexor musculotendinous unit during passive dorsiflexion in children with cerebral palsy compared with typically developing children. Dev Med Child Neurol. 2010;52(6):e101-6.
26. Piscitelli D, Vercelli S, Meroni R, Zagnoni G, Pellicciari L. Reliability of the gross motor function classification system and the manual ability classification system in children with cerebral palsy in Tanzania. Dev Neurorehabil. 2019;22(2):80-6. doi: 10.1080/17518423.2017.1342710
27. Palisano R, Rosenbaum P, Walter S, Russell D, Wood E, Galuppi B. Development and reliability of a system to classify gross motor function in children with cerebral palsy. Dev Med Child Neurol. 1997;39(4):214-23. doi: 10.1111/j.1469-8749.1997.tb07414.x
28. Tang-Wai R, Webster RI, Shevell MI. A clinical and etiologic profile of spastic diplegia. Pediatr Neurol. 2006;34(3):212-8.

How to Cite This Article
Rathod SA, Kale KI, Nagulkar J. Effectiveness of proprioceptive training regimen combined with kinesiotaping to improve balance in spastic diplegic children using pediatric balance scale: an experimental study. Int J Multidiscip Res Growth Eval. 2026;7(1):433–440. doi:10.54660/IJMRGE.2026.7.1.433-440.

Creative Commons (CC) License
This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.