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ORIGINAL ARTICLE

Role of 24 Hours Handling on Gross Motor Function and Spasticity in Cerebral Palsy Children with GMFCS Level IV and V

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ABSTRACT

Objective: The current study was conducted to evaluate the effect of handling on spasticity and gross motor function in spastic cerebral palsy children with Gross Motor Function and spasticity Score (GMFCS) level IV and V.

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Study Design: Quasi Experimental Study

Place Duration of Study: University of Lahore and Dimensions,
Institute of psychological Services and Physical Rehabilitation from
April 2019 to July 2019

Material and Method: The study recruited cerebral palsy children with GMFCS level IV and V, suggesting that they have severe impairment in gross motor function. The children were aged between 1 to 3 years. Eighty-nine children were recruited. Mothers after taking consent were being guided about handling the child. SPSS 24 was used and the values were organized through mean, deviation and dependent t-test. Pre and post results were compiled using Wilcoxon Signed Rank.

Results: The results depicted that n=69 subjects had decreased spasticity after the intervention while n=20 subjects of the total had no improvement.

Conclusion: The current study concluded that guiding the mothers of cerebral palsy children about the proper ways of handling, home environment adaptations and their involvement in the decision making process targets the gross motor function of the children in a positive way.

Key Words: *Cerebral palsy, Handling, Motor function, Spasticity*

INTRODUCTION

Cerebral palsy is a non-progressive impairment of developing brain causing motor dysfunction leading to motor in coordination, contractures, deformity due to muscle inflexibility. This motor insufficiency impacts on activity and participation level of the child. Normal development starts from achieving postural control, being receptive to all

sensory inputs leading to improved cognition and then there comes the stage of fine motor development.^{1,2} Dynamic postural stabilization depends on neural maturation, proper sensory motor integration to deal with environmental constraints.³ As neurodevelopment continuous throughout the patient's life span, targeted and level appropriate treatment strategies improves the quality of life of the child. Difficulty in

swallowing due to oral motor dysfunction or sensory aversions are the first noticeable feature in cerebral palsy children, so family centered care is an accepted component of developing treatment strategies in CP.⁴

Poor practical training to family members prove to be an alarming barrier in the process of rehabilitation along with other socio-cultural barriers and in accessibility of government support.⁵ Handling training of parents by professionals is not only an effective way of improving activity and participation level of the child but it also reduces stress of parents.⁶ Guiding mothers is an essential reciprocal relationship between therapist and mother.² Specific handling techniques help not only in normalizing muscle tone, aligning postures but also in inhibition of abnormal reflexes.⁷

Handling is a specific functional approach that contributes in improving neuroplasticity changes in brain along with regular therapeutic sessions in clinics. Proper handling guidance to mother and care giver maximizes the child potential. Handling is an inexpensive and effective way of adding interventional strategies that not only produces positive effect on the child's but also conserves mother energies and improves their quality of life.² Handling techniques including control of abnormal muscle activity, guidance of 24 hours positioning that added relaxation in the lives of the child and educating the parents regarding child's transference that adds safety to the child and playing with the child. It is the process of identifying the barriers and designing strategies on individual basis.⁸ In spastic child increase in tone and exaggeration of reflexes makes protection and safety of the child during transitions is of paramount importance, so family centered approach should be the basis of treatment. Parent education regarding management of spastic child and its associated complications (dislocations, scoliosis etc.), aggravating and relieving factors is of utmost importance. Most important aspect of handling is the inhibition of abnormal reflex pattern. In some retained reflexes where head position dominates body posture i.e. Asymmetrical Tonic Neck reflex and tonic labyrinthine handling plays a very vital role as before movements inhibition of these exaggerated reflexes is necessary so carrying the child in curled up

position with shoulder forward and hips bent up is the ideal way of carrying the child. Parent guidance regarding movements and handling while feeding, sleeping carrying, lifting and indoor and outdoor activities of the child, needs to be incorporated along with therapy sessions. Developing strategies for home adaptations effects both gross and fine motor activity of the child.²

If we consider the present literature about mother handling techniques in cerebral palsy children, there is still scantiness of the studies in the regarding area. Earlier studies have suggested that home based individual training is more effective than group based interventional techniques. Individuality in the application of techniques increases the mothers' learning and decrease their related stress, anxiety and depression. Most of the literature on handling have been limited to the mothers of more than 5 years of children with early intervention inclusion.^{6,9} Thus, the current study was conducted to evaluate the effect of handling on spasticity and gross motor function in spastic cerebral palsy children aged 1 to 3 years with GMFCS level IV and V.

