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Study of Gross Motor Functions in Cerebral Palsy Patients

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Abstract: Introduction: *The term Cerebral Palsy (CP) was originally coined more than a century ago and loosely translates as "brain paralysis". Cerebral Palsy is the leading cause of childhood disability affecting function and development. The hallmark of CP is a disorder in the development of gross motor functions. This prospective study was performed in the Department of Physical Medicine and Rehabilitation, Chittagong Medical College Hospital, during a period of six months from April 2009 to September 2009 to assess different presentations, risk factors and gross motor function improvement in cerebral palsy (CP) patients.*
Methods: *Data were collected by direct interviewing the patient's mother using a formulated data sheet with the particulars of the patients, chief complains, risk factor, physical examination, types of CP, management and follow up scale with Gross Motor Functional Classification System by the principal investigator. Rehabilitation management were done by counseling, comprehensive physical therapy, occupational therapy, orthosis, assistive and adaptive devices by skill personals. Patients were follow up monthly for 6 months.*
Main outcome ***measure (s)*** *Risk factors and gross motor function improvement*
Results: *The mean age was found 2.99±1.41 years and male to female ratio was 1.2:1. Nearly. a half (48.3%) of the patients had speech disorder and (47.2%) had convulsion. More than one disability was present (44.9%) and single disability was present in (25.8%) patient. Majority (63.0%) patients had prematurity, 16.4% had abnormal fetal presentation, 11.0% had twin gestation and 9.6% had fetal growth retardation. Among the pyramidal (spastic) type of CP, quadriplegia was found 41.6%, hemiplegia 27.0% and diplegia 5.6%. In extra pyramidal group, choreoathetosis was found 5.6% and dystonia was 3.4%. The mean gross motor function level during baseline was 4.17±0.67 with ranged from 3 to 5 and 2.8±1.01 with ranged from 1 to 5 in* ***6th*** *visit. *
Conclusion: *This study was done to assess different presentation of cerebral Paisy (CP), risk factors and gross motor function improvement. Early diagnosis, proper assessment of the functional capacity and needs of the child and providing early intervention are important, a multidisciplinary approach to management with active parental involvement helps the child achieve his potential.*
Key Words: *Gross Motor Functions, Cerebral Palsy Patients, Rehabilitation management*

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I. Introduction

The term Cerebral Palsy (CP) was originally coined more than a century ago and loosely translates as "brain paralysis". The motor disorders of CP are often accompanied by disturbances of sensation, cognition, communication, perception behavior and a seizure disorder".[1]

The brain lesions of CP occur from the fetal or neonatal period to up to age 3 years. However, although insults to the brain after the age 3 years through adulthood may manifest clinically as similar or identical to CP[2]

Some authorities advocate not making a definitive diagnosis in selected cases until age 5 years or later. This approach allows the clinical picture to be clear and potentially allows exclusion of progressive diseases.[3,4] In addition; some children have been diagnosed with CP at an early age, only to have the symptoms resolve later.[5]

A 2007 six-country survey found an incidence of CP of 2.12—2.45 per 1,000 live births,[8] indicating a slight rise in recent years. A 2003 study put the average lifetime cost for people with CP in the US at $921,000

per individual, including lost income.[9] In the industrialized world the prevalence of cerebral palsy is about 2 per 1000 live births10. The incidence is higher in males than in females; the Surveillance of Cerebral Palsy in

Europe (SCPE) reports a M:F ratio of 1.33:1.[11] In the United States, approximately 10,000 infants and babies are diagnosed with CP each year, and 1200—1500 are diagnosed at preschool age.12The incidence of CP increases with premature or very low-weight babies regardless of the quality of care.13 Prevalence of cerebral palsy is best calculated around the school entry age of about six years. the prvalence in the U.S. is estimated to be 2.4 out of 1000 children.[14]

The hallmark of Cerebral Palsy is a disorder in the development of gross motor functions. People who have CP may not be able to walk, eat or play in the same way as most other people. Depending on which areas of the brain have been injured one or more of the following may occur.

1. Muscle tightness or spasm
2. Involuntary movement.
3 Difficulty with gross motor skills such as sitting, standing, walking or running.
4 Difficulty with fine motor skills such as writing and speaking.
5. Abnormal perception and sensation.

