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A STUDY ON EFFECTIVENESS ON INHIBITION OF RETAINED STNR FOR CHILDREN HAVING SPASTIC DIPLEGIC CEREBRAL PALSY

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Abstract
Aim*: To determine the effect of inhibition of retained STNR in spastic diplegic cerebral palsy*
Background and purpose: Spastic Diplegia is the most common type of cerebral palsy. Cerebral Palsy is caused by damage to the immature brain and always starts in childhood. The brain damage results in disorganized and delayed development of the neurological mechanisms of postural control, balance, and movement. 76.9 % of the cases of cerebral palsy are belongs to spastic type and among those 22.4% are affecting with Diplegia. This study was projected to study the improvement in Gross Motor Function of children with spastic Diplegia by using a positions and exercises inhibiting of retained symmetric tonic neck reflex.

Method*: The study has been done in the age group 6- 12 years. 30 children were selected from pediatric section of physiotherapy department and randomly allotted to two groups. Two groups are divided into Group A- Control group(15 children) and Group-B- Experimental Group (15 children). Experimental group treated with STNR inhibiting positions and conventional exercises and control group only with conventional exercises. GMFM used for measuring Gross Motor Function & SAROMM used for Spinal Alignment & Range of Motion Measure.*

Result: *After the intervention, the experimental group shows improvement in overall gross motor Function such as sitting, Crawling, Kneeling and walking with support of orthosis.*

Conclusion: *Reflex inhibiting Positions for retained STNR helps on facilitating Gross Motor Function. Further investigations are certainly needed to assess effectively the effects of the intervention in larger sample.*

Keywords: STNR: Symmetric Tonic Neck reflex, GMFM: Gross Motor Functional Measure, SAROMM: Spinal Alignment & Range of Motion Measure

Introduction

William John Little was the first person to study Cerebral Palsy extensively. He raised the possibility of birth asphyxia as a chief cause of the disorder. William Osler first named it "cerebral palsy" from the German "cerebralekinderlahung" (cerebral child paralysis). Cerebral palsy is a disorder of movement and posture.

According to World Health Organization (WHO) estimation, 10% of the global population has some form of disability due to different causes; in India, it is 3.8% of the population. Nearly 15-20% of the total physically handicapped children suffer from Cerebral Palsy (CP). For India, the estimated incidence is around 3/1000 live births; however, being a developing country, the expected actual figure may be much higher. It was estimated that there are 25 lakh people having Cerebral Palsy in India in 2010.

Cerebral Palsy is caused by damage to the immature brain and always starts in childhood. There is big difference in that the adult brain is mature and no longer growing, whereas in the child with cerebral palsy the brain is not yet fully functional and still growing and developing, so the effect of the damage is rather different from that seen in the adult.

The brain damage results in disorganized and delayed development of the neurological mechanisms of postural control, balance, and movement. The muscles activated for these motor aspects are therefore inefficient and uncoordinated. Brain damage in Cerebral Palsy may also be responsible for special sense defects of vision and hearing abnormalities of speech and language, and aberrations of perception (Hall 1984; Neville 2000).

Cerebral Palsy is classified into Spastic, Athetoid (Dyskinetic) and Ataxic type. There is hypertonic type which either becomes a spastic, athetoid or ataxic type. There is a transient dystonic stage in babies before they are diagnosed as a spastic or Dyskinetic type of cerebral palsy (Bax& Brown 2004). Tetraplegias have either spasticity, dystonia, Dyskinetic (athetosis), hypotonic or ataxia. Hemiplegia usually a spastic type often starting out hypotonic. Hemi athetoids with or without dystonic are occasionally seen , once again classifications are not always clear cut and the therapist, may have to treat impairment will

contribute to the diagnostic type referred for therapy. Developmental functional training is nevertheless indicated for all types of Cerebral palsies.

Inhibition of retained STNR used for many reasons to improve head control or trunk control to normalize the muscle tone, to provide proper postural alignment, to accommodate a lack of muscular support. Facilitation techniques can be used to improve child's performance of functional tasks such as rolling, creeping, crawling, sitting, walking and reacting by promoting postural alignment prior to movement. The physical therapist must strive to provide intervention designed to make the child as independent as possible. Children must be able to move from one position to another is called transition to be mastered include moving from a supine position to a prone position; moving from a supine or prone position to a sitting position; and moving from a sitting position to a standing position. Additional transitional movements usually acquired during normal development are moving from a prone position to a four point position followed by moving to kneeling, half kneeling and finally standing. Children who exhibit excessive movement such as children with athetoid or ataxic cerebral palsy need practice in maintaining stable position against gravity because their neutral tendency is to moving all the time children with fluctuating muscle tone.

