European Journal of Molecular &Clinical Medicine

ISSN2515-8260 Volume 09, Issue 04, 2022

Original Research Article

Efficacy of neurodevelopmental technique versus conventional physiotherapy in improving functional ability with cerebral palsy

[1]Dr. Ashish Sharma PT, [2]Dr. Deepak Lohar PT, [3]Dr. Jafar Khan PT

[1]Research Scholar, Udaipur, Rajasthan, India

[2]Associate Professor, Guide (Neurology), Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

[3]Dean & HOD Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India

Corresponding Author:

Dr. Ashish Sharma PT

Abstract

Introduction: Cerebral palsy is actually an umbrella term for several different types of physical disabilities. The term "cerebral" refers to the area of the brain that is affected by the disease. The disease often includes other connections in the brain involving the cortex and parts of the cerebellum as well. The term "palsy" refers to the disorder of movement. Cerebral palsy causes damage to the motor control centers of the brain and can occur during different parts of pregnancy and birth. Approximately 75% of cerebral palsy cases occur during pregnancy and approximately 5% occur during birth. Additionally, it can occur after childbirth up to about age three. Cerebral palsy occurs in an average of 2 to 3 babies out of 1000 live births. There has also been a slight increase in these numbers in recent years. Cerebral palsy (C.P) describe a group of permanent disorders of the development of movements & posture causing activity limitation that are attributed to non-progressive disturbances that occurred in the developing fetal or the infant brain. The motor disorder of C.P are accompanied by disturbance of sensation, perception, cognition, communication & behaviour, epilepsy & by secondary musculoskeletal problems.

Need of the study:

1) Cerebral palsy is leading cause of chronic childhood disability affecting children between the ages of 3 to 13 years.
2) Premature birth is major risk factor for cerebral palsy, with infants born at the threshold of viability being 70 times more likely to B diagnosed with the disease then those born at term.
3) The most commonly used classification system describes the type of tone abnormality and the limb involvement. By tone abnormalities it is classified as spastic, diskinetic, hypotonic, and mixed. By limb involvement it is diplegia, quadriplegia, triplegia, hemiplegia.

Objective of study: To major the motor abilities and self-care skills before and

ISSN 2515-8260 Volume 09, Issue 02, 2022

after in NDT approach group. To major the motor abilities and self-care skills before and after in conventional therapy. To compare the motor abilities and self-care skills before and after in NDT approach group with conventional physical therapy group.
Conclusion: This study suggests that intermittent NDT that is NDT versus conventional therapy in CP children leads to improvement in overall gross motor abilities and self-care skills. If there is no carryover immediately following treatment session, the positive effects of NDT is debatable. Outcomes as seen on components of Gross Motor Function Measure at three and six months, the physical Therapist has been able to establish higher scores in gross motor skills and self-care activities. This study suggests that NDT is effective when the parents are giving more time for exercise in the home session. And Conventional therapy will improve the overall body function which will help the children to perform a self-care activity.

Keywords: Cerebral palsy, NDT approach, conventional therapy

Introduction

Materials and Methods
Methods of collection of data

Population
Children diagnosis with CP Sample design: Randomized block design Sample size: 30 Type of study: pre-test to post experiment design. Duration of study: 8 weeks

Inclusion criteria
Children with diagnosis of cerebral palsy. Age group between 3 to 13 years. Children classified in levels I-IV at the gross motor function classification system 9GMFCS0. Subjects are able to accept and follow verbal instructions. Mild to moderate cerebral palsy. Both genders.

Exclusion criteria
- Subject with instable seizures.
- Subjects with surgical procedure up to 3 months.
- Subjects they have received treatment for plasticity.
- Subjects if they are suffered from other diseases that interfered with physical activity.
- Subject whose family fell uncomfortable or unable to respond interview and questionnaire.
- Children with less than normal IQ.

Material used
- Gross motor function major scale (GMFM)
- The paediatric evaluation of disability inventory (PEDI)
- Couch Physio ball, mat, Canadian occupational performance measure (COPM)

Methodology
GROUP A
NDT Approach

Concept was developed by Dr. k. bobath is based on neuro developmental techniques and it views development as dynamic, sequential cephalo caudal, proximal distal, automatic before conscious responsive and lastly adaptive. Bobath believed in inhibiting the primitive reflex pattern using promotion movements in normal patterns as well as combination.

