Research Paper
Impact Factor: 3.567
Peer Reviewed Journal

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

EFFECTIVENESS OF PASSIVE STRETCHING AND FUNCTIONAL STRETCHING IN CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY

Vetrivel Raja.M.C.K* B.S.Santhosh kanna Renugadevi.T*****
**Physiotherapist, National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD), Chennai.*
***Lecturer (Physiotherapy),NIEPMD, Chennai.*
****Rehabilitation Officer, Early Intervention Services, NIEPMD, Chennai.*

Abstract
Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed tononprogressive disturbances that occurred in the developing fetal or infant brain. Diplegia is the most common form of spastic CP. The objective of this study is to find out the effectiveness of passive stretching and functional stretching in children with spastic diplegia. The study was conducted in Physiotherapy unit, NIEPMD. 20 children who satisfied with inclusion criteria were selected through stratified convenient sampling. The subjects were randomly divided into 2 groups. Group A received Physiotherapy program with passive stretching exercises. Group B received Physiotherapy program with functional stretching exercises. Each treatment session lasted for 30 – 45 minutes for 4 days/week for the total duration of 10 weeks. Spasticity was evaluated using modified ashworth scale for both groups before and after the intervention. The result showed that there was significant reduction in spasticity for both groups in favour of Group B. It was concluded that either functional or passive stretching program was useful to reduce spasticity in spastic diplegia. It was found that effect of functional stretching was comparatively more than passive stretching.

Keywords: Diplegia, Stretching, Functional, Modified Ashworth Scale, Cerebral Palsy, Spasticity.

Introduction

Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to nonprogressive disturbances that occurred in the developing fetal or infant brain. Diplegia is the most common form of spastic CP[1]. Spasticity is one feature of an upper motor neurone syndrome that may affect functionality, limit daily living activities and diminish quality of life in children with spastic Cerebral Palsy (CP).[1,2]Spasticity causes significant histologic changes, including decreased longitudinal growth of muscle fibres, decreased volume of muscle, change in muscle unit size and change in muscle fiber type. The most widely used scale for assessing spasticity is the Modified Ashworth Scale(MAS).The AS and MAS need no equipment; they are easily and commonly used in the clinic.[2,3]
Stretching exercises were developed to manage spasticity, including passive and active stretching, positioning, and isotonic and isokinetic stretching. The effect of stretching depends on tension applied to the soft tissue, duration, repetition in session, and daily frequency [5,6].

Passive stretching is widely used for individuals with spasticity in a belief that tightness or contracture of soft tissues can be corrected and lengthened. Evidence for the efficacy of passive stretching on individuals with spasticity is limited. It appeared that sustained stretching of longer duration was preferable to improve range of movements and to reduce spasticity of muscles around the targeted joints.[4]

The functional stretching exercises were designed to treat soft tissue flexibility problems during function training; stretching is applied in unique way depending on the concepts of overcorrection of deformities and prolonged stretching to utilize the inhibitory effect of stretching in improving function training during physical therapy treatment in order to optimize motor performance.[7]A systematic review of physical therapy treatment for CP demonstrated that stretching exercise for CP is limited because the mechanism and etiology of muscle contractures are not clear and clinical research evaluating the effectiveness of stretching techniques is inconclusive and cannot guide therapists' clinical decision making.[8]This study is aimed to investigate the effectiveness of passive stretching and functional stretching in spastic diplegic children.

Material and Methods

Study design and subjects

A randomised control trial design was adopted for this study. The subjects were selected from NIEPMD, who were attending physiotherapy unit for follow up services. The study was carried out from November 2012 to January 2013. The study included the children aged 5 – 14 years. Children who were ambulant with crouch gait pattern and were able to follow verbal instructions were selected for this study. Children were excluded who has unstable seizures, surgical intervention for spasticity, Botulinum toxin injections, IQ level deficit, multiple disabilities. 20 children who were satisfied inclusion criteria were selected for this study. The subjects were ramdomly assigned into two groups (Group A, Group B). Each group contains 10 children with spastic diplegia. Modified ashworth scale (MAS) was used to measure spasticity.