Gross Motor Function Classification System (GMFCS) for children with Cerebral Palsy (Palisano et al 1997, updated 2008) classifies children according to what they can do at different age. There are five levels of classifications giving distinctions in self-initiated motor function. Level I children function without restriction, only having limitation in advanced motor skills. The motor function decrease from I to IV, with level V representing children with severe motor restriction.

The Spinal Alignment and Range of Motion Measure (SAROMM) is intended to be administered to people with diagnosis of Cerebral Palsy by trained physical therapist in a community setting. Conventional treatment programme includes passive stretching, strengthening, assistive devices and standing frames. The mechanisms underlying the development of deformity in Cerebral palsy are unclear; although the development of deformity appears to be influenced by the child's gross motor functional level. The development of deformity in a muscle will lead to an alteration in the passive range of motion of the joint involved.

Children with Spastic Cerebral palsy are often troubled by postural dysfunction due to muscle tone abnormalities. It is known that for successful therapeutic intervention in children with spastic cerebral palsy requires a better understanding of underlying mechanism of postural control by proper reflex inhibiting positions. And also to view the performance of gross motor function by altering the position with facilitation in five dimension such as Lying & Rolling, Sitting, Crawling & Kneeling, Standing and Walking, Running & Jumping.

Methodology

Study design : Experimental Study
Sample Size : 30
Group A (Control Group) : 15 Nos
Group B(Experimental Group): 15 Nos
Sampling method : Convenient sampling (Random sampling)
Study Setting : Pediatric Section of Physiotherapy Department
Study Duration : 6 weeks
Inclusion Criteria : 1. Age of children ranging between 6-12 years of both genders
2. Children with spastic diplegic cerebral palsy
3. Children who can understand follow commands given by the therapist.
4. Children have retained STNR
Exclusion Criteria : 1. Children with Athetoid,Ataxic & Flaccid Cerebral Palsy
2. Children with spastic hemiplegia,quadriplegia &triplegia
3. Hip & Knee fixed flexion deformity
4. Convulsion
Materials : Exercise Mat & Bolster
Dependent Variable : Inhibition of retained STNR positions & conventional treatment
Independent Variable : Gross Motor Functional Measure (GMFM)
Spinal Alignment
Outcome Measure : Gross Motor Functional Measure & Spinal Alignment & Range of Motion Measure

Procedure: Thirty patients who fulfilled the inclusion criteria and given the consent to participate in the study were taken. They were from pediatric section of physiotherapy department based on inclusion and exclusion criteria. Group A consists of 15 children who were given conventional treatment. Initial pretest value with GMFM& SAROMM was taken and assigned into two groups by random allocation method. For participants in Experimental group Inhibition of retained STNR along with conventional treatment was given for 6 weeks with 3 sessions in each week and each session consists of 45 minutes per day. For participants in controlled group conventional training was given for 6 weeks with 3 sessions in each week, each session consists of 45 minutes.

At the end of the sixth week posttest measurement was taken. The data was tabulated for statistical analysis.

Group 1: (Experimental Group)

Inhibition of retained STNR with conventional training programme.

Group 2:(Controlled Group)

