

IMPACT OF STANDING ON CHILDREN WITH CEREBRAL PALSY'S BALANCE AND GAIT

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Abstract

In order to better understand how standing can help children with spastic diplegic cerebral palsy (CP) improve their balance and gait, the goal of this study is to describe the effects of standing.

Methods: A flexible, subjective prospective cross-sectional quasi-experiment was employed. Thirty subjects with spastic diplegic cerebral palsy were chosen for the investigation using the convenient sampling approach. The mean age for both males and females in the age group of 2 to 5 years was 3.5. The Gross Motor Function Classification System (GMFCS) screening instrument was used. The Gross Motor Function Measure (GMFM) was used to measure motor function, while the Paediatric Balance Scale (PBS) was used to measure standing balance. The four-week intervention involved three 45-minute sessions each week using a wooden standing frame. Depending on their functional capacities and standing tolerance, the screened child was either placed in the vertical or inclined plane of the standing unit. According to the statistical analysis program Statistical Package for the Social Science (SPSS-25), the paired t-test differences were GMFM pre-post and PBS pre-post -.00 and .05, respectively, between the effect pre-test data by screening tool and the post-test data outcome measure GMFM=0.00, PBS=0.00.

Conclusion: -The study's findings indicate that standing for extended periods of time can enhance balance and gait. In order to improve the device, it's also critical to supply the proper plane and location. Therefore, when treating patients with cerebral palsy, these data should be taken with caution.

How to cite this article: Jyotiranjana Sahoo. IMPACT OF STANDING ON CHILDREN WITH CEREBRAL PALSY'S BALANCE AND GAIT. Int J Drug Deliv Technol. 2026;16(84s):317-325. DOI: 10.25258/ijddt.16.84s.37.

Introduction

With a variety of functional involvement, including motor impairment, physical dysfunction resulting from non-progressive involvement of the immature brain, damage that occurs inside the uterus, either during the prenatal or postnatal stage of an infant's life the term called cerebral palsy. The neurological mechanisms of postural control, often known as balance and movement, are delayed in developmental milestone as a result of brain damage.

According to Davis (1997), one of the most common presenting characteristics of cerebral palsy is delayed motor milestone. It will take till the youngster is between two and three years old, or later, to completely realize the complexity and magnitude of the challenge. Functional issues arise in the occupational context and component of the kid's performance, and as the child gets older, parents worry about changes in the performance area's deterioration.

Abnormal muscle tone, a lack of selective muscle control, abnormal primitive reflex patterns for ambulation, a relative imbalance between muscle agonists and antagonists across joints, and inadequate equilibrium reactions are clinical manifestations of this condition. As a result, the muscles activated for these motor aspects are inefficient and poorly coordinated. People have weak, hypertonic, or hypotonic muscles. A child with postural problems may develop an abhorrent fear of moving around.

Some children difficulty to locate their limb in rela

tion to their bodies because they have difficulty processing sensation from their muscles and joints.

Both social skill and intellectual capacity are impacted. Some of them may also have visuomotor impairment in addition to dyspraxia. Patient with cerebral palsy experience poor gait and balance as a result of these manifestations.

The main characteristics of cerebral palsy are abnormalities in the development of movement, postural control, and balance (CP) ⁶. Many children with CP experience increased muscle tone and poor selective control, which may lead to a decrease in the frequency and variety of voluntary movement [1]. Children with CP experience functional impairments due to abnormal muscular tone and may have an impact on gait through reducing muscle flexibility, hiding muscle strength, preventing the production of sufficient muscle power, raising walking energy expenditure, and changing balance and the relationship between agonist and antagonist muscle groups.[2]

The youngster may be better able to use their selective control more effectively and productively if their spasticity decreases. The restrictions on ankle dorsiflexion during walking may change if spasticity is reduced. Enhancing ankle kinematics when walking may enable the foot to support weight during stance and enable appropriate foot assignment, enabling forward motion for effective walking. Prolonged standing can reduce these issues and is frequently utilized in clinical settings. [3]

Standing

The kids who stood without assistance, including the CP kids and the Typically Developing (TD) kids, met the standards for postural orientation while standing. As a result, they were able to maintain and align their body posture in relation to gravity and their surroundings.