ISSN 2515-8260 Volume 09, Issue 02, 2022

GROUP B
Conventional therapy

In the conventional therapy group intervention focuses primarily on improving body function and structure as the starting point of intervention children will be treated with normal movement pattern and postural handling, maintaining ROM and joint alignment through stretching, co-ordination, balance, casting and splinting.
Data analysis and statistics

Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Out Come measurements are measured using functional skills domain such as Self-care, Mobility and Social function of the subjects studied. The scores are presented as mean SD. Significance is assessed at 5% level of significance with p value 0.05 less than this is considered as statistically significant difference.
Statistical tests: Paired 't' test as a parametric and Wilcox on signed rank test as a non-parametric test have been used to analysis the means of Self-care, Mobility and Social function domains of functional skills from pre-intervention to post- intervention with calculation of percentage of change.
Independent 't' test as a parametric and Mann Whitney U test as a non- parametric test have been used to compare the means of Self-care, Mobility and Social function domains of functional skills between the groups with calculation of percentage of difference between the means.

Result
Group A
NDT

Group B
Conventional Therapy

Table 1: Gender distribution of Subjects

	Gender Group B (No. of Subjects)	Percentage of distribution	Group A (No. of Subjects)	Percentage of distribution
Male	9	60	7	46.67
Female	6	40	8	53.33
Total	15	100	15	100%

Chi-square P<0.001** P<0.001**
P=0.782

The above table shows that the study is carried out on total of 15 children in each group consisting 9 male and 6 female subjects in Group B; 8 females and 7 male subjects in Group A with statistically significant difference in subjects taken with p<0.001.
The above graph shows that 40% of females and 60% of males were studied in group B. The above graph shows that 530% of females and 47% of males were taken in group A.

ISSN 2515-8260 Volume 09, Issue 02, 2022

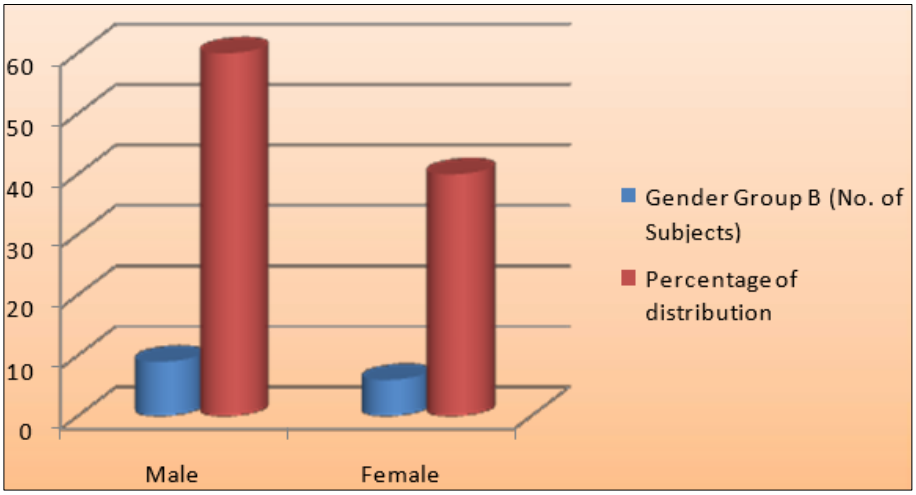

Fig 1: Gender Distribution of the Subject in Group (B)

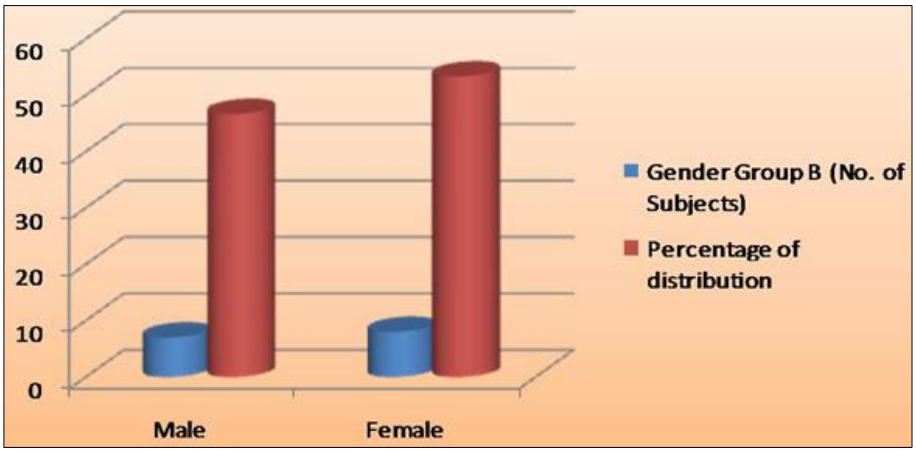

Fig 2: Gender Distribution of the Subject in Group (A)

Table 2: Age Distribution of the children studied

	Age in years	Group A (No of subjects)	Percentage	Percentage Group B (No of subjects)	Percentage
	3-4	1	6.67	0	0
	4-5	5	33.33	0	0
	5-6	2	13.33	5	33.33
	6-7	4	26.67	6	40
	7-8	3	20	5	26.67
Total		15	100	15	100%