MATERIAL AND METHODS

A quasi experimental study recruited cerebral palsy children with GMFCS level IV and V, suggesting that they have severe impairment in gross motor function. The children were aged between 1 to 3 years. The study was conducted in two Pediatric Rehabilitation Centres of University of Lahore and Dimensions, Institute of psychological Services and Physical Rehabilitation from April 2019 to July 2019. Eighty nine children were recruited in the study calculated through sample size calculator advised by WHO¹⁰ $n = Z1^2 - \alpha/2P(1 - P) / (d^2)$, with P being 25.72 and d being 10%. The sampling was done through convenience sampling technique. The recruited children were at GMFCS level IV and V according to which Level IV depicts limited mobility with assistance of physical or mechanical devices and Level V being restricted mobility of children totally dependent on wheelchair in all type of settings.¹¹ Children with epileptic disorders, with any orthopedic complications and those who could not attend daily session were excluded from

the study. The parents participated voluntarily in the study and informed consent was taken. Mother literacy with the basic reading and writing skills was the criteria. The study was approved by the ethical committee of Dimensions, Institute of Psychological Services and Physical Rehabilitation.

A Professional Physical Therapist with Master's degree in Neuromuscular Rehabilitation was responsible to administer the intervention that lasted for three months. Patient received Sensory Integration Therapy and Neuro developmental Therapy along with 24 hours handling strategies being guided to mothers. Special handling strategies during transitions especially from the floor were introduced to the parents i.e. curling the child while providing support under thigh and neck and keeping the child close to the body helps to overcome any aggravating factor. Execution with focus on support behind the neck, and positioning the limbs in extended position to maintain their range also adds relaxation in spastic child. Keeping the arms in forward stretch position improves retractors and elbow flexors spasticity and legs apart around care giver hip or waist while carrying the child improves tone and adds relaxation in adductors. Airplane position i.e. one hand of mother and caregiver between the legs and other under chest is another handling strategy to encourage head lifting. Spastic child carrying with face away with support under thigh and keeping legs apart is another handling strategy to keep the child in reflex inhibiting posture along with developing good environmental interaction. Carrying the child with face toward mother and providing support under shoulder and neck brings hand forward and make reaching and hand approximation possible. Rounding the shoulder while lifting the child from supine position prevents head lag. Mothers were encouraged to discuss all issues regarding handling the child and their feedback was being taken and provided then with all explanations.

Data was collected before intervention and three months after intervention. Mothers after taking consent were being guided about handling the child while feeding, sleeping, bathing and lifting and carrying in and outdoor. Continuous explanation and execution sessions between therapist and mother were being given to the

mothers after regular therapy sessions consisting of 3-4 hours. Good reciprocal communication was being developed to ensure precision that was the basic requirement of providing appropriate handling. Parents were guided to adapt positions accordingly. Mothers were encouraged to discuss all issues regarding handling the child and their feedback was being taken and provided then with all explanations on regular basis.

The outcomes measures used were Gross Motor Function Measure-88 and Modified Tardieu Scale to measure motor functioning and spasticity respectively. GMFM-88 evaluates the motor functioning of cerebral palsy children. The validity and reliability of this measuring outcome is 0.99. The measure includes 88 items with child evaluation in various positions which are lying, rolling, sitting position, crawling, standing and high mobility as in walking and running. Every item is measured from 0 which means lack of motor activity till 3 which is complete motor activity.¹² MTS is used to measure spasticity against resistance to passive movement at various speeds.¹³ Quality of the muscle response is measure from 0 to 5. 0 denotes no resistance against passive Range of Motion and 5 representing that targeted joint is immobile.

SPSS 24 was used for the statistical analysis. The values were organized through mean, deviation and dependent t-test. Pre and post results were compiled using Wilcoxon Signed Rank. Alpha less than 0.05 was taken as significant.

RESULTS

Eighty-nine cerebral palsy children were recruited for the evaluation of the effects of handling strategies on motor function and spasticity in cerebral palsy children. Sampling characteristics were determined, including age, gender of the participating children and the selected levels of Gross Motor Function Classification Scale, shown in table 1. Mean value of age taken was 1.9 years.

TABLE 1: Demographic characteristics (n=89)

Characteristics	Frequency
Age (Years)	1.9 (Mean)
Gender (M/F)	
GMFCS: Level IV	
Level V	

GMFCS: Gross Motor Functional Classification Scale, M/F: Male/Female

Pre and post treatment results regarding gross motor functioning were depicted through paired t-test. Baseline results were compared with the three-month post intervention values. Comparison of motor functioning was made in all the domains of Gross Motor Function Measure as shown in table 2.