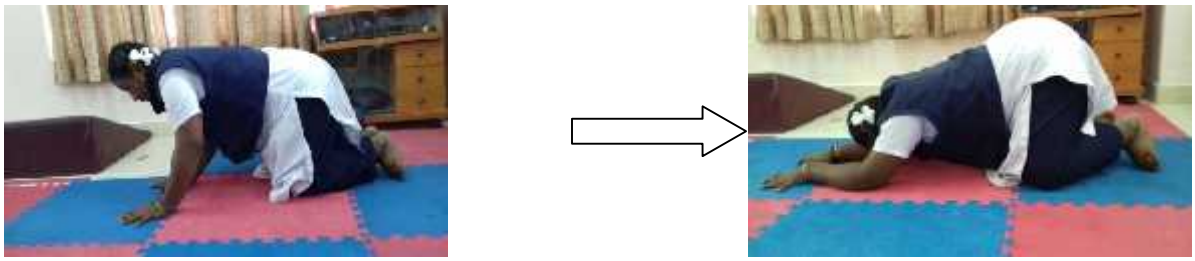
Conventional Training programme

Experimental group

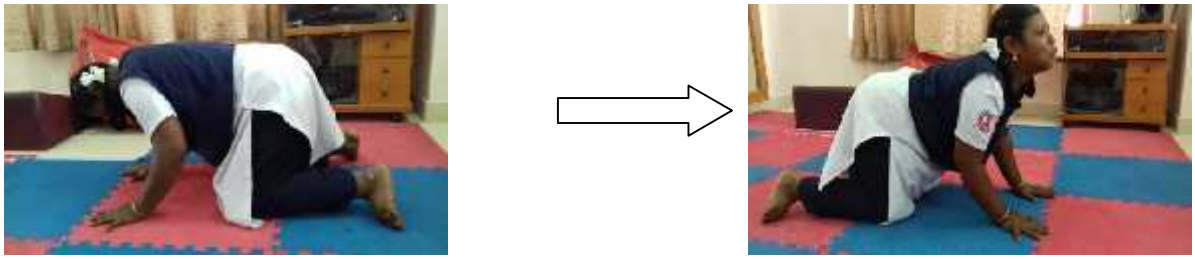
Duration: 6 weeks for 45 minutes/ Session (3 sessions per week /day for each client)

Inhibiting techniques of retained STNR

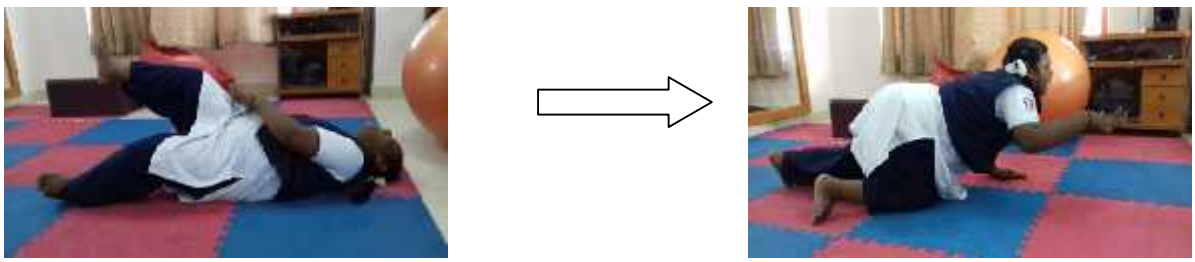
Stretching cat Exercise:



Cat and Cow Exercise:



Cross- Crawl Exercise (RIGHT & LEFT)



Conventional Treatment program

1. Head Control	o Prone over a Bolster, Wedge, or Half-Roll. o Supine on a Wedge or Half-Roll. o Modified Pull-to-Sit Maneuver. o Upright in Supported Sitting. o Weight Shifting from Supported Upright Sitting. o Carrying in Prone. o Carrying in Upright. o Prone in a Hammock or on a Suspended Platform Swing.
2. Trunk Control	o Sitting Propped Forward on Both Arms. o Sitting Propped Forward on One Arm. o Sitting Propped Laterally on One Arm. o Sitting Without Hand Support. o Side Sitting Propped on One Arm.
3. Movement transition that encourage trunk rotation and control	o Rolling from Supine to Prone Using the Lower Extremity. o Coming to Sit from Supine. o Coming to Sit from Prone. o Coming to Sit from Side Lying. o Sitting to Prone. o Prone to Four-Point. o Four-Point to Side Sitting. o Four-Point to Kneeling. o Kneeling to Side Sitting. o Kneeling to Half-Kneeling.
4. Prone to kneeling	o Facilitating the progression of movement from prone to prone on elbows to quadruped position using the shoulders and hips as key points of control
5. Quadruped to crawling	o Raising alternate limbs o Forward/Backward crawling
6. Kneeling to half kneeling	o Kneeling with both hand support o Kneeling with one hand support o Kneeling without support o Kneeling with support of walker to half kneeling o Half kneeling without support
7. Standing	o With support of both hands at hip level o With one hand support o Without support o Walk standing position o One leg standing with support o One leg standing without support
8. Walking	o With support of parallel bar. o With support of reciprocal walker o With support of elbow crutches

In the both group the commonly used intervention was stretching, strengthening of anti-gravity muscle, postural correction, orthotic device such as Hip Knee Ankle Foot Orthosis, Knee Anke Foot Orthosis, Ankle Foot Orthosis depends on the joint stability and mobility devices for ambulation such as walker, elbow crutches. Foremost variance in the experimental group is

how to switch from one position to another position (active or passive), balance in static and dynamic posture and modifying the abnormal posture adapted in lying, sitting and standing or walking.

