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ORIGINAL ARTICLE

Effects of Spastic Cerebral Palsy on Different Functional Factors: A Cross-Sectional Descriptive Study

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ABSTRACT

Objective: To find out the effects of spastic cerebral palsy upon different functional factors such as activities of daily living.

Study Design: Cross sectional study

Place and Duration of Study: Data were collected from Children Hospital and Jinnah Hospital children ward in about 6-8 months from June 2019 to January 2020.

Material and Methods: A self-administered questionnaire was used to check spasticity among CP children along with its effects on other factors. . A convenient sampling technique was used and data was further analyzed by means of SPSS version 21.

Results: Among 90 patients that participated in the study, prevalence of spastic paralysis among CP children turned out to be 67.8%. The frequency of cerebral palsy children with affected activities of daily living (ADLs) was found to be 87.8%. Association of spasticity with different factors was calculated by chi square of p-value and a significant association was found.

Conclusion: The most common type of cerebral palsy is spastic type which has been found with the percentage of 67.8 in which significant results were found with affected ADLs, resistance to passive stretch and muscle tone.

Key Words: *Cerebral palsy, Spastic paralysis, Spasticity, Activities of daily living.*

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INTRODUCTION

Cerebral palsy (CP) is a neurodevelopmental condition that starts in the early childhood and continues throughout life. Cerebral palsy permanently affects the body movement and muscle coordination. It also affects posture and causes activity limitation that is caused by the damage or abnormalities in the developing brain.¹ It refers to loss or impairment of motor function. The motor deficits of cerebral palsy are often followed by disturbance in sensation, perception,

cognition, communication, behavior, or by a seizure disorder.²

The primary problems linked with cerebral palsy are spasticity and lack of muscle strength. These are considered as leading cause of disability in patients with CP. There is inverse relationship between spasticity and level of function therefore greater the level of spasticity lower is the functional level of the patient. Hamstring spasticity leads to the knee flexed pattern of the gait. Spasticity of plantar flexors leads to the gait which refers to walking-on-toes. Contrary to spasticity,

strength has direct association with gross motor functions and gait. Hence with greater strength there are improved functional abilities.³

Damage to upper motor neuron in central nervous system causes spasticity in children of cerebral palsy. Injury to this area decreases cortical input to the descending reticulospinal and corticospinal tracts, which in turn causes loss of motor control, weakness, and reduction in the number of voluntarily active motor units. Hence reduction of these descending tracts removes the normal inhibition of the reflex arcs leading to a hyperactive reflex arc and spasticity. General causes include premature birth, infection in mother, hypoxic injury to the brain and birth trauma during delivery.⁴

Many epidemiological studies have shown that delivery of the baby matters a lot in regard to cerebral palsy. One of the study shows that there are more cases when difficult delivery has occurred due to premature rupture of membranes. But on the other hand some studies have shown that use of vacuum or forceps, long labor or cord around the neck of baby do not cause cerebral palsy.⁵

Spasticity and a loss of muscle strength are the most common symptoms of cerebral palsy. Spasticity and level of function have an inverse association. Spasticity in the hamstrings causes a knee-flexed gait pattern.⁶

In patients with cerebral palsy almost 70 to 91% of motor disorders are due to spasticity. Contractures and pressure sores can also develop with time.⁷

Treatment of spasticity largely depends upon the degree of hypertonia or spasticity. Treatment may include medications, physical therapy, orthopedic surgery, rhizotomy, chemo denervation with botulinum toxin or phenol and intrathecal baclofen.⁸

Franki et al conducted a study to determine the effective treatment for the spasticity in children having CP. And it was resolved that dantrolene therapy was useful in lessening spasticity in children of all age groups suffering from CP.⁹

Investigations have shown some factors that are responsible for the development of cerebral palsy in children. These factors include inherited

thrombophilia, cytokine polymorphisms and infections. Further investigations should determine the interaction between the environment and genes.¹⁰

The aim of the study is to check the frequency of spasticity among cerebral palsy in children along with its effects upon activities of daily living, resistance to passive stretch etc.

