



COMPARISON BETWEEN STRETCHING AND REFLEX INHIBITING PATTERN TO REDUCE TENDON ACHILLES SPASTICITY IN CEREBRAL PALSY CHILDREN

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ABSTRACT

Objective: To compare the effects of stretching exercise and reflex inhibiting patterns to treat achilles tendon spasticity in cerebral palsy children.

Methods: A randomized control trial was conducted at Govt. National Special Education Center, Faisalabad. Children of both genders in age from 5-15 years, diagnosed cases of spastic cerebral palsy with spasticity of grade 1-3 were included. A total of n=22 sample was collected through purposive sampling technique and was divided into two groups by lottery method into group-I "Stretching group" (n=11) and group-II "Reflex Inhibiting Patterns (RIP) group" (n=11). Both groups received infrared therapy as baseline treatment. The data was collected through Modified Ashworth Scale (MAS) and Barthel Index (BI). MAS readings were taken after every 15 days for 2 months. BI readings were taken pre treatment and at 8th week follow up.

Results: SPSS V .20 was used for data analysis. Independent Sample t-test results showed no significant improvement in spasticity and ADLS at 8th week follow up between group 1 and 2 with p-value being greater than 0.05.

Conclusion: The result showed that there is no difference between the treatment group I and II in the treatment of the spasticity in the cerebral palsy children.

Keywords: Cerebral Palsy, Muscle Spasticity, Thermotherapy, Achilles Tendon, Muscle Stretching Exercises, Reflex Inhibiting Pattern

Ethical Approval Number: TUF/DEAN/2021/14

INTRODUCTION

Cerebral palsy (CP) is the major problem of severe physical disability in children. CP is a persisting and unchangeable disorder effecting the movement and posture, occurring in the early age of life. It is a non-progressive brain disorder.¹ It may be represented either as difficulties in manner of walking, attention span, learning, memory loss, process of developing, or sensory disturbances. The diagnosis depend upon metabolic and genetic disorders, hypertonia and shortening and hardening of muscles, refusal to eat and drink, impairment in the sending, receiving and processing of message, also difficulty in the comprehension of verbal, nonverbal and graphic symbol systems, decrease bone mineral density, pain and functional problems of gastrointestinal contributing to bowel are basic complications of cerebral palsy.²

Injury to the brain may occur in before birth, during pregnancy or after birth stage in CP. Spasticity is the main issue of disability in neurological problem for example TIA, the injury to spinal cord, MS and CP. Inability to mobilize and long term spasticity cause the systemic changes in the fibers of muscle and perineurium leading to depletion in joint range of motion (ROM).³ Spasticity is actually disorder of the upper motor area of the brain such as neurological damage to the corticospinal or pyramidal tract in the brain or spinal cord. It is a worldwide complication associated with cerebral palsy. It leads towards musculoskeletal problem and effects the body function.⁴

Stretching is a key element of physical therapy procedures in cerebral palsy children. Stretching is used in boosting up the viscoelastic properties of the muscle tendon unit to reduce the injuries related to the muscle and tendon. Muscle stretching includes different procedures. Firstly the passive stretching in which child does not move actively but PT applies stretch. Secondly active stretching in which the child begins and continue the stretch and finally elongate position in which if maintain position for particular muscle or group of muscles then achieve a longer duration stretch.⁵

Bobath stated that normal motor development is altered due to central nervous system (CNS) dysfunction. Normal development of posture against gravity affected due to motor problems. It emphasis the components which are almost likely to be damaged as a result of central nervous system dysfunction, tone of muscle, reflexes and disorganized movement patterns, postural control ,sensory system, perception, and memory.⁶

Reflex inhibiting patterns and postures (R.I.Ps) includes spasticity obstruct positions or angle so the person by his/her own will can move his/her body parts and easily transfer from one place to another place. This makes the person individualistic in his daily task and activities. When the stimulation is given in inhibitory posture of the person then the chance of increase in spasticity decreases rapidly.⁷

METHODOLOGY

A randomized control trial was conducted at Govt. National Special Educational Center of Faisalabad. The study was conducted after the ethical approval (IRB No. TUF/DEAN/2021/14, dated Feb, 26, 2021). The study conformed to the Consolidated Standards of Reporting Trials (CONSORT) guidelines for reporting of randomized trials and was in line with the contents of the Declaration of Helsinki.

Children of both genders with the age 5-15 years⁸, diagnosed cases of spastic CP⁹ in grade 1 to 3 were included in this study. Children with spasticity because of any other disease e.g. spina bifida or stroke, children having fits and tremors and children taking any other physical therapy treatment¹⁰ were excluded from the study. A total of n=22 sample was collected through purposive

sampling technique to enroll subjects from the population in to the study and divided by lottery method into group A stretching exercise (n=11) and group B RIP (n=11) (Fig.1).