The fundamental ability to stand against gravity is the result of a sophisticated interplay between the motor and sensory systems. Postural control, which includes posture and balance, is essential for the motor task of standing without assistance. In order to maintain stability and direction, postural control entails regulating one's body posture in space.[4]

- The capacity to regulate one's centre of mass with respect to the base of support is known as postural stability.

- Postural orientation is necessary to be able to maintain a standing position. It is the deliberate alignment of body segments with regard to each other and the maintenance of body position for a job with respect to the environment or with respect to gravity.

The inability of the CP children to remain still in relation to gravity is indicative of proprioception abnormalities, which include a lack of ability to perceive limb movements within and between body segments as well as the relative positions of those segments in space. A study conducted by Wingert et al. (2009) revealed that children with CP have disturbed proprioception. Furthermore, Bartonek et al. (2016) hypothesized that disrupted sensory information from the lower limbs contributed to decreased walking velocity in children with CP, and Damiano et al. (2013) reported that proprioceptive deficits were related to instability in standing and to decreased walking speed in children with mild CP. [5-7]

Children with cerebral palsy have been shown to have proprioceptive abnormalities, which include problems with position sense and perception of limb movement in the lower limbs. Furthermore, children with cerebral palsy who were unable to stand unassisted have been linked to instability during standing due to proprioceptive abnormalities.

Locomotion

Postural control is a reflection of the requirement for the dynamic stability of the moving body as well as the establishment and maintenance of an optimal posture for locomotion.[8]

Children with cerebral palsy (CP) benefit from prolonged standing programs, which have been confirmed to have a wide range of good impacts on them. To promote appropriate alignment and weight bearing on the lower limbs, standing frames are advised for kids who have trouble maintaining an upright posture, such as kids with cerebral palsy (CP). (Gudjonsdottir & Mercer, 2002; Stuberger, 1992). Standing exercises have been demonstrated to improve bone growth and mineral density ;

Gudjonsdottir & Stemmons, 1997; Stuberger, 1992; Wilmschurst, Ward, Adams, Langton, & Mughal, 1996), increase range of motion (Baker, Cassidy, & Rone-Adams, 2007; Richardson, 1991;), improve muscle tone, and improve bone growth. Although supported standing is widely used, its therapeutic efficacy in enhancing gait metrics in children with cerebral palsy remains unclear. This study sought to ascertain how lengthy standing affected the children with spastic diplegic cerebral palsy in terms of their balance and gait. Research on standing and gait is scarce [9-13].

As a result, research has been done to determine how prolonged standing can enhance gait and balance.

The purpose of the study is to ascertain how standing helps children with cerebral palsy with their balance and gait.

Literature Review

The impact of inhibitive ankle-foot orthoses on standing balance in a child with cerebral palsy was investigated in 1986 by authors Susan R. Harris and Kathy Riffle. A youngster, aged four to five, was diagnosed with moderate spastic quadriplegia, with more involvement on his left side than his right. At the age of three, he enrolled in the clinic's preschool, where he has been attending five days a week. is presently receiving occupational and physical therapy as part of his preschool curriculum. Five sessions over a two-week period were used to gather baseline data on the subject's independent standing before he received his new set of inhibitive measures. One week after the subject started wearing the new splint, it was suggested in the second trial to give him time to get used to them. The subjects' standing balance was assessed during the second phase, and each condition with orthoses shown a noticeable improvement in the subjects' capacity to stand independently while donning the orthoses.[14]

In 1988, author Kathleen A. Hinderer conducted research on how tone reduction compared to a typical plaster cast affected the gait improvement of children with cerebral palsy. For youngsters with cerebral palsy, a 3-and-a-half-year-old kid with spasticity daiplegia, and slight mental retardation, compare the effects of tone reduction and immobilization casts. The findings imply that for these two children with CP, the tone-reducing cast was more successful than the typical immobilization cast. [15]

Nancy H., the author, had researched the effect of partial unweighting on gait in adolescents with cerebral palsy. Patients with cerebral palsy may benefit from the use of partial weight assistance during gait training. In order to achieve a speedier gait, we accept a partial weight support condition. The subject's highest speed under the unsupported weight condition was 2.4 km/h, however during the partial weight bearing, they were able to walk at

