DOI: https://doi.org/10.53350/pjmhs202317455

ORIGINAL ARTICLE

Effect of Trunk Exercises on Spastic Cerebral Palsy Children's to improve Sitting Postural Control

NIDA JAVED[1], SHOAIB WAQAS[2], MUHAMMAD TARIQ[3], TEHMINA MALIK[4], HASSAN BIN AKRAM[5], MEHWISH KHALID[6]
[1]*Physical Therapist, Ghurki Trust Teaching Hospital, Lahore*
[2]*Associate Professor, Lahore College of Physical therapy, (LM & DC), Lahore*
[3]*Assistant Professor, Lahore College of Physical therapy, (LM & DC), Lahore*
[4]*Assistant Professor, Central Park Medical College, Lahore*
[5]*Clinical Manager, Ghurki Trust Teaching Hospital, Lahore*
[6]*Assistant Professor, Lahore College of Physical therapy, (LM & DC), Lahore*
Correspondence to Dr. Shoaib Waqas Email: shoaib.waqas@lmdc.edu.pk, 0302-4552109

ABSTRACT

Background: Cerebral palsy is a neurological disorder of brain, which impacts on posture, balance, and motor skills of a child due to in coordination between nervous and musculoskeletal system.
Aim: To improve functional independence among children with spastic cerebral palsy, so that independent sitting could be achieved, by which quality of life of these children, labor of therapist and caregiver was minimized.
Methods: The study comprised a total of 29 diagnosed individuals with spastic palsy from the Ghurki Trust and Teaching Hospital. Those who fulfill the inclusion criteria were examined by the pediatric department in GTTH. By using randomized sampling method the subjects were assigned to perform the task. Pre-operative and post-operative assessment was made on group to assess the percentage of gross motor skill by using GMFM Score Sheet. Patients were engaged into series of physical rehabilitation program based on trunk control and strengthening exercises.
Results: The finding of the study showed that 6.9 % kids were in age group 13 months to 18 months, 44.8 % were in between 19 months to 24 months of age, 31% between 25 months to 30 months, and 17.2 % between age group of 31 months to 36 months. The mean difference is 11.93 between pre and post treatment, had Standard deviation 4.11. P value is less than 0.05 which indicates that intervention is significant.
Conclusion: It is concluded that trunk exercises improve sitting postural control among Spastic Cerebral Palsy children.
Key words: CP, GMFCS, GMFM, Trunk Exercise, Spastic CP

INTRODUCTION

Cerebral palsy is a neurological disorder of brain, which impacts on posture, balance, and motor skills of a child due to in coordination between nervous and musculoskeletal system. This physical disability begins early in the childhood due to hypoxemic brain injury before or after delivery and remains entire life resulting in limitations of functional performance[1].

By considering at primitive reflexes and milestone performance indicators, CP can be diagnosed early. For the assessment of the pathophysiology of CP in premature newborns with low birth weight, neuroimaging of the brain, including brain ultrasonography and magnetic resonance imaging, should be used. Other measures of early detection of CP include impairments and functional limitations among CP children. Impairments are abnormalities in muscle strength, tone and mobility which are required for the early development of the postural control[2].

Type of CP includes spastic, ataxic and dyskinetic which differs from each other on the level of brain injury, among all the most common type of CP is spastic one, which results in increased tone, stiffness and exaggerated reflexes due to motor cortex damage during or after delivery. Spasticity of unilateral or bilateral limbs affects a child ability to sit or stand in upright position thus delays motor skills[3].

For every 1000 live births, there are two to 2.5 new instances of cerebral palsy, with 70% of those cases being spastic, five to ten cases being ataxic, and fifteen to twenty percent being dyskinetic[4]. Disorder of movement and postural control in CP results in limitations of functional performance, which effects daily activities and results in disability if untreated[5].

Gross Motor Function Classification System (GMFCS), which divides a CP child's gross motor skills, including sitting and walking, into five categories, is used to classify the severity of motor function in CP. Levels I and II are the least disabled and do not need an assistive device; nonetheless, they struggle with balance and coordination when running and walking. Level 5 impairment is defined as the inability to sit or stand unaided, even with assistive technology[6].