These effects may cause associated problems, for instance, difficulty in eating and swallowing, poor bladder and bowel control and breathing problems. Many, but not all, individuals who have cerebral palsy have secondary mental conditions and disabilities

1. Growth problems
2. Seizure or epilepsy
3. Learning difficulty
4. Hearing impairment
5. Vision problems
6. Emotional problems
7. Speech disorders

It must be remember that not all children with CP have mental retardation. Their intelligence may vary from normal to grossly below normal. Majority of them however have subnormal intelligence.

Cerebral Palsy is classified according to the extremity involved (monoplegia, hemiplegia, triplegia, diplegia, quadriplegia) and characteristics of the neurologic dysfunction (spastic, hypotonic, dystonic, athetotic or a combination.151617 Spastic cerebral palsy is by far the most common type of overall cerebral palsy, occurring in 80% of all cases.[18]

Ataxia-type symptoms can be caused by damage to the cerebellum. Ataxia is a less common type of cerebral palsy, occurring between 5 and 10% of all cases.[19]

The clinical manifestation often differ according to the gestational age at birth, the chronologic age, the distribution of the lesions and the underlying disease. Several other / neurlogic disability often accompany Cerebral Palsy.[20-24]

Many of the normal developmental milestones, such as reaching for toys (3-months), sitting (6-7months), and walking (10-l4months), are based on motor function. A Cerebral Palsy in a child whose development of these skills is delay .Approximately one third of all children with this disease have epilepsy; the prevalence among those with hemiplegia is 50 percent. The likelihood of epilepsy, extrapyramidal abnormalities, and severe cognitive impairment is higher among those with quadriplegia than among those with diplegia or hemiplegia.

We know there are several disorders in a child with CP, like fine motor function cognitive function, gross motor function etc. Among these the gross motor dysfunction is the primary problem in CP. ability of an individual to use his / her small muscles of hands and fingers , in combination of with psychological function such as perception and attention , to accomplish certain tasks like griping, pinching etc with some other basics functions are termed as fine motor function. But the influence of gross motor development on fine motor development is more important than other factors in early developmental period, especially under three years old and in children with CP. The cause of CP is unidentified in 50 percent of the case. Diagnosis of cerebral palsy has historically rested on the patient's history and physical examination. (Furthermore, an abnormal neuroimaging study indicates a high likelihood of associated conditions, such as epilepsy and mental retardation.[26] birth, but is often postponed until the child is 18—24 months of age, in order to evaluate the functional status and the progression or regression of the symptoms. [27]

Management of Cerebral Palsy starts with counseling the parents about the disease. Physiotherapy especially when started early in life, is helpful in promoting normal motor development and preventive deformity and contractures. Physical therapy is the most common intervention in cerebral palsy and is usually a

component of mandated programmes. The neurodevelopmental "Bobath technique" is commonly used. It consists of guiding the child through normal sequences of motor development, inhibition of primitive and abnormal reflexs, re-inforcement of normal postural reflexs and facilitation of normal movements. Strengthening activity such as progressive resistive, isometric and isokinetic training programs employed to address the underlying weakness. Balance and co ordination training progress with repeated task practice, occupational therapist is usually better trained to advice on activites of daily living -feeding, bathing, dressing, toilet training. Multisensorial stimulation provided through peg board, blocks and toys of different colours, textures, sizes and shapes.[29] Occupational therapy helps adults and children maximise their function, adapt to their limitations and live as independently as possible.[31] parallel bars can be constructed with logs of wood to help gait training.(Standing frames and prone boards are a intermediate stage in mobilization. A goodstabIe seat with a back support, abductor wedge, foot rest, is helpful for school aged child. All these can be made by locally trained carpenter.counselling is also an important aspect of occupational therapy treatment with regard to optimizing the parent's skills in caring for and playing with their child to support improvement of their child's abilities to do things[35,36] The occupational therapist typically assesses the child to identify abilities and difficulties, and environmental conditions, such as physical and cultural influences, that affect participation in daily activities.[37] Occupational therapists may also recommend changes to the play space, changes to the structure of the room or building, and seating and positioning techniques to allow the child to play and learn effective.

Speech therapy helps control the muscle of the mouth and jaw, and helps improve renunciation. Speech there after starts before a child begins school and continues throughout the school years.[38]
Biofeedback is a therapy in which people learn how to control their affected muscles. 16feedback therapy has been found to significantly improve gait in children with cerebral palsy.[39]

The Gross Motor Functional Classification System (GMFCS) can be used to capabilities of children from infancy to 12 years, over five levels (level I least involved) based on age-appropriate self-initiated movement with emphasis on trunk control through sitting and walk in.