2.72 km/h. The unweighting condition produced lower heart and blood pressure measurements across comparable gait speeds. This matched the subject's stated effort score.[16]

Tori Smedal, the author, conducted research on how the Bobath idea enhanced balance and gait in patients with multiple sclerosis. Two bobath instructors who have been approved by the International Bobath Instructor Training Association have applied for interpretation. According to this method, the primary cause of movement and gait and balance issues in patients with central nervous system disorders is thought to be a reduction in postural control, improper coordination of movement patterns, weakness, and abnormal tone. With a focus on personal control, the goal of treatment is to enhance function through motor learning. Following Bobath Concept, they demonstrated an improvement in physical function.[17]

Gerog Ebersbach is the author. In 2008, Daniela Fdler et al. conducted a study comparing full body vibration to traditional therapy for gait and balance. Using repetitive sensorimotor stimulation, whole body vibration has been used to treat patients with stroke, myasthenia gravis, and cerebral palsy. A group of people's performance on a clinical examination of their mobility and postural stability improved after three weeks of treatment, which included 40-minute sessions five days a week and relaxation techniques. [18]

In 2011, Monika Zadnikad conducted research on how therapeutic horseback riding and hippotherapy affected the balance and postural control of children with cerebral palsy. Regardless of the activity, a beneficial effect was observed in 21 children with CP in the comparator group. The estimated positive pool impact of size showed that THR or hippocampal therapy was statistically significant in helping children with cerebral palsy. The study-specific meta-regression of research characteristics revealed.[19]

Author Yoram Barma explained how visual and auditory feedback can help patients with cerebral palsy improve their gait. In order to improve baseline performance—walking speed, stride length, and a 10-meter straight track—visual and auditory feedback cues were generated by a wearable device powered by an internal sensor. Performance without the device was measured again and compared to baseline performance after 20 minutes of training with the device and 20 minutes of rest. Patients with CP-related gait problems can benefit from training that uses both visual and aural feedback. In comparison, an age-matched healthy individual showed no improvement.[20]

Natalia de Almeida Curvalho Durate conducted research on the impact of treadmill training and transcranial direct current stimulation on children

with cerebral palsy's balance and functional abilities. Twelve-year-old CP was divided into two intervention groups at random. Experimental group (block of six, stratified according to GMFCS level I–II) Twelve children were assigned to the treadmill training group, while twelve children were assigned to the control group. For two weeks, five weekly sessions of placebo transcranial direct current stimulation training were conducted. Static balance and functional performance improved in children with cerebral palsy when gait training on a treadmill was combined with anodal stimulation of the primary motor cortex.[21]

Chunhee Cho and Wonjeong Hwang Sujin conducted research on how virtual reality treadmill training can help children with cerebral palsy with their gait, balance, and muscle strength. They claimed that youngsters with cerebral palsy are more motivated by rehabilitation treatments based on virtual reality. Treadmill training in a virtual group program linked to a program that uses video games. The design of the control group lasted for eight weeks. Three times a week, for thirty minutes each day, virtual reality was used as an intervention. This study looked at how children with spastic cerebral palsy responded to treadmill gait training combined with virtual reality in terms of their muscular strength, gross motor function, dynamic postural control, walking speed, and walking endurance.[22]

Methodology

A distinct subjective prospective cross-sectional quasi-experimental flexible design was employed for the study's proposals, which addressed the subject's detailed description. The study's design is A-B-A.

They employed convenience sampling. For the investigation, a total of thirty individuals with spastic diaplesic cerebral palsy were chosen. The mean age for both males and females in the 2- to 5-year-old age group was 3.5. Over the course of a year, all subjects were chosen from the paediatric division of the occupational therapy department at SVNIRTAR, RSIC, SCBMCH & Padmini Rehab. in Cuttack. During the initial evaluation, every individual had a spastic CP diagnosis and underwent regular testing. Participants in the study had sufficiently complied with the instructions. Additionally, they gave their informed consent prior to testing.