Spasticity of the children were measured through Wilcoxon Signed Rank Test, targeting the subjects exhibiting the improvement in spasticity after the intervention strategy. The results depicted that n=69 subjects had decreased spasticity after the intervention while n=20 subjects of the total had no improvement (table 3).

TABLE 2: GMFM-88 pre and post results after 3 month follow up (Paired t-test)

Dimensions	Baseline Mean ± std.	Follow up Mean ± std.	N	Sig.
Lying & Rolling	48.15 ± 35.49	84.40 ± 14.37	89	.000
Sitting	20.91 ± 21.96	43.93 ± 19.02	89	.000
Crawling & Kneeling	9.22 ± 11.58	24.01 ± 23.33	89	.000
Standing	4.54 ± 9.59	11.88 ± 19.91	89	.000
Walking, Running & jumping	2.00 ± 3.72	5.30 ± 9.56	89	.000
Total score	16.98 ± 15.22	33.92 ± 15.52	89	.000

GMFM-88: Gross motor Function Measure-88, Sig: Level of Significance

TABLE 3: MTS following 3-month intervention (Wilcoxon signed rank test)

		Ranks	N	Mean Rank	Sum of Ranks
After 3 months - MTS baseline	Negative Ranks		69 ^a	35.00	2415.00
	Positive Ranks		0 ^b	.00	.00
	Ties		20 ^c		

a. After 3 months < MTS baseline
 b. After 3 months > MTS baseline
 c. After 3 months = MTS baseline

MTS: Modified Tardieu Scale

Statistics

	After 3 months – MTS baseline
Z	-7.848
Asymp. Sig. (2-tailed)	.000

DISCUSSION

The objective of current study was to evaluate the effect of mother handling on motor functions and spasticity in children with cerebral palsy with the Gross Motor Function Classification Level IV and V. The current study depicted significant changes in the gross motor activities of the enrolled children aged 1 to 3 years. The results of current

study are in line with the other studies.^{14,15} Further, this study also indicated that gross motor function is improved after three months of interventional strategies. Even the intervention more than three months make significant difference, but this needs additional investigation. These results have been in accordance with some other evidences.¹⁶⁻¹⁹ A study¹⁷ conducted on the home based therapy sessions in thirty-six children aged 4 to 12 years. It supervised the daily activities of children so that they can adapt themselves to the surrounding environment and also the mother handling training. Another study¹ guided the mothers of cerebral palsy children about the handling in five-

hour training program and with the follow up of three months. The study concluded that there is marked increase in fine motor skills after the effective training program. The above mentioned studies have been in line with the findings of our study.

It has been proposed that handling pose a positive impact on gross functions of cerebral palsy children. It has been seen that giving opportunities and providing chance to adopt activities according to the abnormality of the children specifically, the motor functioning is affected.¹⁷ The hypothesized causes for this improvement are that these handling strategies inhibit the abnormal postures and reflexes, augmenting the normal motor patterns for normal postures. The postural training facilitates natural muscle tone thus improving the muscular function. Overall this phenomenon increases the parents' confidence and motivation to continue exercise program. The handling techniques are proved to be helpful when incorporated in activities of daily living, home environment adaptations and with sensory and motor stimulations. The practicality of the handling program relieves the stressors of mothers and cause them to be active at all stages of the intervention program contributing to the motor function improvement.^{8,20} These studies' results have been in line with the current study observations and results.

The intervention of a study² was complemented with some gamely activities to increase enjoyment level of children, motivation and their involvement in the therapy program. The training incorporated the children in the daily activities with the intervention while in seated position, during bathing, changing clothes and other daily life actions. Altogether these actions effect the cerebral palsy children motor functionality. The study results have been in accordance with the current study. Participants included were of early age in between six to seventy months. According to which early intervention have been proved to be of great value in improving the cognition and motor functions of the child,²¹ like the current study. But this area need further investigation yet.

CONCLUSION

The current study concluded that guiding the mothers of cerebral palsy children about the

proper ways of handling, home environment adaptations and their involvement in the decision making process targets the gross motor function of the children in a positive way. It was also suggested that proper handling also improves the spasticity in the muscles, contributing to normal muscular functioning.

Future studies should target the effects of early intervention and the effects of pure handling techniques in the children by training the parents which further contribute to the decreased costs of treatment procedure.

