



## Patternizing Standard of Supine to Sit Movements with Support in Spastic Cerebral Palsy Children

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**Abstract:** Cerebral Palsy (CP) describes group of non-progressive lesions or anomalies of the brain arising in the early stages of its development causing secondary motor impairments syndromes classifications include: - (1) quadriplegic (2) hemiplegic (3) diplegic (4) monoplegic and (5) triplegic. The purpose of this study is to examine patternizing standard of supine to sit movements with support in spastic capital (CP). A random clinical trial was conducted. 30 children were selected the interventions are applied 6 times in a week for 24 weeks. Stretching and combination of floor and Swiss ball exercises were given to the children to get their trunk control.

### I. INTRODUCTION

Cerebral palsy is a term used to describe a broad spectrum of motor disability which is non - progressive and is caused by damage to the brain at or around. Although the damage is non progressive, the clinical picture change as the nervous system develops and the child grows. there are usually associated handicaps.

The prevalence of cerebral palsy is the number of cases present during a specified time, and usually calculated as age -specific prevalence rate (alberman ,1984). a reasonable estimate of the prevalence of cerebral palsy at school age is 2 per 1000 live births in industrialized nations (Paneth et al, 1981). The incidence of a condition is the number of new cases occurring during a defined time period in a population at risk. Because there is a high mortality among the very low birth weight babies, incidence figure tends to be misleading.

#### Causes of cerebral palsy

**Prematurity:-** The chapter on normal development describe some of the ways that the immature brain can be damaged pre term infants are much more likely to be brain damaged both at delivery by trauma, and after because of there immature respiratory and cardiovascular system making them more likely to develop hypoxia and low blood pressure. They are also more likely to develop low blood sugar and jaundice. Immaturity of the liver makes haemorrhage more likely to occur and be severe.

**Asphyxia:-** Severe asphyxia is still an important cause of cerebral palsy even in mature infants, and may be caused by accidents at birth knotted umbilical cord, cord around the neck or prolapsed cord antepartum haemorrhage may be associated with severe asphyxia multiple deliveries may be associated with delay and asphyxia of second or third infants, especially with malpresentation

**Trauma:** - Birth trauma occurs in the following ways

Disproportion- the baby's head or shoulders are too large to pass safely through the birth canal

Forceps delivery- special high forceps with rotation of the head in the birth canal

Breech delivery- specially occurring through a partially dilated cervix, and without forceps applied to protect the head.

Rapid delivery- specially of preterm infant with a very soft skull.

The trauma is usually caused by distortion of the head, and tearing of the tentorium

**Severe jaundice:-** This occur much less frequently since rhesus completability can be prevented by immunising mothers at risk, the preterm baby who is also having breathing problems is now most at risk. Ahigh level of un conjugated bilirubin in the blood damage the basal ganglia causing athetoid cerebral palsy and high tone deafness

**Hypoglycaemia:-** Low blood sugar for a long period can cause severe brain damage and epilepsy. The cerebellum seems vulnerable causing ataxia and there are often visual problems. Besides preterm infants of diabetic's mothers are particularly vulnerable

**Intra- uterine virus infection:** - Rubella virus infection and cytomegalovirus infections are two virus that can cause severe brain damage and associated deafness and visual problems including cataracts.

**Neonatal meningitis:** - Early meningitis is usually associated with severe residual brain damage

**Genetic cause:**-These are becoming relatively more common as perinatal care improves and should be considered particularly in ataxic and some athetoid syndromes

**Vascular causes:** - Occlusion of the internal carotid or middle cerebral artery may occur before or after birth and cause hemiplegia.

## II. TYPES OF CEREBRAL PALSY

**Spastic:** - Spasticity is a disorder of tone characterised by an initial increased resistance to stretch which may then lessen abruptly. It is caused by damage to the upper motor neuron in the cortex or along the pathways which terminate in the spinal cord, and is characterised by increased deep tendon reflex and extensor plantar responses.