Inclusion criteria:

- ☐ The subject had a diagnosis of spastic diplegic cerebral palsy, and the age range was 2 to 5 years.
- ☐ There were both men and women present.
- ☐ The capacity to follow the command.
- ☐ Levels 2 to 3 of the Gross Motor Function Classification System (GMFCS) MAS grade 1 or 2.

Exclusion Criteria:

- ☐ Mentally retarded children were not included.
- ☐ Mental retardation and cerebral palsy are not included.
- ☐ An acute orthopaedic condition.
- ☐ The state after surgery.
- ☐ Any malformation or contracture.

Instrumentation

Screening Tool

Gross Motor Function Classification System (GMFCS)

Nowadays, a lot of people utilize the Gross Motor Function Classification System (GMFCS) to categorize the gross motor function of kids with cerebral palsy. This tool provides data regarding the prognosis of children with cerebral palsy. This results in infants with motor disabilities in a broad population. Children's gross motor function is rated on the GMFCS, a five-level scale that places special focus on movement initiation for standing, balance, and gait. Walking without restrictions is included in level 1, and transport in a manual wheelchair is included in level 5, which is determined by the age in the form of birthday.

Out Come Measure:

Gross Motor Function Measure (GMFM)

The scale was created to evaluate and assess motor function in children with cerebral palsy. It allows us to examine motor behaviour by assigning a standard score. It is the final kind of measure needed to assess how well a motor intervention works for kids with cerebral palsy. The 88 items are arranged in five different dimensions: standing, running, jumping, crawling and kneeling, sitting, and lying and rolling. Each dimension's score is represented as a percentage of the maximum score for that dimension, and the item score is on a 4-point ordinal scale. I only removed D and E, which stand, run, and leap, out of the total score, which is calculated by summing the percentage score for each dimension and dividing by 5. The age group is 5 to 16 years old, and the score was calculated by dividing the total by two.

Paediatric Balance Scale (PBS)

The 14-item scale, which should be evaluated on a 0–4 scale, is used to assess school-age children with mild to moderate motor impairment. If a child earns the highest possible score of four on the first trial. The age range is school age, such as 2 to 14; the highest possible score is 56.

Instrumentation For Intervention

A range of methods were employed to enhance gait and balance. Using several tools, the most common strategy focuses on enhancing the child's postural control through balance and gait.

Instrumentation material to improve Balance and Gait;

1. Standing frame (figure-1)
 - a. Horizontal plane (figure-3)
 - b. Vertical plane (figure-4)

2. Strap (figure-2)
 - a. length of the strap 26inc. / 36inc
 - b. Width of the in 1inc. / 2inc.
3. Toys, pegboard, tower and books. (figure – 5& 6)

Intervention

The goal of the therapy intervention for all subjects was to improve postural control over static balance and gait. Three 45-minute sessions of therapy were conducted over the course of four weeks using the GMFCS screening tool, and the subject was screened for therapy based on inclusion and exclusion criteria. Following the intervention, PBS and GMFM outcome measures were used to assess the subject's progress.

Standing unit:

Depending on their functional capacities and standing tolerance, the screened child was either placed in the vertical or inclined plane of the standing unit. To stabilize and keep the pelvis straight, two-inch straps were fastened around it. To stop swaying and hip flexion, two-inch straps were also placed around the mid-thigh hip. In order to stop involuntary movement, it stabilizes the ankle and hip joints. In order to preserve the lower limb's normal anatomical position as much as possible, it also straightens the lower extremities for appropriate weight bearing. Ankle and hip bands of varying sizes were used to stop involuntary movement. The child was encouraged to use their upper extremities while standing for play or leisure activities. Weight shifting on foot alternately involved unilateral and bilateral reaching forward, upward, and sideways while using activities such as peg boards, rings, and blocks. Using toys based on their interests and preferences, the youngster was permitted to stand for around forty-five minutes in the standing unit while keeping the body's correct anatomical position.

Procedure

The GMFCS (APP-III) screening tool was used to initially screen the subject in accordance with the inclusion and exclusion criteria. The study subject was chosen once the requirements were met. The goal of the study was explained to the parents of the children with cerebral palsy. The study's purpose and methodology were described. Participants were requested to complete the consent form after being invited to join the study.