Mean 5.26± 1.32 - 5.89±0.63 -
Min-Max 3-8 - 5-7 - P= 0.933 (NS)

ISSN 2515-8260 Volume 09, Issue 02, 2022

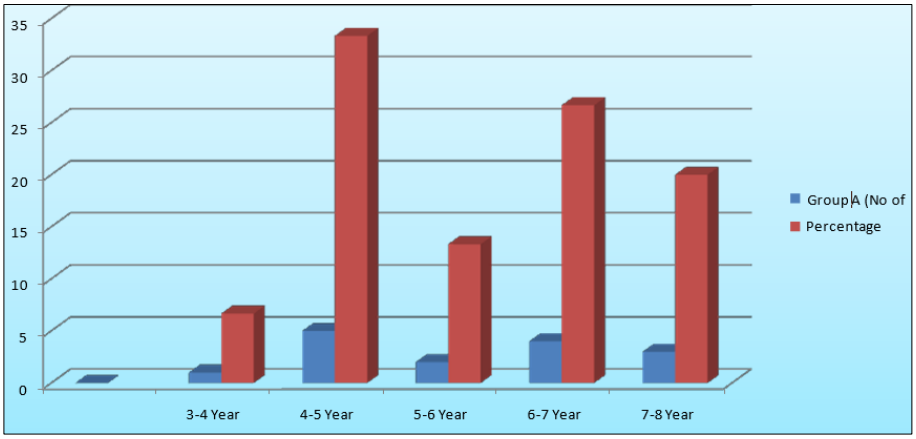

Fig 3: Age Distribution of the subject (Child) Group-A

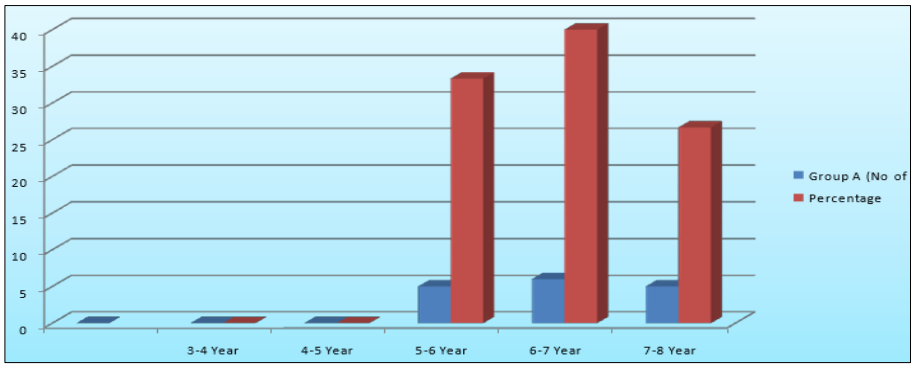

Fig 4: Age Distribution of the subject (Child) Group-B

The above table shows that in Group A there were 1 subjects in age group between 3-4 years and 5 in age group between 4-5 years, 2 in age group between 5-6 years, 3 in age group between 7-8 years with mean age of the subjects were 5.26 years. In Group B there were 5 subjects in age group between 5-6 years and 6 in age group between 6-7 years, 4 in age group between 7-8 years with mean age of the subjects were 5.89 years.

Table 4: Analysis of functional skill within the Group A and Group B (Pre to post analysis) Group-A

	Pre intervention (Mean ±SD) min-max	**Post intervention (Mean ±SD) min-max**	**Perecnt age of change**	**t value a (Parametric)**	**Z valueb (Non parametric)**	**95%Confidence interval of the difference Lower Upper**	**Significance (2-tailed) P value**
Self-Care Domain	39.67 ± 5.39 (30 -47)	47.20± 4.98 (40-56)	-2.31%	-7.203	-3.376 - 9.777	-5.290	P <0.000**
Mobility Domain	33.67± 4.60 (25 -40)	42.87± 1.92 (40-46)	- 44.89%	-7.357	-3.411- 11.882	-6.518	P< 0.000
Social Function Domain	41.33± 2.71 (37- 48)	50.33± 6.28 (41-62)	52.42%	-5.198	5.077- 12.802	-3.327	P < 0.000

Table 5: Analysis of functional skill within the Group A and Group B (Pre to post analysis GROUP-B