Cerebral Palsy is one of the commonest problems for which patients attending in the Department of Physical Medicine & Rehabilitation, Chittagong Medical College Hospital, Chittagong. In this study an attempt has been taken to analysis of gross motor functions in Cerebral Palsy patient.

Type of the Study: It was prospective study.
Place and period of study: Department of Physical Medicine and Rehabilitaiton, Chittagong Medical College Hospital, over a period of six Months (April 2009 to September 2009).

Selection criteria:
A. Inclusion criteria:
Age 1-7 year.
B. Inclusion criteria:
1) Age < 1 year
2) CP with meningo- encephalities

Study Procedure:
Data was collected by direct interviewing the patient's mother using a formulated data sheet (appendix-A) with the particulars of the patients, chief complains, risk factor, physical examination, types of CP, management and follow up scale with Gross Motor Functional Classification System (appendix-D) Rehabilitation management was done by counseling, comprehensive physical therapy, occupation therapy,orthosis , assistive and adaptive devices. Patient was follow up monthly for 6 months.

Data Collection
Data was collected using a structured questionnaire (research instrument) containing all the variables of interest.

Main Outcome variables:
Age, Sex, chief complaints, associated disability, disability distribution before pregnancy, during Pregnancy, during labour and delivery, types of CP, baseline and different follow up and gross motor function level in different follow up.

Statistical analysis:

After collection data was checked & analysis was done by Statistical Package for social science (SPSS). Result of clinical study statistical analysis was presented by tables, figures, Graphs and diagrams etc. All these should have their own legends (i.e. title) and be serially numbered.

II. Result

Table I Age distribution of the study patients (n=89)

Age (in years)	Name of patients	Percentage
<2	38	42.7
3-5	47	52.8
>5	4	4.5
Mean + SD		2.99+ 1.41
Rang (min- max)		(1-7)

A total of 89 Patients were included in this study. Maximum 47(52.8%) patient's age belonged to 3-5 years age group. The mean age was found 2.99+ 1.41 years with ranged from 1 to 7 years.

Table II Sex distribution of the study patients (n=89)

Sex	Name of patients	Percentage
Male	49	55.1
Female	40	44.9

Regarding the sex distribution of the study patients, male was found 49(55.1%) and female was 40 (44.9%). Male female ratio as 1.2:1.

Table III Distribution of the study patients according to chief complaints (n=89)

Chief complaints	Number of patients	Percentage
Difficulty in head control	8	9.0
Difficulty in sitting	29	32.6
Difficulty in standing	61	68.5
Difficultly in walking	55	61.8

Regarding the chief complaints of the study patients, majority 61 (88.5%) patients had difficulty in standing, 55 (61.8%) had walking, 29 (32.6%) had sitting and 8(9.0%) had head control difficulty.

Table IV Distribution of the study patients according to associated disability (n=89)

Associated disability	Number of patients	Percentage
Speech	43	48.3
Convulsion	42	47.2
Hearing	12	13.5
Swallowing (Drooling)	11	12.4
Visual	7	7.9
Mental retardation	6	6.7
Squint	2	2.2

Regarding the associated disabilty of the study patients, majority 43 (48.3%) patients had speech, followed by 42 ((47.2%) had convulsion, 12(13.5%) had hearing, 11(12.4%) had swallowing (Drooling,) 7 (7.9%) had visual, 6 (6.7%) had mental retardation and 2 (2.2%) had squint.

Table VI Risk Factors (Before pregnancy) of the study patients (n=89)

Before preggnacy	Number of patients	Percentage
History of abortion	9	56.3
Early pregnancy	7	43.8

Risk factors (before pregnancy), 9 (56.3%) patients had history of abortion, 7 (43.8%) had early pregnancy.

Table VII Risk Factors (During pregnancy) of the study patients (n=89)

During pregnancy	Number of patients	Percentage
Prematurety	46	63.0
Abnormal fetal presentation	12	16.4
Twin gestation	8	11.0
Fetal growth retardation	7	9.6

Among the risk factors (during pregnancy), majority 46 (63.0%) patients had prematurity followed by 12 (16.4%) had abnormal fetal pressentation, 8 (11.0%) had twin gestation and 7 (9.6%) had fetal growth retardation.