MATERIAL AND METHODS

This cross-sectional study was conducted at Children hospital and Jinnah Hospital of Lahore from June 2019 to January 2020. A sample size of 90 was taken. The convenient sampling method was used.

Consent was taken from each participant's parents or attendees and then questionnaires were filled. The inclusion criteria were children having CP and age <15 years old.¹¹

The questionnaire was used to identify the frequency of spastic paralysis along with its effects on activities of daily living, resistance to passive stretch and tone of limbs among CP children. Data was analyzed using IBM SPSS version 21. A p-value less than 0.05 was considered significant.

The demographic data included questions about individual features like age and gender. Then type of CP, body side involved, muscle tone, toe walk, gait, posture, balance, sitting problems, activities of daily living (ADLs), assistive device used were asked by parents to fill in. Other comorbidities such as resistance to passive stretch, joint range were measured by goniometer.

RESULTS

Table 1 explains the demographics including type of cerebral palsy, tone of limbs in which results showed that 67.8% children showed spastic CP, 17.8% flaccid CP and 14.4% ataxic. Ratio of paraplegic CP was much more than any other types involved (51.1%). Table 2 shows the cross tabulation that 60 spastic 16 flaccid and 3 children with ataxic CP were having problems with activities of daily living making total of 79 (87.8%) children showing significant association, as p-value was 0.01. Table 3 shows the cross tabulation that 58 (95.1%) of spastic children were having resistance to passive stretch up to 64.4% and shows the significant association between the

type and resistance to passive stretch, as p-value was 0.01. Table 4 shows the cross tabulation between tone of limbs and results concluded were significant. Tone of limbs was assessed by

physical assessment by monitoring muscle tone that was found increased and tight limbs were measured.

TABLE 1: Demographic data of study population

Variable	Variable characteristic	Frequency n (%)	Valid (%)	Cumulative (%)
Gender	Male	63 (70.0)	70.0	70.0
	Female	27 (30.0)	30.0	100.0
Type of CP	Spastic	61 (67.8)	68.0	68.0
	Flaccid	16 (17.8)	18.0	86.0
	Ataxic	13 (14.4)	14.0	100.0
Body Side	Hemiplegic	13 (14.4)	14.0	14.0
	Paraplegic	46 (51.1)	51.0	65.0
	Quadraplegic	28 (31.8)	32.0	97.0
	Diplegic	03 (03.3)	03.0	100.0

TABLE 2: Cross tabulation of Type of CP with activities of daily living (ADLs)

Does child face difficulties doing activities of daily life? * What type of C.P. does the child have? Cross tabulation						
		Type of cerebral palsy			Total (%)	p-Value
		Spastic (%)	Flaccid (%)	Ataxic (%)		
Does child face difficulties doing activities of daily life?	Yes	60 (98.4)	16 (100.0)	3 (23.1)	79 (87.8)	0.01
	No	1 (1.6)	0 (0.0)	10 (76.9)	11 (12.2)	
Total		61 (100.0)	16 (100.0)	13 (100.0)	90 (100.0)	

TABLE 3: Cross tabulation of Type of CP with Resistance to passive stretch

Cross tabulation of Type of CP with Resistance to passive stretch							
		Type of cerebral palsy			Total	p-Value	
		Spastic	Flaccid	Ataxic			
Does child have resistance to passive stretch?	Yes	Count % within What type of C.P does the child have?	58 95.1%	0 0.0%	0 0.0%	58 64.4%	0.01
	No	Count % within What type of C.P does the child have?	3 4.9%	16 100.0%	13 100.0%	32 35.6%	
Total		Count % within What type of C.P does the child have?	61 100.0%	16 100.0%	13 100.0%	90 100.0%	