	Pre intervention (Mean ±SD) min-max	**Post intervention (Mean ±SD) min-max**	**Perecnt age of change**	**t value a (Parametric)**	**Z value (Non parametric)**	**95%Confidence interval of the difference Lower Upper**	**Significance (2-tailed) P value**
Self-Care Domain	32.00 ± 5.34 (21 -10)	42.67± 5.39 (30-45)	-1.60%	-7.375	-3.411 - 13.769	-7.564	P <0.000
Mobility		38.47± 4.43	-	-11.084	-3.417-	-14.527	P< 0.000

ISSN 2515-8260 Volume 09, Issue 02, 2022

Domain	29.07± 3.55 (24 -38)	(30-45)	47.36%		13.367		
Social Function Domain	40.27± 5.17 (32- 49)	50.93± 5.33 (40-56)	- 43.68%	-3.411	9.033- 12.979	-10.407	P < 0.000

** Statistically Significant difference p<0.05 A. Pared t test. B. Wilcoxon Signed Ranks Test; NS- Not significant

The above table shows that when means of parameters analyzed from pre to post intervention, there is a statistically significant improvement in means of Self-care domain, Mobility domain and Social function domain within the Group A and Group B when analyzed from pre intervention to post intervention with p<0.000.

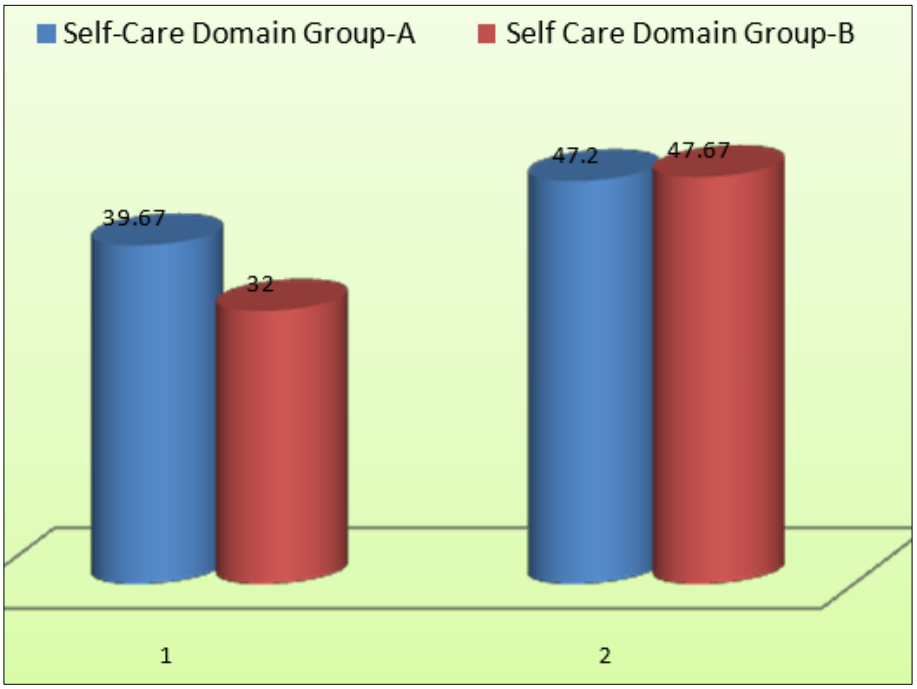

Fig 5a: Analysis of functional skill: Self-care domain within the Group A and Group B (Pre to post analysis)

The above graph shows that there is a statistically significant difference in means of Self Care domain within Group A and Group B when analyzed within in groups from pre intervention to post intervention.

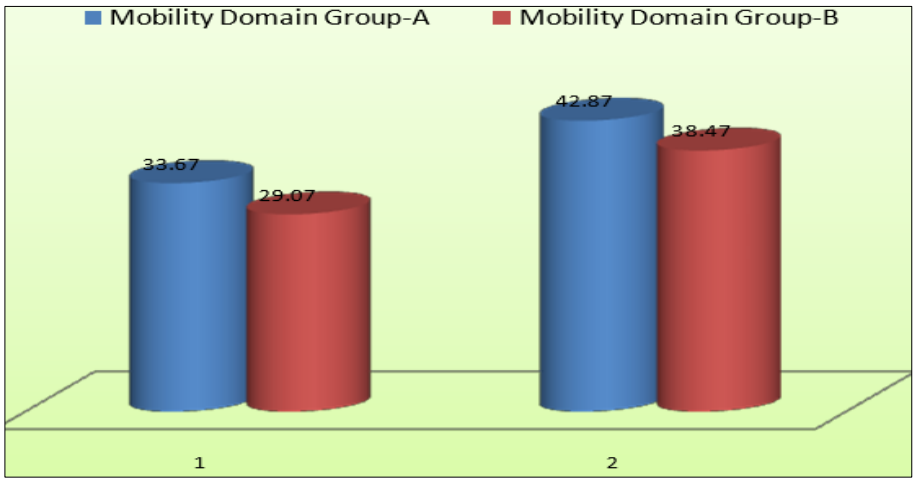

Fig 5b: Analysis of functional skill: Mobility domain within the Group A and Group B (Pre to post analysis)

ISSN 2515-8260 Volume 09, Issue 02, 2022

The above graph shows that there is a statistically significant difference in means of mobility domain score within Group A and Group B when analyzed within in groups from pre intervention to post intervention.

