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EFFECTS OF QUADRICEPS FEMORIS STRENGTHENING ON SPASTICITY IN CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY

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ABSTRACT

AIM OF THE STUDY:

Background and purpose: The Bobath neuro developmental treatment approach advised against the use of resistive exercise, as proponents felt that increased effort would increase spasticity. The purpose of this study was to test the premise that the performance of exercises with maximum efforts will increase spasticity in children with spastic diplegic cerebral palsy (CP).

Objectives Of The Study: To study the effects of Quadriceps femoris strengthening on spasticity in children with spastic diplegic cerebral palsy

METHODOLOGY

Subjects: Thirty children with spastic diplegic cerebral palsy ranging age from 5 to 8 years participated in a Quadriceps femoris strengthening program.

Duration : 6 weeks

Data Analysis: The pre and post test data has been collected from the subjects. The data has to be analyzed in statistics using the paired t test and simple t test.

Results: There were no changes in spasticity following Quadriceps femoris strengthening exercise . i.e spasticty has not increased after Quadriceps femoris strengthening exercise .

CONCLUSION: The results do not support the premise that exercises with maximum efforts increase spasticity in CP with spastic diplegic.

KEYWORDS : Spasticity, Isometrics , Isotonics, First Swing Excursion

INTRODUCTION

Cerebral Palsy is considered a neurological disorder caused by a non-progressive brain injury or malformation that occurs while the child's brain is under development. Cerebral Palsy primarily affects body movement and muscle coordination. It was once thought that cerebral palsy was caused by complications during the birthing process. While this does happen, it is now widely agreed that birthing complications account for only a small percentage, an estimated 10 percent, of Cerebral Palsy cases. Current research suggests the majority of cerebral palsy cases result from abnormal brain development or brain injury prior to birth or during labor and delivery. Cerebral Palsy affects body movement, muscle control, muscle coordination, muscle tone, reflex, posture and balance. It can also impact fine motor skills, gross motor skills and oral motor functioning.

An individual with Cerebral Palsy will likely show signs of physical impairment which may include spasticity. However, the type of movement dysfunction, the location and number of limbs involved, as well as the extent of impairment, will vary from one individual to another. It can affect arms, legs, and even the face; it can affect one limb, several or all. Cerebral Palsy affects muscles and a person's ability to control them. Muscles can contract too much, too little, or all at the same time. Limbs can be stiff and forced into painful, awkward positions. Fluctuating muscle contractions can make limbs tremble, shake, or writhe. Balance, posture, and coordination can also be affected by cerebral palsy. Tasks such as walking, sitting, or tying shoes may be difficult for some, while others might have difficulty grasping objects.

AIM / OBJECTIVE OF THE STUDY:

Study was conducted in an aim or objective to test the premise that the performance of Quadriceps femoris strengthening exercises with maximum efforts will increase spasticity in children with cerebral palsy (CP).

RESEARCH DESIGN AND METHODOLOGY

A Quasi experimental study design was conducted with 30 children who fulfilled the inclusion and exclusion criteria, at the paediatric therapy centre in Chennai for a duration of 6 weeks.

INCLUSION CRITERIA:

- Diplegic spasticity
- Subjects of age of 5 to 10 yrs
- Ability to follow simple commands
- Good trunk and Hip control
- Quadriceps weakness

EXCLUSION CRITERIA:

- Subject below 2 yrs of age
- Hip flexor tightness
- Hip adductor tightness
- TA tightness
- Fractures of Hip and knee
- Pain or orthopaedic problems affecting the legs
- Unstable seizures

METHOD:

Knee muscle spasticity was assessed bilaterally using the pendulum test to elicit a stretch reflex immediately before and after 3 different forms of right Quadriceps femoris muscle exercise (isometric, isotonic) during a single bout of exercise training. Pendulum test outcome measures were: (1) first swing excursion, (2) number of lower leg oscillations, and (3) duration of the oscillations.

DATA ANALYSIS:

The pre and post test data has been collected from the subjects. The data has to be analyzed in statistics using the paired t test and simple t test.

1. FSE – Right Side

Testing the Pre and Post-test scores of FSE – Right Side using Paired t-test and the corresponding output is shown below:

Table: 1

\	t-Test: Paired Two Sample for Means		
s		*FSE_R2*	*FSE_R1*
	Mean	78.0417	77.1667
	Variance	11.7143	10.9548
	SD	3.4226	3.3098
	Observations	60	60
	Pearson Correlation	0.9824	
	Hypothesized Mean		
	Difference	0	
	Df	59	
	t Stat	10.5583	
	P(T<=t) one-tail	0.0000	
	t Critical one-tail	1.6711	
	P(T<=t) two-tail	0.0000	
	t Critical two-tail	2.0010	

RESULT:

There is significant improvement in FSE on right side due to the treatment ($t = 10.56$, $p < 0.05$). The mean value of FSE-right side is increased from 77.17 (SD = 3.31) to 78.04 (SD = 3.42).

2. NOOS – RIGHT SIDE

Testing the Pre and Post-test scores of NoOS – Right Side using Paired

t-test and the corresponding output is shown below:

t-Test: Paired Two Sample for Means -NoOS Right side
Table: 2

	NoOS_R2	
	(Post)	*NoOS_R1(Pre)*
Mean	4.6667	3.9333
Variance	0.4209	0.2582
SD	0.6488	0.5081
Observations	60	60
Pearson Correlation	0.6255	
Hypothesized Mean		
Difference	0	
Df	59	
t Stat	11.0000	
P(T<=t) one-tail	0.0000	
t Critical one-tail	1.6711	
P(T<=t) two-tail	0.0000	
t Critical two-tail	2.0010	

RESULT:
There is significant improvement in NoOS on right side due to the treatment ($t = 11.00$, $p < 0.05$). The mean value of NoOS-right side is increased from 3.93 (SD = 0.51) to 4.67 (SD =0.65)

3. DOS – RIGHT SIDE
Testing the Pre and Post-test scores of DOS – Right Side using Paired t-test and the corresponding output is shown below:

t-Test: Paired Two Sample for Means-DOS
Table:3

	DOS_R2 (Post)	*DOS_R1 (Pre)*
Mean	3.2500	3.2567
Variance	0.1653	0.2981
SD	0.4065	0.5460
Observations	60	60
Pearson Correlation	0.7369	
Hypothesized Mean Difference	0	
Df	59	
t Stat	-0.1399	
P(T<=t) one-tail	0.4446	
t Critical one-tail	1.6711	
P(T<=t) two-tail	0.8892	
t Critical two-tail	2.0010	

RESULT:
There is no significant change in DOS on right side due to the treatment ($t = 0.1399$, $p=0.4446 > 0.05$). The mean value of DOS-right side before (Mean = 3.26, SD = 0.55) and after(Mean=3.25, SD = 0.41) the treatment is approximately same (i.e., Mean ≈ 3.3).

RESULTS
There were changes in spasticity showing decrease in the spasticity following Quadriceps femoris strengthening exercise . i.e spasticty has not increased after Quadriceps femoris strengthening exercise as per the premise.

CONCLUSION
The results do not support the premise that exercises with maximum efforts increase spasticity in children with spastic diplegic cerebral palsy.

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