



Impact of Comprehensive Intervention in Children with Cerebral Palsy

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Introduction: Cerebral palsy (CP) refers to a spectrum of disorders causing physical and intellectual morbidity among large number of children across the globe. Management of these children has to be done by a multidisciplinary team.

Objectives: To assess the physical and functional disabilities of these children using accepted scales of GMFM and FIM and to determine their response to intervention.

Materials And Methods: The study was conducted at a Tertiary Care Centre as a follow up study, during the period July-December 2016. Follow up period was one year. The study participants were diagnosed cases of CP in the age group 1-16 years of age. The children registered were graded based on GMFM and FIM scales. {GMFM: Gross Motor Function Measure} and {FIM: Functional Independent Measurement}. Comprehensive intervention were given by the rehabilitation team and re-evaluation were done at the end of one year. The data was analyzed using SPSS version 16 and paired t test.

Results: Out of the 41 children enrolled, 30 had quadriplegia, 3 had hemiplegia and 8 had spastic diplegia. The gross motor score and functional score were suboptimum in the majority of patients. However they showed significant improvement following intervention

Conclusion: Comprehensive multidisciplinary rehabilitation can play a major role in the management of CP.

Keywords: Cerebral Palsy, GMFM, FIM, Intervention.

INTRODUCTION

Cerebral palsy (CP) is a non-progressive neuro motor disorder of central origin in children with multiple neurological deficits and variable intellectual handicap. They also suffer from seizures, feeding problems, multiple nutritional deficiencies and social isolation. The quality of life is also affected and the care takers perceive various hardships. The prevalence is as high as 3.5 per 1000 children all across the globe with a slightly growing trend in incidence over the

years.¹ The available data from India also shows the prevalence of 3 per 1000 children.² Various risk factors operating during prenatal and natal period have been proved as risk factors for the cause of "CP".³ The physical and mental handicaps due to the disease pose serious challenges; both to the patient and to the caregiver.⁴⁻⁶ Providing proper care to them require massive commitment from the part of all caregivers particularly the parents. With increased physical disability or decreased

Functional capability of the patient, the stress on the caregiver rises. The types of cerebral palsy include quadriplegia(20%) spastic diplegia(35%), hemiplegia (25%) and extrapyramidal(15%)⁷. It has been showed that comprehensive multidisciplinary treatment can significantly bring down the physical and functional disabilities in cerebral palsy. Several uncontrolled trials have reported increases in strength after training in children with cerebral palsy and that increased strength can translate into improved activity⁸ However, no much studies are available showing the effect of interventions in children with cerebral palsy in India. Hence this study was undertaken.

AIM OF THE STUDY

To assess the Physical and Functional improvement of children diagnosed as cerebral palsy pre and post intervention

SETTING

The study was undertaken in the Pain and Palliative care clinic of a tertiary care center. SAT Hospital, Govt. Medical College, Trivandrum, Kerala.

The clinic was established to provide a comprehensive management for children suffering from chronic debilitating disorders like cerebral palsy, post encephalitic sequelae and neurodegenerative disorders. It is conducted by department of Pediatrics in association with Pallium India (NGO accepted by WHO for providing palliative care and pain relief)

MATERIALS AND METHODS

The study was conducted as a hospital based follow up study. The period for patient enrolling was July-December 2016, with periodic follow up for one year. Approval of the Institution Ethics Committee and written informed consent from the caregivers of the children were obtained prior to enrolment.

The study participants were diagnosed cases of Cerebral Palsy (CP) in the age group one to sixteen years. All the children registered in the

clinic during the six month period, who were willing to take part in the study were included. Relevant data were collected from caregivers and hospital records.