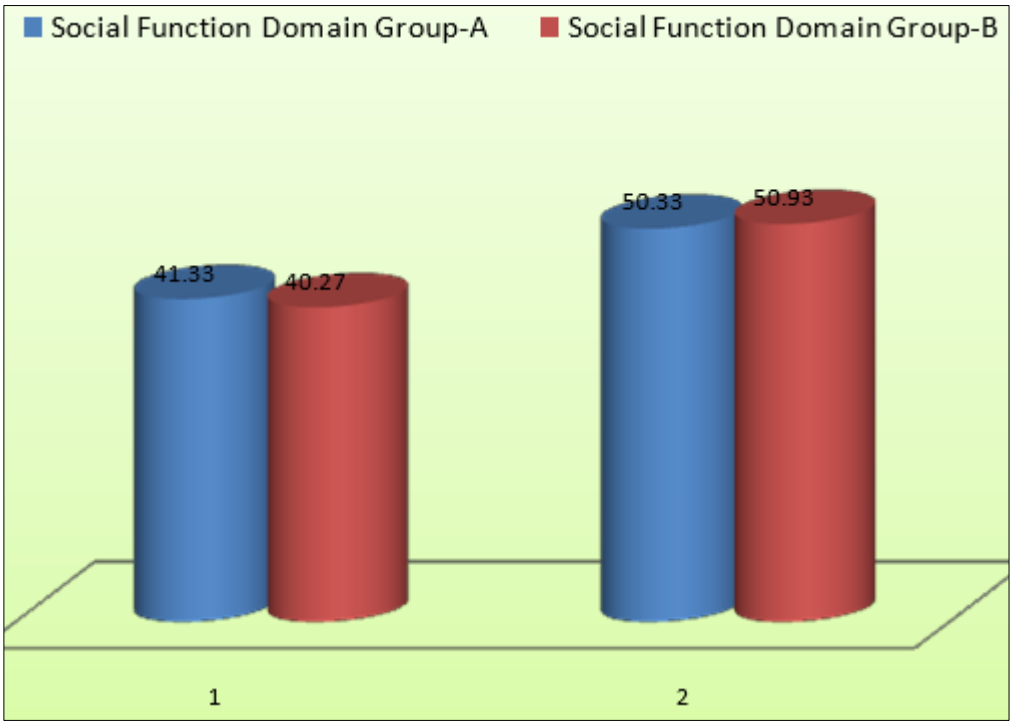

Fig 5c: Analysis of functional skill: Social function domain within the Group A and Group B (Pre to post analysis)

The above graph shows that there is a statistically significant difference in means of Social function domain within Group A and Group B when analyzed within in groups from pre intervention to post intervention.

Table 6: Comparison of domains of functional skills between the Group A and Group B

	Group A (Mean ±SD) min-max	**Group B (Mean ±SD) min-max**	**Perecntage of change**	**t value a (Parametric)**	**Z valueb (Non parametric)**	**95% Confidence interval of the difference Lower Upper**	**Significance (2-tailed) P value**
Self Care Domain	32.00± 5.34 (30 -47)	39.67± 5.39 (21- 40)	0.43%	3.910%	-3.179 -3.650	11.683	P =0.001**
Mobility Domain	33.67± 4.60 (25 -40)	29.07± 3.55 (24 -38)	0.0%	3.061	-2.601 1.522	7.678	P=0.005**
Social Function Domain	41.33± 2.71 (37- 48)	38.47± 4.43 (30 -45)	9.83%	2.134	-1.749 0.115	5.619	P =0.042 (NS)

Post intervention comparsion

GROUP- B

Self care	47.20± 4.98 (40-56)	42.67± 5.39 (32-50)	-1.13%	2.390	-1.893 0.647	8.419	P =0.024 (NS)
Mobility	42.87± 1.92	40.27± 5.17	1.69%	1.824	-1.332 -0.320	5.520	P=0. 079

ISSN 2515-8260 Volume 09, Issue 02, 2022

domain	(40-46)	(32 -49)					(NS)
Social	50.33± 6.28	50.93± 5.33	3.93%	0.282	-.727 - 4.962	3.762	P =0.780
Function	(41-62)	(40-56)					(NS)

** Statistically Significant difference $p<0.05$; NS- Not significant; a. Independent t test. B. Mann Whitney U test Test

The above table shows that when means of parameters were compared between group A and group B before intervention, there is a statistically significant in means of Self-care domain, Mobility domain and no statistical significance in Social function domain between the Group A and Group B. there is a statistically significant in means of Self-care domain, Mobility domain and no statistical significance in Social function domain between the Group A and Group B.