TABLE 4: Cross tabulation of Type of CP and Tone of limbs

Cross tabulation of type of CP with tone of limbs						
		Type of Cerebral palsy			Total (%)	p-Value
		Spastic (%)	Flaccid (%)	Ataxic (%)		
Do the child have following symptoms?	Tight limbs	61 (100.0)	0 (0.0)	0 (0.0)	61 (67.8)	0.01
	Flaccid limbs	0 (0.0)	16 (100.0)	0 (0.0)	16 (17.8)	
	Normal	0 (0.0)	0 (0.0)	13 (100.0)	13 (14.4)	
Total		61 (100.0)	16 (100.0)	13 (100.0)	90 (100.0)	

DISCUSSION

In Australia a study was carried out by Alison Dale et al. and found the prevalence of spastic paralysis about 66%.¹² On the same pattern, Else Odding et al in 2009 found the prevalence of spastic paralysis as 70%.¹³ He also concluded that CP has other impairments along with spastic paralysis such as epilepsy and speech disorders etc. In the study they have found the disturbed ADLs equally as far as other co morbidities.¹⁴ Our study shows 67.8% children with spasticity.

In a study in 2009 by Christopher Morris stated that male children are more affected by spasticity from cerebral palsy in comparison to female children and the male to female ratio estimated was 1.4:1.¹⁵ In comparison, no such significant ratio of males and females were seen. But this may be due to the limitation in the study as male and female ratio was not equal due to availability of children.

In this study we have asked for the disturbed daily chores from the parents of affected children in whom reported restricted movement was 66.7% and 33.3% without any restriction. A study in 2015 also found that movement restriction is a very effect of cerebral palsy. Transfer has always being the biggest problem for these children and about 82.2% of the total were reported problems with transfer and rest 17.8% were doing normal transfer by their own selves. As restricted movement was involved that is why limited mobility has also seen among these children and was reported by parent about 92.1% and only 7% were shown with normal mobility. Other studies have also given the same results such as reported restricted movement, limited mobility and also problems with transfer. Difficulty in balance was found ambiguous among these children. They use assistive devices for walking such as wheel chairs or crutches, others walk by using wall or their attendants support. They usually resist in passive stretch. Similarly in this study we have recorded that most of the subjects showed resistance to passive stretch.¹⁶

In a study in 2017 by Rose et al, it was recorded that children with spastic paralysis were also having tight limbs and excess limitation in movements. CP is the most common problem among children and amongst them is the spastic

paralysis.¹⁶

In 2006, a study conducted by Pin et. al. found that resistance to passive stretch (RPM) has clearly seen among CP children that when they are given stretch passively, they show maximum resistance to the movement due to tightness of limbs and spasticity.¹⁷ Similarly, in this study 67.8% CP children were reported with resistance to passive movements and 32.2% were reported with no resistance in response to passive movements.

Spasticity is directly relevant to tightness of limbs. In this study we have calculated 67.8% children were having tight limbs, 17.8% with flaccid limbs and 14.4% were recorded with normal tone of muscles. Similarly, in a study in 2017 by Rose et al, it was recorded that children with spastic paralysis were also having tight limbs and excess limitation in movements. CP is the most common problem among children and amongst them is the spastic paralysis.¹⁸

This study emphasizes on quality of life facing by the children of cerebral palsy with altered activities of daily living, passive stretch to resistance and the effects on tone of muscle.

This study urges for future research on treatments of cerebral palsy children with varied bodily tones. Further, the results may be varied in future.

CONCLUSION

The frequency of spasticity was 67.8% among CP children of age group 1 to 15 years found in the study. Among physical appearance, bent/flexed knees, flexed wrist, abnormal posture indicated that the child have CP. On assessment tight limbs and hypertonic muscles indicated presence of spasticity.