The physical disability was assessed by a modified version of Gross Motor Function Measure (GMFM)¹⁰ and functional ability by a modified Functional Independent Measure (FIM) scale¹¹. GMFM is a standardized observational instrument designed to measure change in gross motor function over time. The GMFM assesses motor function (how much of a task the child can do) rather than the quality of the motor performance (how well the child performs the task). Modified GMFM-66 adapted from GMFM 88 scale, was used to assess children with cerebral palsy age 5 months to 16yrs. With GMFM-66, each child was assessed by pediatrician, physiatrist and physiotherapist at a two monthly interval starting from the initial visit. It tests activities in 5 dimensions: Lying and rolling, Sitting, Crawling and kneeling, Standing and walking, Running and jumping. It is a standardized observational instrument designed and validated to measure the changes in gross motor function in children over time.

The FIM (Functional Independent Measurement) instrument is a basic indicator of severity of disability. The functional ability of a patient changes during rehabilitation and the FIM instrument is used to track those changes.

Functional change is a key outcome measure of rehabilitation episodes. It comprises of 18 items, each of which is assessed with a seven point ordinal scale. Higher the score for an item, the more independently the patient is able to perform the tasks assessed by that item. The items are divided into two major groups; 13 Motor items and 5 Cognitive Items. Total scores range from 18 to 126. The rating scale designates major graduations in behavior from dependence to independence and provides for the classification of individuals by their ability to carry out an activity independently, versus their need for assistance from another person or a device.

The GMFM-66 and FIM questionnaires were modified in such a way that the modified tools contained the items more suited for the study population. The content of the modified scale were given to a group of expert team comprising of pediatrician, pediatric neurologist, physiatrist, palliative care physician, psychologist, physiotherapist and occupational therapist and qualitatively validated

Spastic type is the most common type of cerebral palsy. Spasticity is the major problem encountered during rehabilitation of CP. Spasticity makes motor control very difficult, it increases the energy expenditure, and causes secondary musculoskeletal contractures. Hence it is crucial to assess the muscle tone initially, do early intervention and also to assess the changes occurring in muscle tone periodically.

The children were initially assessed by the multidisciplinary team comprising of Physiatrist, Pediatrician, Neurologist, Physiotherapist, and occupational therapist. The physical disability and functional ability was graded by the team as per scale. They were regularly given physiotherapy by the same team. Mothers were taught the methods of physiotherapy and advised to provide specific goal oriented training daily for at least four times a day. Nutritional supplementation were also provided if needed. They were periodically followed up on a two monthly basis and grading of physical disability and functional ability was performed after one year of intervention.

All the results were entered in the prepared preformat in Microsoft excel and analysis was done.

STATISTICAL ANALYSIS

The observations were computed and analyzed using SPSS version 16. Quantitative variables were expressed as mean (standard deviation) and categorical variables as percentages. Motor and functional activities of the study participants were also assessed. The pre and post intervention results were compared using "paired t test"

RESULTS

The participants in the present study were 41 children with a minimum completed age of 1 year and maximum of 16 years. The mean (SD) age of the participants was 5.50 (3.83) years. Among participants 56.1 % (n=23) were girls and the rest were boys. Two third of the participants (n=26, 63.4%) were of first birth order and three fourth (n=30, 73.2%) were born out of term vaginal delivery (Table 1). The range of birth weights were 1.43 kg to 3.5 kg with a mean (SD) of 2.34 (0.56) kg. Twenty four of the 41 participants (58.5%) were of low weight at birth (LBW babies) for a cut off of 2.5 kg.

The type of CP was categorized in to Quadriplegic CP, diplegic CP and hemiplegic CP based on the clinical presentation. Grade of disability on GMFM was categorized into 5 'grades of disability' {grade 1-5}, while functional independence on FIM scale. (Scale "O": complete independence, Scale 1: partial independence with supervision, Scale 2: partial dependence with minimal assistance, Scale 3: partial dependence with moderate assistance and Scale 4: Complete dependence)

Quadriplegic CP constituted the majority comprising of 30 (73.1%), followed by diplegic type 8 (19.5%) and hemiplegic type 3(7.3%). Assessment of physical disability showed that the problems were significantly higher for the quadriplegic children and the functional assessment also showed the same pattern of results