A total of thirty children with cerebral palsy were chosen as subjects. GMFCS (APP-III) was used to classify them. Three 45-minute sessions of therapy were conducted over the course of four weeks, standing on a standing frame in both vertical and incline planes.

Balance and gait were improved in spastic diplegics using a standing frame (figure 1). The idea of weight bearing on the lower limbs with varying cotton strap widths and sizes prevents the patient from bending forward too much and from swaying

sideways too much. Standing involved keeping the trunk and lower limbs in an upright, anatomically correct position. Not every patient required the usage of every strap. In order to engage the subject (figures 5 and 6) within the allotted 45 minutes, I used a variety of toys, a pegboard, a tower, and a book. I also used some of the toys therapeutically for weight shifting and reaching.

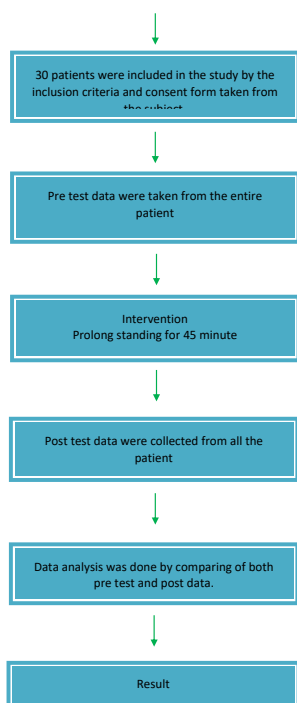
The standing frame may be moved indoors thanks to its four wheels. To fit the subjects in the frame based on height, there are two height-adjustable grading systems.

Following the intervention, subjects were reassessed using the GMFM (APP-IV) and PBS (APP-V) outcome measures to determine the impact of the standing on frame.

The software SPSS-25 was used to compare the effects of the pre-test data via screening tool and the post-test data outcome measure.

The analysis's findings indicate that there have been notable significant changes.

Flow Chart



Data Analysis

A total of thirty subjects, ranging in age from two to five, were chosen for the study and analysed. Their mean age was ± 3.3 .

The data was analysed using the SPSS 25 program. Prior to the intervention, the subject was evaluated using the GMFM and PBS, two outcome measure instruments. The same investigator conducted a reassessment after each assessment.

The Wilcoxon Signed Ranks Test was used to compare the GMFM pre

test and posttest in order to determine whether there was a significant difference in mean scores.

(Table 1)

N=30							
PRE-TEST			POST-TEST			S I G V A L U E	
M E A N	ST D.D EVI ATI ON	ST D. E R R O R M E A N	M E A N	ST D.D EVI ATI ON	ST D. E R R O R M E A N		
6 . 4 6	5.69	1. 03	2 9 . 5 3	20.5 2	3. 74	0	

Table 1: Indicate Significance Value < 05

The Wilcoxon Signed Ranks test was used to compare the PBS pre-test and post-test data in order to determine whether there was a significant difference in mean score. (Table 2)

N=30							
PRE-TEST			POST-TEST			S I G V A L U E	
M E A N	ST D.D EVI ATI ON	ST D. E R R O R M E A N	M E A N	ST D.D EVI ATI ON	ST D. E R R O R M E A N		
4 . 7 7	2.23	0.4	1 7 . 4	9.24	1.6 8	0 . 0 0 5	

Table 2: Indicate Significance Value < 05

The GMFM pre-test-post-test and PBS pre-test-post-test were compared using the pair (T) test, and the test value was significant. (Table 3)

		M E A N	STD.D EVIA TION	STD .ER ROR ME AN	d f	Z	S I G
P A I R 1	G M F M P R E- P O S T	- 23 .0 7	16.87	3.08	2 9	- 4. 7 8 2	0
P A I R 2	P B S- P R E- P O S T	- 12 .7	8.36	1.52	2 9	- 4. 7 8 5	0

Table 3: Indicate Significance Value < 05

Ultimately, there was a notable discrepancy between the scores of the GMFM post-test and the PBS post-test. (Table 4)

		N	ME AN	STD.DEV IATION	STD.E RROR
P A I R 1	G M F M P O S T	3 0	29. 53	20.52	3.74
P A I R 2	P B S P O S T	3 0	17. 4	9.24	1.68