When means of parameters were compared between group A and group B post intervention, there is no statistically significant in means of Self-care domain, Mobility domain and Social function domain between the Group A and Group B.

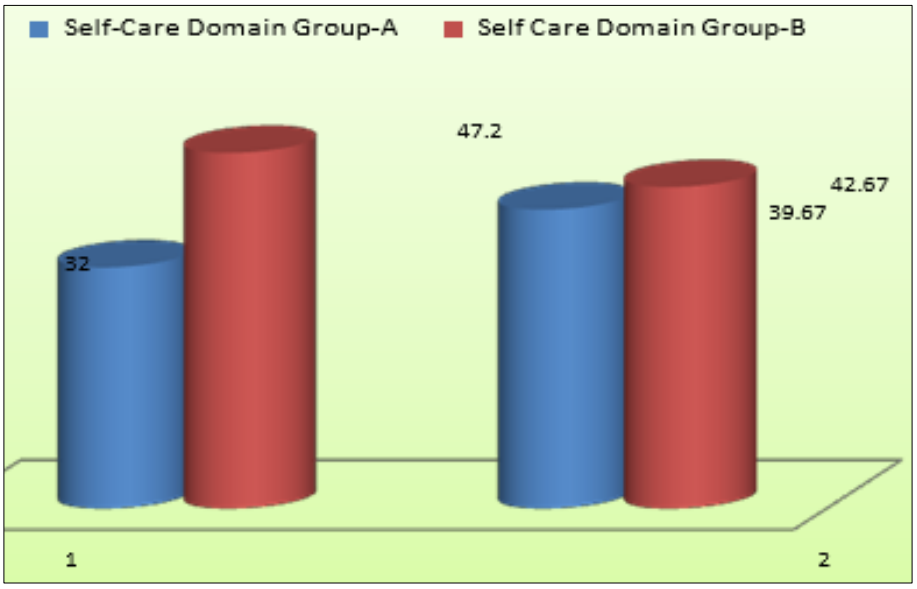

Fig 6a: Comparison of Self-care domain of functional skills between the Group A and Group B

The above graph shows that there is a statistically significant difference in means of self-care domain in Group A and in Group B and there is no statistically significant difference when analyzed post intervention.

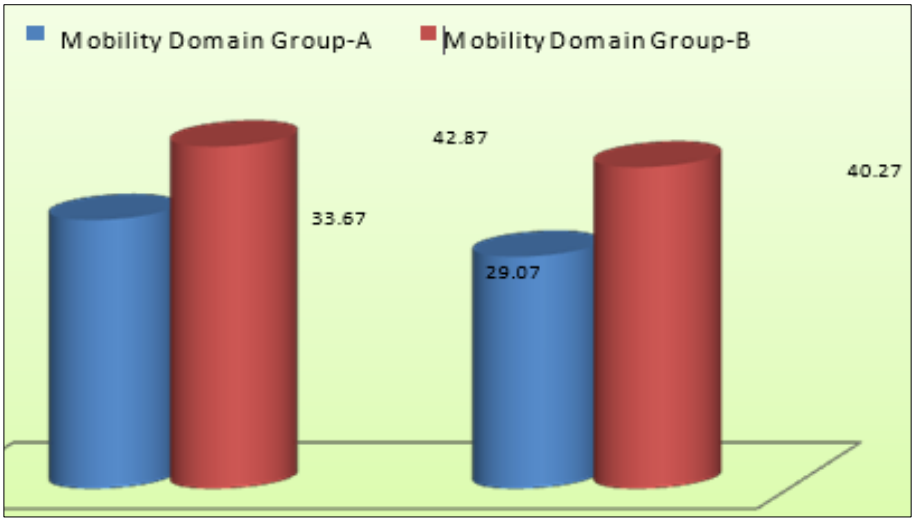

Fig 6b: Comparison of Mobility domain of functional skills between the Group A and Group B

ISSN 2515-8260 Volume 09, Issue 02, 2022

The above graph shows that there is a statistically significant difference in means of functional skills domain in Group A and in Group B and there is no statistically significant difference when analyzed post intervention.
The above graph shows that there is a statistically significant difference in means of social function domain in Group A and in Group B and there is no statistically significant difference when analyzed pre and post intervention.