Spastic muscles are continuously contracting, and there is apparent weakness of their antagonists leading to abnormal positions of the joints on which they act. Deformities of joints develop which may become fixed contractures with time

**Dystonic choreo- athetosis:** - Involuntary movements (choreo- athetosis) are so frequently combined with dystonic posturing that they are conveniently classified together. The damage is centred on the basal ganglia. Choreo-athetosis is most frequently found with damage to the caudate nucleus, and dystonia with damage to the globus pallidus.

Athetosis is defined as irrepressible slow writhing movements, the result of imperfectly co-ordinated activity of agonist and antagonist, which are exacerbated by attempting voluntary movement Choreic movements are rapid involuntary jerks presents at rest which are increased by voluntary movements

Dystonia is a disorder of muscle tone expressed as postural abnormalities, intermittent contractile spasm and complex action dystonia's where purposeful movements are deformed.

Voluntary movements are partially or totally disrupted anywhere in the body, including the lips and tongue. The baby is usually marked hypotonic, developing abnormal movements during the second year. Muscles tension develops as a mechanism to control posture in the adult, but characteristically there are marked variations in tone.

**Ataxia:** - Ataxia is caused by damage to the cerebellum or its pathways. The sign is of hypotonia, disturbance of balance, Inco-ordination, intention tremor, dysarthria and sometimes nystagmus. This is relatively rare form of cerebral palsy and may be part of a dysmorphic syndrome or be associated with intra-uterine infection. Mental handicap is common

**Common associated problems:** - Because damage to the brain is likely to be generalised, other neurological problems may also be present and should be looked

**Visual problems:** - Optic nerve damage- atrophy leading to visual handicap.  
Damage to visual pathways or visual cortex leading to cortical blindness

**Hearing problems:** - Nerve deafness. High frequency loss in kernicterus. Cortical damage bilateral

**Speech:** - Disorders of articulations as in bulbar palsy associated with quadriplegia, or movement disorders affecting speech as in athetosis or ataxia.

**Mental handicap:**-Damage preventing development of memory. Loss of associations fibres linking parts of the brain causing learning problems.

**Epilepsy:** - Scar of the brain may be epileptic foci. All types of epilepsy can occur and be related to learning problems. Many children with cerebral palsy have infrequent seizures and medications should be considered carefully.

## III. OBJECTIVES AND HYPOTHESIS

To know the effect of patterning movements in children with spastic cerebral palsy

### Hypothesis

**Null hypothesis-** There is no significance of patterning movements with support to get sitting posture in children with spastic cerebral palsy.

**Experimental hypothesis-** Patterning movement will help to attain sitting posture in children with spastic cerebral palsy

### METHODOLOGY

#### Objectives

1) To know the effect of patterning standards of supine to sit movements with support in children with spastic cerebral palsy.

#### Hypothesis

**Null hypothesis-** There is no significance of patterning movements with support to get sitting posture in children with spastic cerebral palsy

**Experimental hypothesis** – Patterning movement will help to attain sitting posture in children with spastic cerebral palsy

#### Sampling

**Sample size:** - The sample size is fixed to a total number of 30 children No such grouping is done

**Sample setting:** - Home based  
**Sample design:** - experimental study  
**Study duration:** - 6 month  
**Sample method:** - Random sampling

#### Inclusion criteria

- 1) Children with diagnosed spastic cerebral palsy
- 2) Children must be in between 7-10 years
- 3) Both boys and girls are included
- 4) Children with spasticity 2 or less on modified Ashworth scale
- 5) Children having neck control
- 6) Children able to attain side lying position independently
- 7) Regular therapy children

#### Exclusion criteria

- 1) Children whose age is less than 7 and more than 10 years
- 2) Children who got Botox injection in past 6 months
- 3) Children having any kind of bony deformity
- 4) There is no history of seizures
- 5) Children with spasticity more than 2 in modified Ashworth scale

#### Instrumentation and functional scale used

- 1) Modified Ashworth scale
- 2) Trunk control measurement scale (TCMS)
- 3) GMFCS
- 4) MMT (Manual Muscle Testing)
- 5) VAS (Visual Analogue Scale)
- 6) ROM (Range of Motion)
- 7) APGAR
- 8) Swiss ball
- 9) AFOs

## IV. PROCEDURE

The 30 children were screened on the inclusion criteria and exclusion criteria to be included in the explained and a written consent which was obtained from parents of all children with CP. All children are in one group and exercise planned for them are same for all the exercises were carried out in circuit manner. Exercises were performed intensively with 8 repetitions in order to promote motor learning and improve muscle strength and endurance. The training was completely individualized and exercises were given with attention to each child to get correct performances of the exercises. The exercises were given through goal directed game like activities with little fun to get maximum active participation from the child and to make the child enjoy the session.