Table 4: Indicate Significance Value < 05

Result

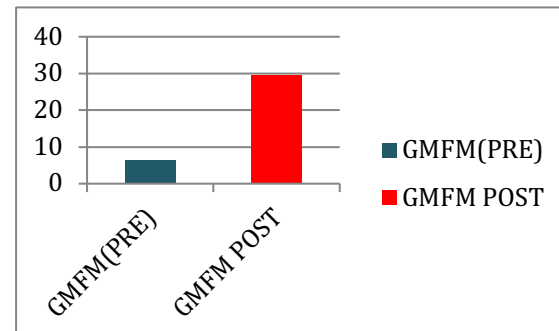
With a pre-test mean score of 6.46, standard deviation 5.69, and standard error 1.03, and a post-test mean score of 29.33, standard deviation 20.52, and standard error 3.74, the descriptive statistic for the GMFM-88 is displayed in table -1. In (table-2), line graph 2 (A) and column graph 2 (B), the pre-test PBS score ranged as follows: mean 4.70, standard deviation 2.23, standard error 0.40, post-test mean score 17.40, standard deviation 9.24, and standard error 1.68.

Table 1, line graph 1 (A), and column graph 1 (B) all show a significant difference between the GMFM pre-test and post-test, with a significance level of $p=0.00$. The scores showed a substantial

difference when the pre-test and post-test data were compared.

GRAPH-1

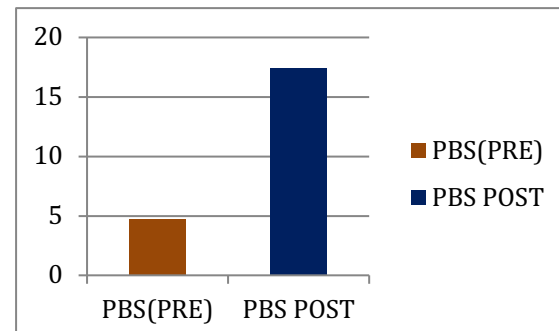
GMFM TEST PRE - POST TEST-B



The PBS first and final evaluations in (table 2), line graph 2 (A), and column graph 2 (B) show a significant difference with $p=0.005$. There is a notable difference in the scores when comparing the pre-test and post-test data.

GRAPH-2

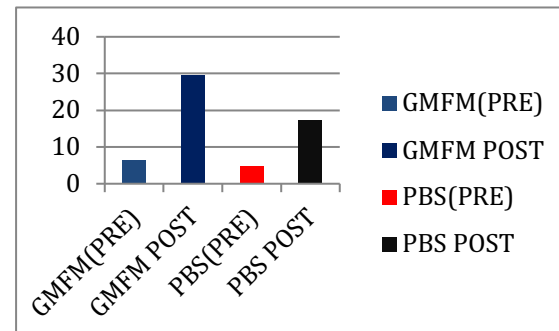
PBS PR-POST-B



Both the pre-test and post-test mean scores of the GMFM and PBS are significantly different (table 3). The GMFM mean score is 23.07, 12.70, with standard deviations of 16.87, 8.36, and standard errors of 3.08, 1.52, and the Z value is -4.752, -4.785, with $p=0.00$, 0.005 for each. A significant score is obtained when both are compared, and it is displayed in line graph 3 (A) and column graph 3 (B).

GRAPH-3

GMFM PRE-POST AND PBS PRE-POST-B

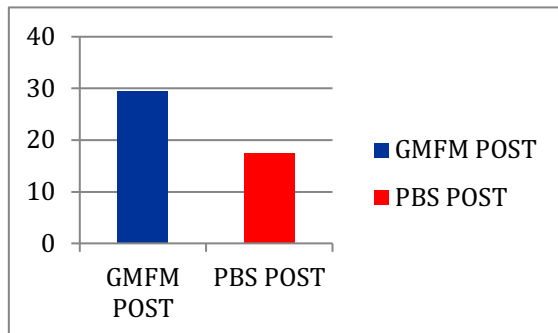


When comparing the post-test results for GMFM and PBS (table 4), the mean scores for GMFM and PBS differ by 29.53 and 17.40, respectively, with standard deviations of 20.52 and 9.24. 3.74, 1.68 error Line graph 4 (A) and column graph 4 (B) both

depict the differences that were observed within the group.