Discussion

This study aimed to compare the effectiveness of NDT versus conventional Therapy. The study has focused the role of conventional therapy and NDT in the cerebral palsy children. The following outcome variables of scale GMFM- 66 (p=0.00) and PEDI (p=0.00) between the group was found to be highly significant at 6 months. Thus all the children with Spastic CP in both the groups were assessed on GMFM-66 I areas of Lying and Rolling, sitting, standing, walking, running and jumping At 3 months and 6 months. Highly significant differences are seen in between control and experimental groups. GMFM is consistent in the measurement of gross motor skills and those children with cerebral palsy exhibit stable gross motor skills during repeat measurement when the time of day, therapists, and evaluation setting were held constant. The GMFM was administered twice, within a one-week time period, to twenty-one children with cerebral palsy. So this proves that this scale will be helpful in future analysis of treatment efficacy using the GMFM as an outcome measure. Neurodevelopment treatment used in this study consisted of handling techniques, inhibition and facilitation techniques, weight shifting and weight bearing, integration of activities, positioning and adaptive equipment. Throughout the trial, NDT intervention for both groups was based on the fundamental and current principles of the approach, as it has evolved more recently (Bobath and Bobath (1984) 9; Bly (1991) 23; Mayston (2001a, 2001b) 43;44.
In this study parents are taught correct handling techniques, positioning the child in antideformity position in bed, chair and on floor, activities which improves gross and fine motor hand functions, play activities which improve gross motor and visual perceptual skills like ball catching and throwing, ball kicking, memory games etc. Are given as a home programme.11, 17, 22, 42 Treatment strategies involving both parents and children have been shown to be most effective in achieving an enhanced developmental outcome. Respective studies have suggested that Parent/caregiver education is one of the main elements of the intervention which is intended to facilitate the parent-child relationship, enable the parent to handle/assist with their child's difficulties, and give an intensive period for practice of activities 23, 25. The parent’s journey of adjustment and their capacity to participate in activities to improve their child's abilities. Initially, parents were coming to grips with the diagnosis, and this precluded their full involvement in home activities. However, at a point of breakthrough, they entered a phase of high participation interpreted as striving to maximize. Parental participation is necessary in promoting the psychosocial well-being of children. After reviewing the literature concerning people with cerebral palsy and the effects of strength training on muscle strength, mobility, gait function, spasticity, and self-concept, there seems to be a positive correlation between "progressive, task-oriented strength training" in a community setting and improvements in the dependent variables. There is also evidence of the relationship between lower body strength training and motor functioning, while there wasn't any evidence of strengthening exercises increasing spasticity. It is important that parents as well as physical educators have an idea of where weaknesses generally are in children with cerebral palsy, and what exercises will work on those areas of concern. 52 It is in accordance with the study conducted by T. Dolenc Velinkovi *et al.* (2005) 54 that followed the same sequence and concluded that with early treatment we have the chance to integrate active normal sensory-motor experiences before abnormal movement patterns have become a habit.NDT is a successful approach but we should not think that we can cure a brain lesion or cerebral palsy, or that we can change all cases to only “minimal” cerebral palsy. If the treatment is started before abnormal patterns of movement have become established, we can help the child to

organize his potential abilities in what for him is the most normal way.

Conclusion

This study suggests that intermittent NDT that is NDT versus conventional therapy in CP children leads to improvement in overall gross motor abilities and self-care skills. If there is no carryover immediately following treatment session, the positive effects of NDT is debatable. Outcomes as seen on components of Gross Motor Function Measure at three and six months, the physical Therapist has been able to establish higher scores in gross motor skills and self-care activities.

This study suggests that NDT is effective when the parents are giving more time for exercise in the home session. And Conventional therapy will improve the overall body function which will help the children to perform a self-care activity.