We divide our exercise plan in **two** parts: -

- 1) On floor
- 2) On Swiss ball

#### On floor: -

- Stretching
- Supine to side lying
- Side lying to prone
- Prone to quadruped

#### On Swiss ball: -

##### (a) Supine

- Supine on ball leg touched on floor
- Supine to sit
- Curl- up
- Pivoting on Swiss ball

##### (b) Prone

- Prone to palm quadruped
- Curl up
- Prone on palm tip with hip extension

##### (c) Side lying

- Prone to side lying with lower extremity dissociation

- Side lying to sitting

**Stretching: -****1) On floor exercise: -****a) Stretching: -****Upper limb:****Lower limb:****Trunks:**

Stretching will done before and after the session gradually the number of repetitions and holding time will be increased according to condition or need will ask the children's attender to do same twice a day

**a) Supine to side lying: -**

Therapist position: - Kneeling beside the children

Children position: - Supine lying

Procedure: - Ask the children to do side lying and, hold the children's shoulder and hip and facilitate doing side lying

**b) Side lying to prone: -**

Therapist position: - Kneeling beside the children

Children position: - Side lying

Procedure: - Ask the children to attain prone position by holding the shoulder and hip of the children and facilitate the to attain that position

**c) Prone to quadruped: -**

Therapist position: - Kneeling beside the children

Children position: - Prone position

Procedure: - Ask the children to do quadruped by flexing his/her knees and hip and by flexing his /her shoulder and by extending elbows

In 1-4 weeks: -		
Exercises	Sets	Repetitions
Supine to side lying	3	10
Side lying to prone	3	10
Prone to quadruped	3	10

In 4-8 weeks: -		
Exercises	Sets	Repetitions
Supine to side lying	3	15
Side lying to prone	3	15
Prone to quadruped	3	15

**On Swiss ball: -****a) Supine: -****Supine on ball with leg touched the floor: -**

Therapist position: - Sitting in front of the children

Children position: - Supine on ball

Procedure: - Position the child supine on the ball with the feet to the floor. Hold through the lower abdominals to stabilize them on ball. Now facilitate through one arm and bring the child diagonally up to stance

**Pivoting on Swiss ball: -**

Therapist position: - Sitting in front of the children

Children position: -Supine on ball

Procedure: - Position the child supine on the ball with the feet to the floor. Hold through the belly of the child to stabilize them on ball. Now facilitate through both the hands and shift child in left and right direction

**Supine to sit: -**

Therapists position: - Sitting in front of the children

Children position: -Supine on ball

Procedure: - Position the child supine on the ball with the feet to the floor. Hold through the shoulder of the child and stabilize them on ball. Now facilitate through both the hands and bring the child up

**b) Side lying: -****Prone to side lying with lower extremity dissociation: -**

Therapist position: - Sitting in front of the children

Children position: -Prone lying on ball

Procedure: - Position the child prone on the ball with the feet to the floor. Hold through the belly of the child and stabilize them on ball. Now facilitate through both the hands and bring the child up

**Side lying to sitting: -**

Therapist position: - Sitting in front of the children

Children position: - Side lying on ball

Procedure: - Position the side lying on the ball with the feet to the floor. Hold through the shoulder of the child and stabilize them on ball. Now facilitate through both the hands and bring the child up

c) **Prone: -**

**Prone on palm tip with hip extension: -**

Therapists position: - Sitting in front of the children

Children position: - Prone on ball

Procedure: - Position the prone on the ball with the feet to the floor. Hold through the belly of the child and stabilize them on ball. Now facilitate through both the hands and bring the child up