Data Analysis

The outcome values obtained were tabulated in Microsoft Excel 10 spread sheet, and were exported to SPSS Statistics 17.0 version for Windows 7 for statistical analysis.

The effects of the intervention on the changes from pre to posttest values in both groups were analyzed using Paired 't' Test for within group analysis and Independent Sample 't' test for between Group analysis.
The P value was chosen as per the description given by SPSS Statistics for Windows 7 Ultimate Version.

Within Group Analysis of Improvement In Gross Motor Function By Experimental And Control Group (GMFM)

S.No	GROUP	Analysis	Mean ± SD	"t" value	Significance
1.	Experiment Group	Pre test	55.53±15.647	-3.703	.002
		Post test	65.47±19.737		
2.	Control Group	Pre test	47.93±18.622	-6.902	.001
		Post test	50.67±18.927		

The results of this study from the above table indicate that, in within group analysis of improvement in the Gross Motor Function shows extremely significant in the Experimental and Controlled group.

Within Group Analysis of Improvement In Joint Range Of Motion By Experimental And Control Group (Saromm)

S.No	GROUP	Analysis	Mean ± SD	"t" value	Significance
1.	Experiment Group	Pre test	6.687±3.7138	5.048	.001
		Post test	6.165±3.7164		
2.	Control Group	Pre test	6.158±5.4851	3.353	.005
		Post test	5.608±4.9400		

The results of this study from the above table indicate that, in within group analysis of improvement in the joint range of motion shows extremely significant in the Experimental and Controlled group.

Between The Group Analysis of Inhibition of Retained Stnr With Conevtional Programme (Experimental Group) Vs Conventional Programme (Control Group)

S.No	Areas	Analysis	GROUP	Mean ± SD	"t" value	Significance
1.	GMFM	Post test	Experiment	65.47±19.737	2.096	**.045**
			Control	50.67±18.927		
2.	SAROMM	Post test	Experiment	6.165±3.7164	.349	**.730**
			Control	5.608±4.9400		

The result of the study from the above table indicate that between the group analysis of Inhibition of Retained STNR with conventional program and conventional program shows significant in Gross Motor Functional Measure and non significance in SAROMM.

Results

The result of this study from the table indicates that in between the group analyses there is significant improvement in Gross Motor Functional activities in Experimental group than Control group. There is no significance in Joint range of Motion on comparing experimental with controlled Group.

Discussion

This study focuses on to determine the effectiveness of techniques inhibiting retained STNR with conventional training programme versus conventional programme on children with Cerebral Palsy individuals. It was done on 30 subjects having children with Cerebral Palsy. The motivational study was "Inhibition-treatment of retained STNR(Symmetrical Tonic Neck Reflex) with a combination of Extra lesson and Chirophonetics therapy" done bySir BalázsTarnai, (2012)**.**This study supports my assumption that the inhibition of retained STNR will improve the motor Skills (Swimming & Bicycling) along with fine

motor skills such as self-awareness/proprioception. Stretching is not alone the treatment for managing the children with Cerebral palsy. Positioning and facilitation it works on normalizing muscle tone, inhibiting the pathological reflex, improving the posture, movement with control, improving gait patterns and overall learning motor skills such as creeping, rolling, lying to sitting from supine and prone position, sitting to quadruped, crawling, kneeling to kneel walking, kneeling to half kneeling, standing, walking. The key point is to make them independent as much as possible such as training the position with support and fade it to without support.

A child does not 'move by neurophysiology alone' not only have various ideas on learning motor control been integrated into the general therapy, the influence of the context of child's function is given special consideration. This take place in a child's home, school, and community. It is primarily the motivation of a child along with environmental stimulation. To register the movement in brain the repetition is vital and it was taught for the parents and siblings to stimulate the child to carry out the program at home.

The controlled group was given with passive stretching, orthotic appliance for maintain the joint range of motion and preventing deformities. Assistive devices such as corner chair, adaptive chair, standing frame was used to maintain the alignment of the body segments. In this group mobility was initiated with parallel bar and walker. Positional stretching was effective rather than passive stretching for the children with cerebral palsy as it was sustainable.

It was found there was significant improvement in both experimental group and controlled group in terms of Gross Motor Functional Measure but in Spinal Alignment and Range of Motion Measure it was not significant when compare between the two groups.

Conclusion

From the result of this study, it was concluded reflex inhibiting positions for retained STNR helps her on facilitating Gross and Fine Motor Function. Further investigations are certainly needed to assess effectively the effects of the intervention in larger sample.

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