Treatment methods

Group A received the selected physiotherapy program. The program included passive stretching to hip flexors, hip adductors, hamstring, tendoachilles, trunk control and balance exercises. Passive stretching was applied for 20 – 30 sec with 20 – 30 sec rest, 3 – 5 times for each muscle witin pain limit followed by strengthening exercise for weak muscles.Group B received the same selected program and functional stretching instead of passive stretching. The functional stretching exercises were performed by training the children to be in functional positions like long sitting, walk stand and stride stand positions. For example, the children were trained to maintain walk standing and stride standing positions with gradual increase of distance between lower limbs with extended knees to stretch lower limb muscle.

Both groups received the treatment program for 30 – 45 minutes/session, weekly 4 days for the duration of 10 weeks.Each group was evaluated before and after 10 weeks of treatment.

Data analysis

Frequency of MAS score among both groups was calculated and pre test – post test comparison was done. Table depicts about the comparison of the frequencies of the MAS pre test and post test scores obtained by both groups A and B.

Table : Comparison between the frequency of MAS scores of Group A(Passive stretching) and Group B(Functional stretching)

S.No	Particulars	Frequency (Percentage)			
		Group A(Passive stretching)		Group B (Functional stretching)	
		Pre test	Post test	Pre test	Post test
1.	0 (No increase in muscle tone)	0	0	0	0
2.	1 (Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) moved in flex	0	4 (40%)	0	5 (50%)
3.	1+ (Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder(less than half) of the ROM)	4 (40%)	1 (10%)	4 (40%)	2(20%)
4.	2 (More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved)	3 (30%)	4 (40%)	3 (30%)	3 (30%)
5.	3 (considerable increase in muscle tone, passive movement difficult)	3 (30%)	1 (10%)	3 (30%)	0
6.	4 (affected part(s) rigid in flexion or extension)	0	0	0	0
Total		**10**	**10**	**10**	**10**

Figure 1. illustrates about the frequency of MAS scores of pre test and post test for Group A with passive stretching.

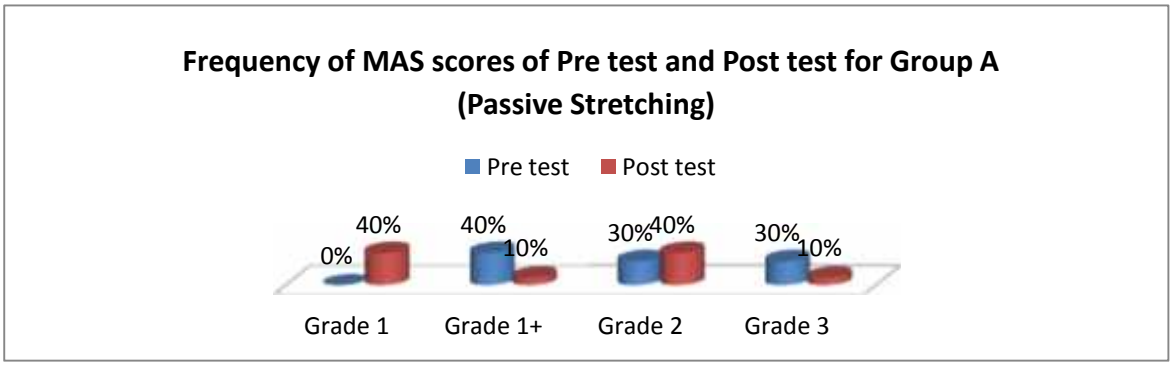
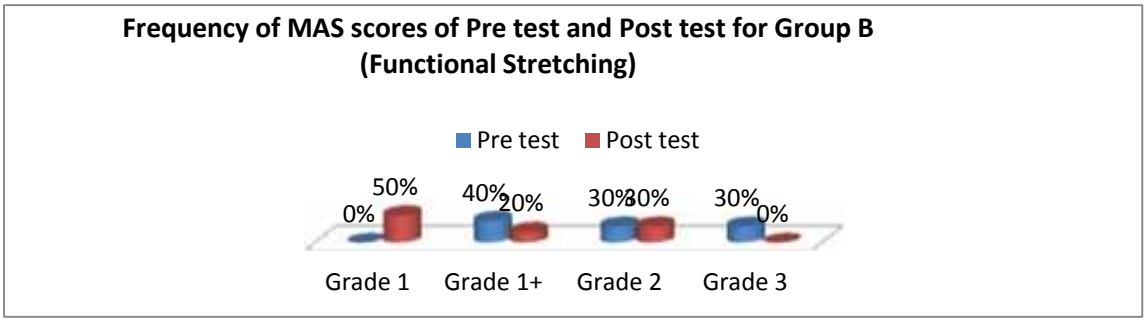


Figure 2 illustrates about the frequency of MAS scores of pre test and post test for Group B with functional stretching.