Group A received passive stretching exercise for 30 minutes on alternative days.¹¹ Group B received traction and light joint compression for 30 minutes on alternate days.⁹ Both groups received infrared therapy on baseline for 15 minutes.¹² All patients received treatment for six weeks on alternate days. Modified Ashworth Scale (MAS) was used for assessment of spasticity.¹³ Barthel Index (BI) was used for measuring activities of daily living (ADLs).⁹ Modified Ashworth Scale was measured pre-treatment as baseline measure, 2 weeks after treatment, at 4 weeks, at 6 weeks and 8 weeks after treatment. Barthel Index recordings were taken pre-treatment as baseline measure at then at 8 weeks post treatment. All outcome measures were recorded at the set time.

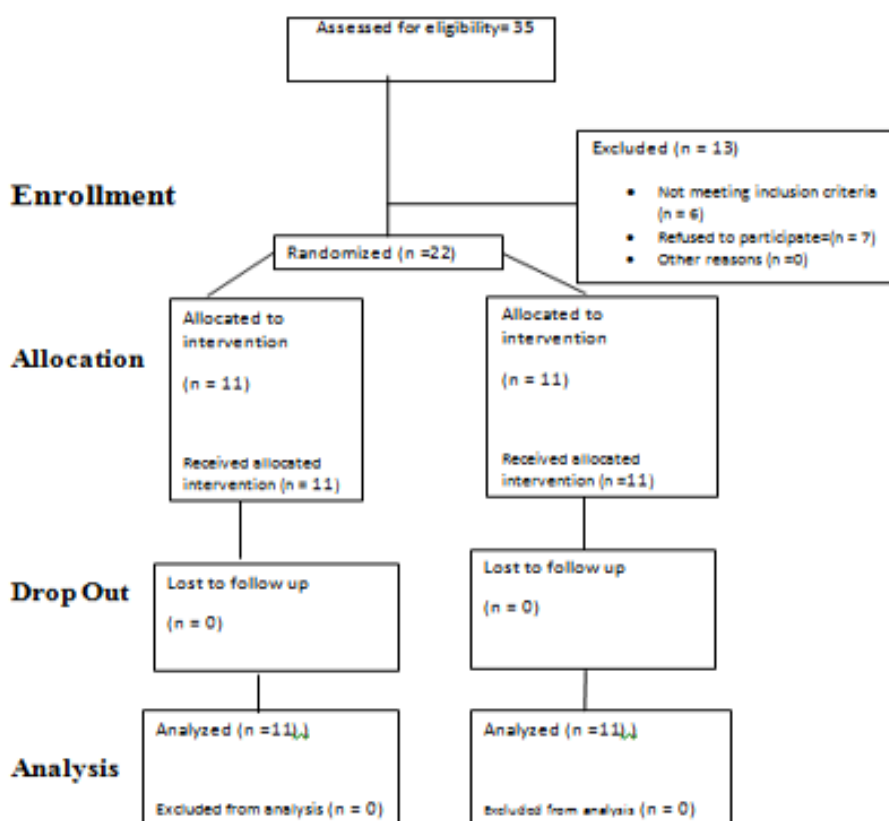


Fig.1: CONSORT Diagram.

Written informed consent was taken from participant’s caregivers. Demographic data at the baseline was obtained in term of age and gender. The baseline and post intervention, data was collected through MAS for spasticity and BI for ADLs. Independent sample t-test was used for between groups comparison and paired samples t-test was used for within group analysis for Barthel Index. While, Repeated Measures ANOVA was used for within group analysis for Modified Ashworth Scale. The data was analyzed on Statistical Package for Social Sciences (SPSS) V.20 and level of significance was set at 95% CI (p≤0.05).

RESULTS

A total of n=20 male and n=2 female participants were present in the sample and majority of children (8) were of 11 years (Fig. 2 and Fig 3).

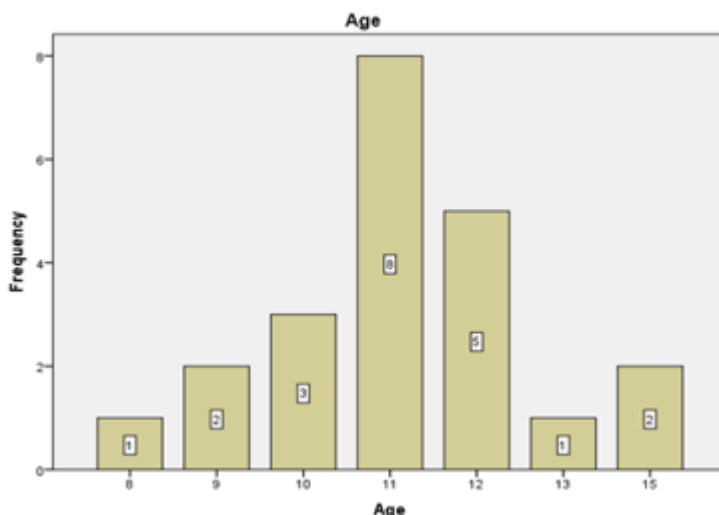


Fig.2: Age of Study Participants.