**Back extension: -**

Therapist position: - Sitting in front of the children

Children position: - Prone on ball

Procedure: - Position the prone on the ball with the feet to the floor. Hold through the belly of the child and stabilize them on ball. Now facilitate through both the hands and bring the child up

**Prone to palm quadruped: -**

Therapist position: - Sitting in front of the children

Children position: - Prone on ball

Procedure: - Position the prone on the ball with the feet to the floor. Hold through the belly of the child and stabilize them on ball. Now facilitate through both the hands and bring the child in quadruped

During 8-12 weeks: -		
Exercise	Sets	Repetitions
supine on ball with leg touched the floor	3	10
pivoting on Swiss ball	3	10
supine to sit	3	10

After 12<sup>th</sup> week all side lying and prone exercise are included

12-16 week: -		
Supine		
Exercise	Sets	Repetitions
supine on ball with leg touched the floor	2	10
pivoting on Swiss ball	2	10
supine to sit	2	10
Side lying		
Prone to side lying with lower extremity dissociation	3	10
Side lying to sitting	3	10
Prone		
Prone on palm tip with hip extension	3	10
Back extension	3	10
Prone to palm quadruped	3	10

16-20 week: -		
Supine		
Exercise	Sets	Repetitions
Supine on ball with leg touched the floor	2	10
pivoting on Swiss ball	2	10
Supine to sit	2	10
Side lying		
Prone to side lying with lower extremity dissociation	3	15
Side lying to sitting	3	15
Prone		
Prone on palm tip with hip extension	3	15
Back extension	3	15
Prone to palm quadruped	3	15

20-24 week: -		
Supine		
Exercise	Sets	Repetitions
supine on ball with leg touched the floor	2	10
pivoting on Swiss ball	2	10
Supine to sit	2	10

Side lying		
Prone to side lying with lower extremity dissociation	3	15
Side lying to sitting	3	15
Prone		
Prone on palm tip with hip extension	3	15
Back extension	3	15
Prone to palm quadruped	3	15



**V. RESULTS AND DISCUSSION**

**RESULTS:**

After intervention the average (mean ± standard deviation) score of trunk control (10.0) of spastic cp children found to be significantly better trunk control however, the mean difference of 3.0 point in score of trunk control at post intervention stage in spastic cp children reach at statically strongly/ highly significant (p<0.05) level of significance henceforth, the intervention among



spastic cp children may be preferred as an effective programme for improving trunk control of spastic cp children the mean 24 week post treatment of Ashworth scale and MMT difference measurement are significantly higher compared to the base line treatment.

**DISCUSSION:**

Exercise prescribed in the protocol caused hypertrophy of trunk muscles (Rectus Abdominis, External Abdominal Oblique Internal Abdominal Oblique and Transverse Abdominis)are mainly responsible for trunk control. Studies also suggest there may

be an increase in fast twitch and slow twitch muscle fibers an increase in myofibril size. The use of Swiss ball increased the action potential generation of trunk muscles causing an increase in their muscular forces. Studies further suggest strengthening exercises are effective in increasing muscular activity Muscle activation is caused by motor unit activation and recruitment thus leading to strengthening and hypertrophy of trunk muscles. [33,34]

It is reported that greater motor unit recruitment and a higher rate of motor unit firing, which may be elicited by strengthening exercise, can raise the level of muscle activation [35]

## VI. CONCLUSION

This study shows that the patternizing movements is effective for developing the trunk muscle activity, strengthen the core muscle of the trunk and maintain the stability in upright position and it gives freedom to the upper limb activities. In patternizing movements, all types of weight shifting are activated with minimal transitions so that energy expenditure of the therapist is less than. This approach is more significant than the conventional treatment approach

We consider this is because the trunk strengthening exercise with a patternizing movements increased the muscle activity. Many previous studies have reported that strengthening exercises, such as trunk strengthening exercise, are effective at increasing muscle activity. [33,34]

### Limitation of study

The study was confined to a sample size of 30 children only and so the result obtained cannot be generalized.

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