Result

50 % of the children have attained MAS Grade 1 through functional stretching, which was found to be only 40 % through passive stretching. 20 % of the children have attained Grade 1+ through functional stretching, which was found to be only 10 % through passive stretching. Thus, from the MAS Grade scores attained by the children in comparing the post test of the passive and functional stretching, it can be concluded that functional stretching is more effective than passive stretching in children with spastic diplegia.

Discussion

Diplegia is the most common form of spastic CP. It primarily affects bilateral lower extremities, resulting in issues with gait, balance and coordination. There is a large range in the level of motor involvement for children with diplegia. Gait deficits such as equinus and crouch gait posture tend to be the greatest concern for these children. The functional stretching exercises were designed to treat soft tissue flexibility problems during function training; stretching is applied in unique way depending on the concepts of overcorrection of deformities and prolonged stretching to utilize the inhibitory effect of stretching in improving function training during physical therapy treatment in order to optimize motor performance.[7]Spasticity was measured by Modified Ashworth Scale. The result of the study demonstrated that there was significant reduction in spasticity for both groups in favour of functional stretching program. Walk stand position stretched mainly hamstrings in forward leg and hip flexors and tendoachilles of behind leg, while stride stand position stretched hip adductor muscles. Teaching the functional skill with correction of abnormal motor pattern provides sensory stimulation. This leads to faster transferring of learned skill fronm the cognitive stage to the autonomous stage which in turn leads to performance of skill.

Limitation: Study was limited to small group of about 20 children.

Recommendations

This study has to be conducted in larger sample and even how these interventions support to increase Range of motion.

Conclusion

The results of this study support the use of either functional or passive stretching program to reduce spasticity. It was found that effectiveness of functional stretching for children with spastic diplegia was comparatively more than passive stretching.

References

1. Perin B: Physical therapy for the child with cerebral palsy. Pediatric Physical Therapy. Edited by: Tecklin JS. 1989, Philadelphia: JB Lippincott Company, 68-105.
2. Engsberg JR, Olree KS, Ross SA, Park TS: Quantitative clinical measure of spasticity in children with Cerebral Palsy. Arch Phys Med Rehabil. 1996, 77: 594-599. 10.1016/S0003-9993(96)90301-9.
3. Bohannan RW, Smith MB: Interrater reliability of a modified ashworth scale of muscle spasticity. Phys Ther. 1987, 67: 206-207.
4. Pin T[1], Dyke P, Chan M. The effectiveness of passive stretching in children with cerebral palsy.Dev Med Child Neurol. 2006 Oct;48(10):855-62.
5. A. Swierczyńska, K. Renata, and M. Jaworek, “Physical and other methods therapy of the spasticity in children,” Przegla d Lekarski, vol. 64, no. 11, pp. 974–977, 2007.
6. Y. N. Wu, M. Hwang, Y. Ren, D. Gaebler-Spira, and L. Q. Zhang, “Combined passive stretching and active movement rehabilitation of lower-limb impairments in children with cerebral palsy using a portable robot,” Neurorehabilitation & Neural Repair, vol. 25, no. 4, pp. 378–385, 2011.
7. Mohamed Ali Elshafey, Adel Abd-Elaziem, and Rana Elmarzouki Gouda. Functional Stretching Exercise Submitted for Spastic Diplegic Children: A Randomized Control Study. Rehabilitation Research and Practice, volume 201492014), Article ID 814279, 7 pages. http://dx.doi.org/10.1155/2014/814279
8. I. Franki, K. Desloovere, J. De Cat et al., “The evidence-base for basic physical therapy techniques targeting lower limb function in children with cerebral palsy: a systematic review using the International Classification of Functioning, Disability and Health as a conceptual framework,” Journal of Rehabilitation Medicine, vol. 44, no. 5, pp. 385–395, 2012.