Strength training among CP children was avoided due to increase in spasticity and decrease range of motion, however a recent comparative pilot study shown improvement in standing posture among CP child with modified hip and trunk exercises, focusing on weak anti-gravity muscles of lower limb and trunk thus decreases exaggeration of anterior pelvic tilt and strengthens hip and trunk extensors which are require to achieve standing posture among spastic CP children[7].

Despite the fact that spasticity and muscle weakness have been treated using a variety of remedial techniques, useful organized activities performed as part of a circuit training regimen are believed to be a promising intercession to improve muscle quality without interfering with abnormal engine control (spasticity)[8].

The rationale of this study was to assess the effects of trunk exercises on spastic CP children in improving postural control for independent sitting, thus enhancing the quality of life of children and minimizing the labor of mother and physical therapist.

MATERIAL AND METHODS

This was a quasi-experimental study comprised of 29 patient samples and conducted at Ghurki Trust Teaching Hospital, Lahore after permission from hospital ethical committee. Diagnosed Spastic CP children's ages ranged from 13 months to 36 months; GMFCS level IV was included, and all other CP subgroups like athetoid and ataxic were excluded. Those who fulfilled the inclusion criteria were examined by the pediatric department at GTTH. By using the randomized sampling method, the subjects were assigned to perform the task. A pre- and post-assessment was made on the group to assess the percentage of gross motor skill by using the GMFM Score Sheet. Patients were engaged in a series of physical rehabilitation exercises based on trunk control and strengthening exercises. In order to maintain the optimal level of intervention throughout the treatment programme, physiotherapists delivered the programme to patients depending on their tolerance and needs. Throughout these sessions, the

Received on 10-11-2022
Accepted on 24-03-2023

patients were carefully examined, their function and gross motor responses were tracked, and the intervention was modified and optimized. Each session consisted of five parts: a warm-up, specific strengthening exercises, functional task-oriented activities, endurance exercises, and a cool-down. Those who met the criteria were provided written informed permission using a straightforward random technique once the sample size was established using an online data selection procedure. The data was gathered both before and after the treatment using the Gross Motor Function Measure (GMFM) score sheet (GMFM-88)[1]. The data was entered and analyzed using SPSS statistical software version 21.

RESULTS

There were 17 male and 12 females, with below mentioned ranges and frequency:

Age	Frequency	%	Valid%	Cumulative%
13-18 months	2	6.9	6.9	6.9
19-24 months	13	44.8	44.8	51.7
25-30 months	9	31.0	31.0	82.8
31–36 months	5	17.2	17.2	100.0
Total	29	100.0	100.0	

GMFM Pre and Post intervention analysis: It shows that pre interventional percentage (31.69) and post interventional percentage (43.62). The mean difference is 11.93 between pre and post treatment, had Standard deviation 4.11. P value is less than 0.05 which indicates that intervention is significant.

Outcome Variable	GMFM
Pre-Rx	31.69
Post-Rx	43.62
Mean Difference	11.93
St. Deviation	4.11
P-Value	0.00

Interpretation of Wilcoxon Signed Ranks Test: This result indicates the significant results of this study

N	Mean Rank	Sum of Ranks
GMFMB Post - GMFM B Sitting		
Negative Ranks	0	.00
Positive Ranks	29	15.00
Total	29	

DISCUSSION

The study's hypotheses called for training with trunk exercises at the proper frequency and intensity for a period of 12 weeks. This quasi-experimental study's key conclusion was that children with spastic CP had improved functional efficiency thanks to their exercise regimen. These findings are in line with earlier findings by other researchers. Gains in sitting performance following circuit training with activities like treadmill walking, (side) step ups, and sitting to stand are crucial from a clinical and practical standpoint[9].

The idea of specificity in functional training would therefore increase the functional efficiency of CP children with spasticity by including functional activities. This might ultimately enhance the quality of life for these young people who require further study. Our findings are consistent with other research showing that functional training regimens can improve daily living skills including walking, side steps, and transfers in children with (spastic) CP (sitting to stand)[10].