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REFERENCES

1. Braun KVN, Doernberg N, Schieve L, Christensen D, Goodman A, Yeargin-Allsopp M. Birth prevalence of cerebral palsy: a population-based study. *Pediatrics*. 2016;137(1).
2. Al Baradie RS. Neurodynamics and mobilization in Stroke Rehabilitation—A Systematic Review. *Majmaah Journal of Health Sciences*. 2017;5(2):99-112.
3. Oskoui M, Coutinho F, Dykeman J, Jetté N, Pringsheim T. An update on the prevalence of cerebral palsy: a systematic review and meta-analysis. *Developmental Medicine & Child Neurology*. 2013;55(6):509-19.
4. Bar-On L, Molenaers G, Aertbeliën E, Van Campenhout A, Feys H, Nuttin B, et al. Spasticity and its contribution to hypertonia in cerebral palsy. *BioMed research international*. 2015;2015.
5. Bar-On L, Harlaar J, Desloovere K. Spasticity assessment in cerebral palsy. *Cerebral Palsy*. 2020:585-600.
6. Clodt E, Rosenblad A, Rodby-Bousquet E. Demographic and modifiable factors associated with knee contracture in children with cerebral palsy. *Developmental Medicine & Child Neurology*. 2018;60(4):391-6.
7. Himmelmann K, Beckung E, Hagberg G, Uvebrant P. Bilateral spastic cerebral palsy—prevalence through four decades, motor function and growth. *European Journal of Paediatric Neurology*. 2007;11(4):215-22.
8. Medical AS. Intrathecal baclofen pump for spasticity: an evidence-based analysis. *Ontario health technology assessment series*. 2005;5(7):1.
9. Franki I, Bar-On L, Molenaers G, Van Campenhout A, Craenen K, Desloovere K, et al. Tone reduction and physical therapy: strengthening partners in treatment of children with spastic cerebral palsy. *Neuropediatrics*. 2020;51(02):089-104.
10. Unni JC. Pharmacotherapy For Spasticity In Cerebral Palsy. *Indian Journal of Practical Pediatrics*. 2018;20(4):256.
11. Seyhan K, Arslan UE, Çankaya Ö, Özal C, Akbaş AN, Üneş S, et al., editors. The Effect of Comorbidities of Children with Cerebral Palsy (5-13 age group) on Quality of Life in Ankara. 3 International 21 National Public Health Congress; 2019.
12. Park E-Y, Kim W-H. Effect of neurodevelopmental treatment-based physical therapy on the change of muscle strength, spasticity, and gross motor function in children with spastic cerebral palsy. *Journal of physical therapy science*. 2017;29(6):966-9.
13. Odding E, Roebroek ME, Stam HJ. The epidemiology of cerebral palsy: incidence, impairments and risk factors. *Disability and rehabilitation*. 2006;28(4):183-91.
14. Johnson S, Fawke J, Hennessy E, Rowell V, Thomas S, Wolke D, et al. Neurodevelopmental disability through 11 years of age in children born before 26 weeks of gestation. *Pediatrics*. 2009;124(2):e249-e57.
15. Bansode S, Ghane VR. Malnutrition in Children with Cerebral Palsy: An Indian Study. *J Med Sci Clin Res*. 5(10):28911-15.
16. O'Callaghan ME, MacLennan AH, Gibson CS, McMichael GL, Haan EA, Broadbent J, et al. The Australian cerebral palsy research study—protocol for a national collaborative study investigating genomic and clinical associations with cerebral palsy. *Journal of paediatrics and child health*. 2011;47(3):99-110.
17. Pin T, Dyke P, Chan M. The effectiveness of passive stretching in children with cerebral palsy. *Developmental medicine and child neurology*. 2006;48(10):855-62.
18. Akbas AN, Gunel MK. Effects of trunk training on trunk, upper and lower limb motor functions in children with spastic cerebral palsy: a stratified randomized controlled trial. *Konuralp Medical Journal*. 2019;11(2):253-9.