Table VIII Risk Factors (During labour and delivery) of the study patients (n=89)

During labor and delivery	Number of patients	Percentage
Fetal distress	17	27.9
Premature separation of the placenta	14	23.0
Difficulty delivery	12	19.7
Delivery with umbilical cord wrapped around throat	12	19.7
Prolong labor	11	18
Low APGAR Score	7	11.5
Meconium stain	3	4.9

Among risk factors (during labor and delivery), majority 17 (27.9%) patients had fetal distress, followed by 14 (23.0%) had premature separation of the placenta, 12 (19.7%) had difficulty delivery and delivery with umbilical cord wrapped around throat. Other results are depicted in the table.

Table IX Risk Factors (During the early postnatal period)) of the study patients (n=89)

During the early postnatal period	Number of patients	Percentage
Newborn encephalopathy	10	71.4
Trauma	4	28.6

During the early postnatal period 10 (71.4%) patients had newborn encephalopathy and 4 (28.6%) had trauma.

Table X Distribution of the study patients according to types of Cerebral Palsy (n=89)

Types of Cerebral Palsy	Number of patients	Percentage
Pyramidal (spastic)		
Quadriplegia	37	41.6
Hemiplegia	24	27.0
Diplegia	5	5.6
Paraplegia	3	3.4
Monoplegia	1	1.1
Extra pyramidal		
Choreoathetosis	4	4.5
Dystonia	3	3.4
Atonic (cerebellar)		
Atonic diplegaia	5	5.6
Congenital cerebellar ataxia	4	4.5
mixed		

Regarding the types of Cerebral Palsy of the study patients. In Pyramidal (spastic) group, quadriplegia was found 37 (41.6%), hemiplegia was 24 (27.0%) and diplegia was 5.6% in extra pyramidal group, choreoathetosis was found 4 (5.6%) and dystonia was 3 (3.4%). Among the atonic (cerebellar), atonic diplegia was 5 (5.6%), congenital cerebellar ataxia was 4 (4.5%) and mixed was 3. 4%).

Regarding the associated disability of the study patients, majority 43 (48.3%) patients had speech, followed by 42 ((47.2%) had convulsion, 12(13.5%) had hearing, 11(12.4%) had swallowing (Drooling,) 7 (7.9%) had visual, 6 (6.7%) had mental retardation and 2 (2.2%) had squint.

Table XI Distribution of the study patients according to gross motor function classification system during baseline and different follow- up (n=89)

Baseline and different Follow up	Mean±SD	Rang Min-max
Baseline (0 month)	4.17±0.67	3-5
1st visit (Month 1)	4.12+0.71	3-5
2nd visit (Month 2)	3.89+069	3-5
3rd visit (Month 3)	3.65 +- 0	3-5
4th visit (Month 4)	3.43+89	3-5
5th visit (Month 5)	3.09+-.88	3-5
6th visit (Month 6)	2.8+1.01	3-5

The mean gross motor function level during baseline ws 4.17± 0.67 with ranged from 3 to 5. During 1st visit and 2nd visit the mean gross motor function level were 4. 12 ± 0.71 and 3.89 ± 069 respectively. The mean gross motor function level was 3.65± 0 in 3rd visit. 3.43+089 in 4th visit, 3.09±0.88 in 5th visit 2.8+1.01 in 6th visit.

Table XII Evaluation of gross motor function level between basely with different follow-up (n=89)

Gross motor function level in different follow-up	Gross motor function level (baseline) III (n=12)		IV (n=43)		V (n=26)	
	n	%	n	%	n	%
1st visit (Month 1)						
III	12	100.0	4	9.3	0	0.0
IV	0	0.0	39	90.7	0	0.0
V	0	0.0	0	0.0	26	100.0
2nd visit (Months 2)						
III	12	100.0	12	27.9	0	0.0
IV	0	0.0	31	72.1	11	42.3
V	0	0.0	0	0.0	15	57.7
3rd visit (Months 3)						
II	7	58.3	0	0.0	0	0.0
III	5	41.7	20	46.5	4	15.4
IV	0	0.0	23	53.5	7	26.9
V	0	0.0	0	0.0	15	57.7
4th visit (Months 4)						
II	7	58.3	4	9.3	0	0.0
III	5	41.7	23	53.5	7	26.9
IV	0	0.0	16	37.2	8	30.8
V	0	0.0	0	0.0	11	42.3
5th visit (Months 5)						
II	12	100	12	27.9	0	0.0
III	0	0.0	23	53.5	7	26.9
IV	0	0.0	8	18.6	15	57.7
V	0	0.0	0	0.0	4	15.4
6th visit (Months 6)						
I	7	58.3	0	0.0	0	0.0
II	5	41.7	16	37.2	4	15.4
III	0	0.0	23	53.5	7	26.9
IV	0	0.0	4	9.3	11	42.3
V	0	0.0	0	0.0	4	15.4