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REFERENCES

1. Johari S, Rassafiani M, Dalvand H, Ahmadi Kahjoogh M, Daemi M. Effects of maternal handling training at home, on development of fine motor skills in the children with cerebral palsy: A randomized clinical trial. *Journal of Occupational Therapy, Schools, & Early Intervention*. 2016;9(4):321-31.
2. Ghorbanpour Z, Hosseini SA, Vameghi R, Rassafiani M, Dalvand H, Rezasoltani P. The effect of mothering handling training at home on the motor function of children with cerebral palsy: A pilot randomized controlled trial. *Journal of Occupational Therapy, Schools, & Early Intervention*. 2019:1-11.
3. Duncan K, Goodworth A, Da Costa CSN, Winger M, Saavedra S. Parent handling of typical infants varies segmentally across development of postural control. *Experimental brain research*. 2018;236(3):645-54.
4. Aisen ML, Kerkovich D, Mast J, Mulroy S, Wren TA, Kay RM, et al. Cerebral palsy: clinical care and neurological rehabilitation. *The Lancet Neurology*. 2011;10(9):844-52.
5. Pashmdarfard M, Amini M, MEHRABAN AH. Participation of Iranian cerebral palsy children in life areas: A systematic review article. *Iranian journal of child neurology*. 2017;11(1):1.

6. JALILI N, RASSAFIANI M, DALVAND H, HAGHGOO HA, FARZI M. The effectiveness of handling training on stress and quality of life among mothers of children with cerebral palsy aged 4-12 years old. 2013.
7. Dos Santos CG, Pagnussat AS, Simon A, Py R, do Pinho AS, Wagner MB. Humeral external rotation handling by using the Bobath concept approach affects trunk extensor muscles electromyography in children with cerebral palsy. *Research in developmental disabilities*. 2015;36:134-41.
8. Dalvand H, Rassafiani M, Hosseini SA, Samadi SA, Khankeh HR. Concept analysis of occupational therapy handling in the children with cerebral palsy: A hybrid model. *Archives of Rehabilitation*. 2015;16(2):110-9.
9. Afshar S, Rassafiani M, Hosseini SA. Effect of occupational therapy home program on activities of daily living of 5-12 years old children. *Journal of Rehabilitation*. 2013;13(4):117-23.
10. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian journal of psychological medicine*. 2013;35(2):121.
11. Palisano RJ, Rosenbaum P, Bartlett D, Livingston MH. Content validity of the expanded and revised Gross Motor Function Classification System. *Developmental Medicine & Child Neurology*. 2008;50(10):744-50.
12. Michaelis U. Gross Motor Function Measure (GMFM-66 & GMFM 88) User's Manual 2nd Edition Clinics in Developmental Medicine Edited by Dianne J Russell, Peter L Rosenbaum, Marilyn Wright, Lisa M Avery London, UK: Mac Keith Press, 2013£ 70.00 (Spiral Binding), pp 290 ISBN: 978-1-908316-88-2. *Developmental Medicine & Child Neurology*. 2015;57(12):1188-.
13. Gracies J-M, Burke K, Clegg NJ, Browne R, Rushing C, Fehlings D, et al. Reliability of the Tardieu Scale for assessing spasticity in children with cerebral palsy. *Archives of physical medicine and rehabilitation*. 2010;91(3):421-8.
14. Tsorlakis N, Evaggelinou C, Grouios G, Tsohatzoudis C. Effect of intensive neurodevelopmental treatment in gross motor function of children with cerebral palsy. *Developmental medicine and child neurology*. 2004;46(11):740-5.
15. Park E-Y. Effect of physical therapy frequency on gross motor function in children with cerebral palsy. *Journal of physical therapy science*. 2016;28(6):1888-91.
16. Novak I, Cusick A, Lowe K. A pilot study on the impact of occupational therapy home programming for young children with cerebral palsy. *The American journal of occupational therapy*. 2007;61(4):463.
17. Novak I, Cusick A, Lannin N. Occupational therapy home programs for cerebral palsy: double-blind, randomized, controlled trial. *Pediatrics*. 2009;124(4):e606-e14.
18. Thyer BA. *Quasi-experimental research designs*: Oxford University Press; 2012.
19. Rostami HR, Malamiri RA. Effect of treatment environment on modified constraint-induced movement therapy results in children with spastic hemiplegic cerebral palsy: a randomized controlled trial. *Disability and rehabilitation*. 2012;34(1):40-4.
20. Nelson P, Glenny AM, Kirk S, Caress AL. Parents' experiences of caring for a child with a cleft lip and/or palate: a review of the literature. *Child: care, health and development*. 2012;38(1):6-20.
21. Habibi E, Sajedi F, Afzali HM, Hatamizadeh N, Shahshahanipour S, Glascoe FP. Early Childhood Development and Iranian Parents' Knowledge: A Qualitative Study. *International journal of preventive medicine*. 2017;8.