References

1. Kuban kc. Leviton A. C.P. n ENG J Med. 1994;330(3):188-195.
2. Hirtz D. Thurman DJ. Gwinn-Hardy K. Mohamed M. Chaudhri AR. zalutsky R. howcommon are the common neurologic disorders? Neurology. 20007;68(5):326-337.
3. Cummins SK, Nelson KB, Grether JK veli EM. Cerebral palsyin four northern California counties birth through 1983 through 1985, J peadiatr. 1993;123(2):230-237.
4. Pellegrino L. C.P. in MZ batshaw *et al.* children with disability, 6th edition 307-408.
5. Bax M, terminology and classification of cerebral palsy in childhood.Der med child neurol. 1964;6:295-297
6. Majolijnketelaar, Adri Vermeer, Harm't Hart *et al.* effects of functional therapy program on motor abilities of children with cerebral palsy, physical therapy Sep 2001;81(9):1534-1545.
7. Charlene Butler and Johnne Darrah *et al.* effects of NDT for cerebral palsy: an AACPDM evidence report. Development medicine and child neurology. 2001;43:778-790.
8. Anne Brit Sorsdal, Rolf Moe-nilssen and Helga K Kaale2. Change in basic motor abilities, quality of movement and every day activities following intensive, goal- directed, activity-focused physiotherapy in a group setting for children with CP. BMC Pediatrics. 2010; 10:26.
9. Sigrid Ostensj O, Ingvil Oien and Bj Org Fallang. Goal-oriented rehabilitation of pre-schoolers with cerebral palsy- a multi-case study of combined use of the Canadian Occupational Performance measure (COPM) and the Goal Attainment Scaling (GAS). 2008;11(4):252-259.
10. Mary Law, Johanna Darrah, nancy Pollock et al. Focus on Function a randomized controlled trial comparing two rehabilition interventions for young children with cerebral palsy. BMC Pediatrics. 2007;7:31
11. Beckung E, Carlsson G, *et al.* The natural history of gross motor development in children with cerebral palsy aged 1 to 15 years. Developmental Medicine &Child Neurology. 2007;49:751-756.
12. Beckung K, Carlsson G, *et al.* The natural history og gross motor development in children with cerebral palsy aged 1 to 15 years. Developmental Medicine & Child Neurology. 2007;49:751-756.
13. Lena Ekstrom AHL, Eva Johansson, *et al.* Functional therapy for children with cerebral palsy an ecological approach. Developmental Medicine & Child Neurology. 2005;47:613-619.
14. Sigrid Ostensjo and Eva Brogren Carlberg et al. Everyday functioning in young children with cerebral palsy: functional skills, caregiver assistance, and modifications of the environment. Development medicine & child Neurology. 2003:Vol45: page no. 603-612.
15. Peter L. Posenbaum, and Stephen D. Walter. Et al. Prognosis for Gross Motor Function in Cerebral palsy- Creation of Motor Development Curves. JAMA; September 18, 2002;288(11):1357-1363.

16. Eva Beckung and Gudrun Hagberg, *et al.* Neuro impairments, activity limitations, and participation restriction in children palsy. Developmental Medicine & Child Neurology. 2002;44:309-316.
17. Marjolijn Ketelaar, Adri Vermeer, Harm't, *et al.* effects of a functional therapy Program on motor abilities of children with cerebral palsy. Physical therapy; September 2001;81(9):1534-1545.
18. Robert J Palisano, Peter Rosenbaum, *et al.* Validation of a model of Gross Motor function for children with cerebral palsy. Physical therapy. 2000;80(10):974-985.
19. Bobath K, Bobath B. The facilitation of normal postural reactions and movements in the treatment of cerebral palsy Physiotherapy 50: 3-18 Bax MCO. (1964) Terminology and classification of cerebral palsy. Dev Med Child Neurol. 1964;6:295-297.
20. Gibson. Perceptual development, Child Psychology, Chicago Bobath K, Bobath B. (1972) Cerebral palsy. In: Pearson PH, Williams CE, editors. Physical Therapy Services in the Developmental Disabilities. Springfield, IL: Thomas, 1969, 37-185pp.
21. Wright T, Nicholson J. Physiotherapy for the spastic children evaluation Developmental Medicine and Child Neurology. 1973;15:146-63.
22. Carlsen PN. Comparison of two occupational therapy approaches for treating the young cerebral palsied child. Am J Occup Ther 29: 267-272 Scherzer AL Mike V et al. (1976) Physical therapy as a determinant of change in the cerebral palsied infant. Pediatrics. 1975;58(1):47-52.
23. Georgia De Gangi, *et al.* Towards a methodology of the short term effects of Neurodevelopmental Treatment. Am J Occup Ther July 1983, 37(7).
24. Bobath K, Bobath B. The Neurodevelopmental Treatment. In: Scrutton D, editor:. Management of the Motor Disorders of Children with Cerebral Palsy. Clinics in Developmental Medicine No. 90. Oxford: Spastics International Medical Publications (Mac Keith Press), 1984, 6-18. 74
25. Marozas DS, May DC. Research on effects of color reversal on the visual perceptual and visuomotor performances of spastic cerebral palsied and other exceptional individuals. Perceptual and Motor Skills. 1986;62:595-607.
26. Watt J. A prospective study of inhibitive casting as an adjunct to physiotherapy for cerebral palsied children. Developmental Medicine and Child Neurology. 1986;28:480-8.
27. Quinton MB. The Importance of the Body Image in our daily Lives and in Therapy. Schweizerischer, Bundder Therapeuten cerebraler Bewegungsstörungen, Mittteilungsblatt. 1986;25:9-17.