During baseline, 12 patients have motor function level III, 43 patients having level IV and 26 patients having level V. During **5th** visit at **5th** months all patients were improved motor function level II in patients who had motor function level Ill and out of these patients, 7(58.3%) had improved gross motor function level I in **6th** months follow-up.

Patients who had have motor function IV during baseline, 4(9.3%) were static and 39(90.7%) improved during **6th** months follow-up visit, out of which 16(37.2%) gross motor function level II and 23(53.5%) level Ill.

Patients who had have motor function V during baseline, 4(15.4%) were static and 22(84.6%) improved during **6th** months follow-up visit, out of which 4(15.4%) gross motor function level II, 7(26.9%) level III and 11(42.3%) level IV.

A total number of 89 consecutive patients with Cerebral Palsy who came in department of Physical medicine and Rehabilitation, Chittagong Medical College Hospital (CMCH) Chittagong, during the study period were enrolled in this study

in this current study it was observed that more than a half (52.8%) of the patient's age belonged to *3-5* years age group and the mean age was 2.99±1.41 years with ranged into 7 years. Almost similar age range observed by Aksu24 where the authors found age range varied from 2 to 6 years. In another study, Baker et al found the mean age was 5.2±2.0 years, which are comparable with the current study. In this present study it was observed that Cerebral Palsy was more common in Male where 55.1% and 44.9% were male and female respectively and male to female iatio was 1.2:1. In Cerebral Palsy male predominant also obtained by khan[48], Rootlieb et al2 Baker et aI-and Singh et al[7],

Many of the normal developmental milestones, such as reaching for toys (3-4months), sitting (6-7months), and walking (10-14 months), are based on motor function. In this current series it was observed that most (68.5%) of the patients presented with standing problem, 61.8% with walking problem, 32.6% sitting and 9.0% patients had head control. definition gross motor ability is the capability for an individual to use his/her 'extrimities, trunk, head and neck and joints to accomplish certain task, such as lying,, sitting, crawling and kneeling standing, walking, running and jumping.

Speech and language disorders are common in people with Cerebral Palsy. The incidence of dysarthria is estimated to range from 31% to 88%. Speech problems are associated with poor respiratory control, laryngeal and velopharyngeal dysfunction as well as oral articulation disorders.

Regarding the associated disability of the current study patients it was observed that almost a half(48.3%) of the patients had speech disorder followed by 47.2% convulsion, 13.5% hearing disorder, 12.4% swallowing (Drooling), 7.9% had visual, 6.7% had mental retardation and 2.2% had squint. Khan48 found 49.4% speech problem, 45.1 % mental retardation, seizure 38.7%, squint 26.8%, hearing impairment 13.9%. Singhi et afound mental retardation 72.5%, speech disorder 7.8%, visual disorder 41.0%, hearing disorder 14.0% and convulsions 32.0Y0. In another study, Von Wendt et al.21 showed impaired hearing in 7.0%, visual defect in 19.0% and mental retardation (lQ less than 85) was present in 70.0%. Rootlieb et *al.22* and Singhi et aL57 showed squint 12.'O% and mental retardation 80.0% respectively. The above findings are consistent with the current study:

Hutton and Pharoah[52] showed 59.0% have severe ambulatory disability and 55.0% have severe manual disability. Pharoah et al. showed 33.4% had severe ambulatory disability (no independent walking), 23.7% severe manual disability (incapable of feeding or dressing unaided), 23.1% severe learning disability (IQ <50), 8.9% severe visual disabiljy (vision <6/60 in the better eye) and 0.7% had severe hearing disability (>70 dB loss). His series it was observed among the risk factors (during pregnancy), almost two third (63.0%) of the patients had prematurely followed by 16.4% had abnormal fetal presentation, 11.0% had twin gestation and 9.6% had fetal growth retardation. Singhi et al. found twins gestation 1.2% in their study patients with cerebral palsy. Among the risk factors (during labour and delivery) it was observed in this current study that majority (27.9%) the patients had fetal distress, followed by 23.0% premature separation of the placenta, 19.7% had difficulty delivery and delivery with umbilical cord wrapped around throat, 18.0% had prolong labor, 11.5% had Low APGAR Score and mconium stain 4.9%. Lie et al.[49] mentioned that APGAR score strongly associated with Cerebral Palsy. Eleven percent children with an APGAR score of less than 3 were diagnosed with Cerebral Palsy, compared with only 0.1% of the children with APGAR score of 10. During the early postnatal period in this present study it was observed that 71.4% patients had newborn encephalopathy and 28.6% had trauma. Kolawole, Patel and Mahdi53 showed birth trauma and neonatal asphyxia 94.0% in their study patients. Jacobsson and Hagberg5 suggests that 70.0—80.0% of CP cases are due to prenatal factors and that birth asphyxia plays a relatively Minor role 10.0% Regarding the types of CP it was observed in this current series according to pyramidal (spastic), quadriplegia was found 41.6%, hemiplegia 27.0% and diplegia was 5.6%. In extra pyramidal, choreoathetosis was found 5.6% and dystonia 3.4%. Among the atonic (cerebellar), atonic diplegia 5.6%, congenital cerebellar ataxia was 4.5% and mixed was 3.4%. Khan48 Evans et al.2° found hemiplegia 36.0%, diplegia 28.0%, quadriplegia 26%, monoplegia 2.0% and paraplegia 2.0%. In another study, Singhi et al.[57] obtained that quadriplegia 61.0%, diplegia 22.0%, hemiplegia 17% and mixed 13.9%. Rootlieb et aI. showed quadriplegia 12.5%, diplegia 18.8% and hemiplegia 53.1%.1ajority of the findings are in agreement with the present study regarding the type of CP .

Gross Motor Functional Classification System (GMFCS) can be used to describe *the* functional capabilities of children from infancy to 12 years, over five levels (level I least involved) based on age-appropiate self-initiated movement with emphasis on trunk ontrol through sitting and walking.) this study it was observed during baseline, 12 patients have motor function level III, 43 patients having level IV and 26 patients having level V. During *5th* visit at *5th* months all *patients* were improved motor function level Ii in patients who had motor function level Ill and out of these patients, 58.3% had improved gross motor function level I in 6th months follow-up. In this series it was observed in patients who had have motor function IV during baseline, 9.3% were static and 90.7% improved during 6" months follow-up visit, out of which 37.2% gross motor function level II and 53.5% level Ill. In this current study it was observed in patients who had have motor function V during baseline, 15.4% were static and 84.6% improved during 6th months follow-up visit, out of which 15.4% gros yiotor function level II, 26.9% level Ill and 42.3% level IV. A meta-analysis was done by McLaughlin et al. three randomized clinical trials showed common outcome measure was used for spasticity by function. At baseline, 82 children were under 8 years old and (35 had Gross Motor Function CIassificaion System level II or Ill disability. GMFCS data revealed greater functional improvement with dorsal rhizotorny (SDR) plus physiotherapy (SDR+PT) (difference in change score +4.0, pO.OO8). Multivariate analysis in the SDR+PT group revealed a direct relationship between percentage of dorsal root tissue transected and functional improvement. SDR+PT is efficacious in reducing spasticity in children with spastic diplegia and has a small positive effect on gross motor function.

III. Conclusion

This study undertaken to assess different presentation, risk factors and gross motor function improvement in Cerebral Palsy patient. Considering the information gathered from this study, it could be concluded that Cerebral Palsy is a common cause of disability in childhood. Spastic quadriplegia is the most severe form of Cerebral Palsy with multiple disabilities. The hallmark of cerebral palsy is a disorder in the development of gross motor functions. Not all children with cerebral palsy have mental retardation Physical therapy may be considered as a common mandated intervention program in Cerebral Palsy. Of course, we don't

consider that the results of this study should be interpreted as the final answer but it will accelerate to look into new approaches in Rehabilitation that are more effective in promoting motor and functional improvements in children with Cerebral Palsy.

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