A study supports the use of task-oriented strength training to help children with cerebral paralysis improve their mobility function. The findings indicate that a task-focused strength training programme is linked to effective functional outcomes. The results suggest that children with cerebral palsy can benefit from a task-oriented strength training programme. Larger sample size investigations are required in future research[4].

A research conducted by Becher in 2010 has both positive and negative effects. In terms of short-term benefits, training for a week is beneficial, but not in terms of long-term outcomes. Immediately following practice, there was a statistically significant impact (p0.05) on muscle strength, but not on muscle strength (knee extensors + 12 percent [0.56 N/kg; 95 percent confidence interval(Abdolrahmani) 0.13-0.99]; hip abductors + 11 percent [0.27 N/kg; 95% CI(Abdolrahmani) 0.00-0.54]; complete + 8 percent [1.30 N/kg; 95 percent CI An influence on detraining was observed after six weeks.

On the other hand, Tyagi (2011) conducted a controlled study with a small sample of children with spastic dilplegic, aged 5 to 10, and found that the intervention group (n=9) receiving functional strength training significantly increased their walking range during a 2-minute walk test and a 10-meter walk test, but not the control group (n=9)[11].

Although type II error is common in small samples, the responders in the current study may represent a very small portion of the population, yielding a less clinically meaningful result. Hence, to confirm or refute the results of this investigation, high-quality randomized clinical studies will be required in the future.

CONCLUSION

It is concluded that trunk exercises improve sitting postural control among Spastic Cerebral Palsy children.

Conflict of interest: Nil

REFERENCES

1. Alotaibi M, Long T, Kennedy E, Bavishi S. The efficacy of GMFM-88 and GMFM-66 to detect changes in gross motor function in children with cerebral palsy (CP): a literature review. Disability and rehabilitation. 2014;36(8):617-27.
2. Palmer FB. Strategies for the early diagnosis of cerebral palsy. The Journal of pediatrics. 2004;145(2):S8-S11.
3. Walsh EG. Muscles, masses and motion: The physiology of normality, hypotonicity, spasticity and rigidity: Cambridge University Press; 1992.
4. Jamil H, Waqas S, Asim HM. Functional Abilities in Dyskinetic Cerebral Palsy Children between Age 5-12 Years: JRCRS. 2020; 8 (2): 53-55. Journal Riphah College of Rehabilitation Sciences. 2020;8(2):53-5.
5. Capute AJ, Shapiro BK. The motor quotient: a method for the early detection of motor delay. American Journal of Diseases of Children. 1985;139(9):940-2.
6. Lee SH, Shim JS, Kim K, Moon J, Kim M. Gross motor function outcome after intensive rehabilitation in children with bilateral spastic cerebral palsy. Annals of Rehabilitation Medicine. 2015;39(4):624-9.
7. Kim J-H, Seo H-J. Effects of trunk-hip strengthening on standing in children with spastic diplegia: a comparative pilot study. Journal of physical therapy science. 2015;27(5):1337-40.
8. Chung J, Evans J, Lee C, Lee J, Rabbani Y, Roxborough L, et al. Effectiveness of adaptive seating on sitting posture and postural control in children with cerebral palsy. Pediatric Physical Therapy. 2008;20(4):303-17.
9. Butler PB. A preliminary report on the effectiveness of trunk targeting in achieving independent sitting balance in children with cerebral palsy. Clinical Rehabilitation. 1998;12(4):281-93.
10. Dewar R, Love S, Johnston LM. Exercise interventions improve postural control in children with cerebral palsy: a systematic review. Developmental Medicine & Child Neurology. 2015;57(6):504-20.
11. Temcharoensuk P, Lekskulchai R, Akamanon C, Ritruechai P, Sutcharitpongsa S. Effect of horseback riding versus a dynamic and static horse riding simulator on sitting ability of children with cerebral palsy: a randomized controlled trial. Journal of physical therapy science. 2015;27(1):273-7.