8	1 (4.54)
9	2(9.09)
10	3(13.63)
11	8(36.36)
12	5(22.72)
13	1(4.54)
15	2(9.09)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	22	8	15	11.23	1.688
Valid N (listwise)	22				

Table I: Baseline Demographics of the Study Population (N= 22)

Parameters		Sample
Age in Years (Mean ± SD)		11.23 ± 1.688
Gender	Male f(%)	20 (90.91%)
	Female f(%)	2 (9.09%)

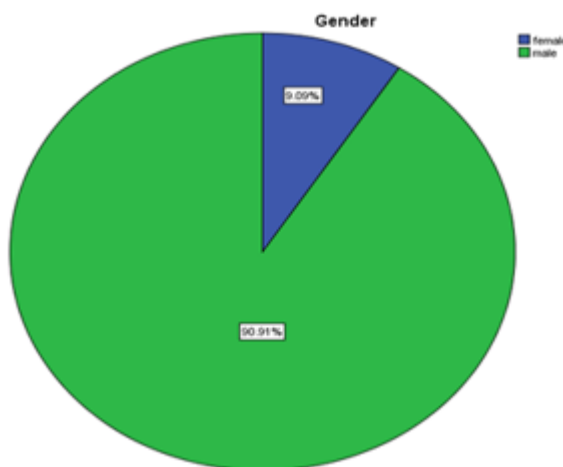


Fig.3: Gender of Study Participants.

Results demonstrated no significant difference in MAS score at baseline, at 2nd week follow up, 4th week follow up, 6th week follow up and 8th week follow up between both groups ($p > 0.05$). Results for

BI scores also demonstrated no significant difference at baseline and at 8th week follow up between both groups ($p>0.05$) (Table-I).

Table-I: Between Group Comparison (MAS and BI)

Outcome Measure & Sessions	Group A Stretching Mean+ S.D	Group B RIP Mean+ S.D	Sig 2 –tailed
MAS at baseline	2.18+.874	1.73+.467	.144
MAS at 2 nd week	2.18+.874	1.73+.467	.144
MAS at 4 th week	2.18+.874	1.73+.467	.144
MAS at 6 th week	1.82+1.079	1.73+.467	.800
MAS at 8 th week	1.73+1.104	1.45+.522	.467
BI at baseline	69.55+ 19.033	78.18+ 8.146	.182
BI at 8 th week	71.82+ 20.158	79.55+ 7.230	.245

Level of significance: $p<0.05^{**}$

DISCUSSION

The results suggested that there is no significant difference between both interventions in the treatment of spasticity and activities of daily living in cerebral palsy children.

A research was conducted by Panibatla, et al. (2017) to examine the effect of Bo-bath technique in combination with muscle tension balanced PNF technique on lower limb spasticity in cerebral palsy children. Treatment group received both muscle tension balanced PNF technique and bobath technique. While, the control group received bobath technique only. Modified Ashworth score, Barthel Index and Fugl-Meyer motor function (lower limb component) was used to evaluate patients pre and after intervention. All outcome measures improved in both groups. But, the bobath technique control group demonstrated significant improvement in severity of muscle spasticity.¹⁴

A research was performed by Kumar et al. (2016) to examine the effects of stretching and bobath reflex inhibiting pattern to reduce spasticity and improve daily activities of living in spastic hemiplegic patients. Treatment was provided for 4 weeks. Modified Ashworth scale and Barthel index were recorded pre intervention and 2nd, 3rd and 4th weeks after intervention. MAS and BI pre and post scores improved in both groups. But, more improvement was observed in the passive stretching.¹⁵

Another study by Shamsoddini et al. (2014) examined the effect of Bobath, Brunnstorm and sensory integration activities compared with stretching and massage therapy to improve gross motor functional movements and reduce spasticity in cerebral palsy children. One group received Bobath and other interventions and other group received stretching and massage therapy. Results demonstrated significant improvement in Bobath group.¹⁶

A study was conducted by Joffe (2014) to compare the effect of Bobath technique and Proprioceptive Neuromuscular Facilitation technique in improving function in cerebral palsy children. Gross motor functional scale was used as an outcome measure pre and post treatment. The study concluded that there was no significant difference observed between Bobath and PNF groups for GMFCS scores. Both techniques were found equally effective for improving function in cerebral palsy children, with no technique found being superior to other.¹⁷

A study was conducted by Batra (2015) to modulate tone to promote motor development using a neurofacilitation of developmental reaction (NFDR) approach in children with neurodevelopmental delay. One group received Neurofacilitation of Developmental Reaction and in other group different approaches comprising of Bobath techniques, Rood inhibitory approach and PNF were applied. Modified Ashworth scale and Gross motor Functional Movements were used as outcome measures. Results demonstrated significant improvement in NFDR group as compared to Bobath group. Results are in agreement with the current study where Bobath has shown improvement in reducing tone.¹⁸

Limitation of Study: This study was conducted with a smaller sample size. This was a single centered study conducted and specifically patients with maximum grade 3 spasticity were included. So, the results can't be generalized to patients with grade 4 spasticity.

CONCLUSION

The result shows that there is no difference between the treatment group A and B. The results of both treatment groups of stretching exercise and the reflex inhibitory pattern are equally beneficial in reducing spasticity and improving ADLs in the cerebral palsy children.

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Conflict of Interest: None declared

Study Cost: Self-funded

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