Correlation between GMFM and FIM scores also indicated that motor capabilities are directly contributing to the level of self-dependence in children with CP. Severe forms of disease were more associated to extreme forms of motor and functional difficulties resulting in increased dependence on the care givers. So, categorizing children under various types of CP at the earliest is of utmost importance as their nutritional and other requirements could be catered to, in a more comprehensive manner. The muscles were specifically examined for spasticity which showed marked reduction in the spasm. Spasticity

decreased in all the groups who showed more muscle strength. This agrees with previous uncontrolled studies of strength training in children with cerebral palsy that reported no increase in spasticity. Taken together, these findings suggest that strength training is not harmful.⁹ Comparing the pre and post intervention results of physical disability and functional abilities based on GMFT and FIM values, significant improvement was noticed in all the types of cerebral palsy (p value: <0.05). The improvement in physical disability was minimal in quadriplegic CP but they showed significant improvement in functional abilities after intervention. (p value: 0.003). This proves that multidisciplinary intervention can cause significant improvement in the physical weakness and functioning of the child with cerebral palsy. This will definitely help the care giver in looking after the child and will significantly improve the overall quality of life of these children and their families.

DISCUSSION

Correlation between GMFM and FIM scores indicated that motor capabilities are directly contributing to the level of self dependence in children with CP. Severe forms of disease were more associated to extreme forms of motor and functional difficulties resulting in increased dependence on the care givers. So, categorizing children under various types of CP at the earliest is of utmost importance as their nutritional and other requirements could be catered to, in a more comprehensive manner.

Empowering the care givers in rehabilitation is vitally important. In Indian scenario, mothers play the key role in looking after children and in case of children with disabilities, it mostly the responsibility of the mother alone. The study showed that in families where all the family members were involved in the rehabilitation process, significant improvement was seen. In case of diplegic and hemiplegic CP the improvement in both physical and functional elements were remarkable and the end of one

year. This shows that continued and regular multidisciplinary interventions can play a major role in bringing children with CP into the mainstream. This will definitely bring down the stress on the care givers and improve the quality of life.

CONCLUSION

Comprehensive multidisciplinary management of children with cerebral palsy will significantly improve their outcome. Empowering of care givers in providing continued care at home plays a major role in rehabilitation.

CONTRIBUTION

PGHP: Collection of data, Writing manuscript, Helping in analysis

SG: Detailed analysis, Editing manuscript

KEE: supervising the study

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Dr.D. Kalpana: Pediatric neurologist

Dr.Selvan: Physiatrist

Mr.Sunaj: Physiotherapist

Smt.Sreedevi: Occupational therapist

Table showing GMFT-pre and post intervention

Grade	Pre Intervention	Post Intervention	Paired T Test
Gr I	0	5	0.000
Gr II	1	8	
Gr III	2	1	
Gr IV	8	11	
Gr V	30	16	

Table showing FIM pre and -post intervention

Grade	Pre Intervention	Post Intervention	Paired T Test
Gr I	0	1	0.000
Gr II	0	4	
Gr III	0	8	
Gr IV	7	7	
Gr V	34	21	

Table showing comparison of various types of CP, pre and post intervention

Type		Mean (SD)	Paired t test
Hemiplegic CP (N=3)	GMFT1	4.33(0.57)	0.02*
	GMFT2	2.0(0.00)	
	FM1	3.67(0.37)	0.03*
	FM2	2.0(1.0)	
Diplegic(N=8)	GMFT1	4(0.68)	0.000*
	GMFT2	1.5(0.25)	
	FM1	3.63(0.51)	0.000*
	FM2	1.13(0.64)	
Quadriplegic (N=30)	GMFT1	4.83(0.46)	0.499
	GMFT2	4.3(0.91)	
	FM1	3.9(0.30)	0.003*
	FM2	3.53(0.80)	
All cases(N=41)	GMFT1	4.63(0.69)	0.000*
	GMFT2	3.59(1.4)	
	FM1	3.83(0.38)	0.000*
	FM2	2.95(1.28)	

GMFT1: Gross Motor Functional Score Prior To Intervention

GMFT 2: Gross Motor Functional Score After Intervention

FM I : Functional Ability Prior To Intervention

FM 2 : Functional Ability After Intervention

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