GRAPH-4

GMFM POST AND PBS POST-B



Discussion

This study sought to investigate how standing affected the balance and gait of children with cerebral palsy. There was a significant improvement between the pre-test and post-test results, as indicated by the GMFM scores in this study ($p = .00$). The following items demonstrated notable progress: 1. Pull yourself to a large floor bench, then stand for three seconds with your arms free. 3-stand: raise your right foot for three seconds while using one hand to grip onto a big bench. 4. Stand: hold a large bench in one hand and lift your left foot for three seconds. 5. Keep your arms free and stand for 20 seconds. 6. You can stand without moving your arms if you sit on a little bench. 7. Take ten steps forward while standing with both hands held; 8. Take ten steps forward while standing with one hand held; and 9. Take ten steps forward while standing according to GMFM. Pre-test and post-test results compared to the PBS data showed p -values of 0.005 for standing unsupported, sitting unsupported, standing on one foot, standing with feet together, and standing with one foot in front.

Item No. 1 : pulls to stand at a large bench on the floor Without using the upper limbs extensively, according to Dodd et al. (2002), the core muscles help to support the middle region of the body so that the upper and lower limbs can move in controlled ways. Therefore, it may be possible to adapt the core stability program to improve balance in kids with CP.

Item No. 2: Standing maintains, arms free 3 seconds: Prior to intervention, the kid was unable to balance. The muscle agonist and antagonist in both groups operated in tandem to sustain co-contraction for fluid movement. Balance showed a noticeable improvement.[23]

Item No. 3 : Using one hand and one leg Standing difficult due to the restricted base of support when lifting her one leg. While the estimated body transverse rotation contribution was considerable for anterior-posterior balance, limb protraction/retraction control was found to be dominating during medial-lateral sway.

Item no.4: stand: using one hand to grasp onto a large bench while lifting the right foot for three seconds: The child's balance will be maintained by grasping the large bench, and the CG will pass via the left hip and knee joint to do so. Sterba et al. (2002) provided support for the idea that strengthening the core muscles could improve postural and balance reactions in children with cerebral palsy. [24]

Item no.5: stand: using one hand to grasp onto a large bench, raise the left foot for three seconds, as the study's correlative, was backed by the research cited in item number 4.

Item no.6: Sit on a small bench: This allows you to stand without using your arms. To do this, you must co-contract your agonist and antagonist hip joint muscles. This is because standing up requires an isometric contraction of your hamstrings and an isotonic contraction of your quadriceps, which allows for a smooth and coordinated movement.

Item no.7: Stability is defined as the capacity to keep a stable posture when standing with two hands held and taking five steps to the right. Ali, Mostafa S. (2019) permitting smooth chosen motions leading to better upper- and lower-limb muscle strength, which impacts the spine through the length tension connection. [25,26]

Item no.8: stand with one hand held and take ten steps forward: Because of more effective weight distribution patterns and greater load transfer, the Core stability program enhanced balance. Therefore, core workouts may help our children with CP become more balanced.[27]

Item no.9: stand: moves forward Ten actions: These outcomes show increases in gait pattern efficiency as well as inter-limb coordination and walking. Despite the lack of group significance, every participant's walking pace increased. Proprioceptive reflex and pain perception counteraction. Exercise including weight bearing increases neuromuscular activation.90 Exercise involving weight bearing has an impact on muscle strength and boosts power to enhance Balance.

A child's functional balance ability was assessed using the paediatric balance test, which has been selected as the basis of the standardized and non-standardized measurements that currently provide valuable information.[28]

The CP youngsters were categorized using the Gross Motor Function Classification System. These classification techniques are mostly useful for diagnosis and mainly depend on clinical judgment. Their validity and dependability have not been examined. The subject was chosen based on the GMCS scale. We discovered that the validity and reliability of the GMFCS are extremely high.[29]

Conclusion

According to this study, standing for extended periods of time can enhance balance and gait. Additionally, it's critical to have the right

positioning equipment to enhance balance and gait. Therefore, when treating patients with cerebral palsy, these data should be taken with caution.

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