

To Compare the Effectiveness of Sustained Slow Stretch and Pressure Application in Spastic Diplegic Cerebral Palsy

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Abstract

The most common kind of cerebral palsy, which affects between 70 - 80 % of those diagnosed, is spastic cerebral palsy. Treatment options include surgery, medicine, and physical therapy. This illness impairs the coordination and regulation of motor function. In turn, the spinal cord's and the nerve's responses are affected, resulting in the stiffness and spasticity of the muscles. The present study aimed to find the effectiveness of sustained slow stretch and pressure application in spastic diplegic cerebral palsy. Based on inclusion and exclusion criteria, a comparative experimental study was carried on. 20 samples were divided into interventional (n=10) and conventional groups (n=10) and the samples were sampled according to convenient sampling. Interventional group received an inhibitory pressure application of about 35 to 50mmHg for 20 minutes with the help of sphygmomanometer over the hamstring muscle for 4 weeks. Conventional group received sustained slow stretch over the hamstring muscle for about 20 minutes per session for 4 weeks and the results will be interpreted. There was only minor difference between the groups when compared statistically and was clinically significant. The result of this investigation allows us to draw the conclusion that both types of therapies, gradual continuous stretching and application of pressure, is effective.

Keywords

Spastic cerebral palsy, pressure application, sustained slow stretch

Introduction

Cerebral palsy is a lifelong disability that has an impact on the individual, their family, and their immediate community. Poor coordination, rigid muscles, weak muscles, and tremors are among symptoms of cerebral palsy, which affects children in their early years. Furthermore, symptoms may include seizures, hearing and speaking issues, tone reflexes, motor development and coordination, deformities in general, and static deformities such as joint contractures, which cause gait pattern abnormalities (Nelson & Grether 1999; Alagesan, & Shetty 2011). Although the majority of the causes are unknown, there are a number of risk factors that can be identified. (Bax et al. 2005). In Uganda and Egypt, the prevalence of CP was roughly 3.6 and 2.9 cases per 1000 children, respectively, while in the United States, Europe, and Australia, the prevalence was 1.8 to 2.3 cases per 1000 children (El-Tallawy et al.

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2014). Cerebral palsy disorders are further divided into types, such as spastic, ataxic, dyskinesia, mixed. Spastic cerebral palsy is the most frequent type of total cerebral palsy, accounting for more than 80% of all cases (Bangash et al. 2014).

Muscle spasticity is caused by a lesion of the upper moto neuron, which commonly results in muscle contractures that limit range of motion and induce muscle stiffness. The neuromuscular system may adjust muscle tone spontaneously when a muscle stretches. This stretch reflex modulation is critical for motion control and balance. Excessive and incorrect muscular activation occurs as a result, which can contribute to muscle hypertonia. Spasticity is the most prevalent motor disability in people with CP. Knee flexion deformity, induced by hamstring muscular contracture, is a frequent lower extremity disease in children with spastic diplegic CP. Crouching or jumping postures/gaits result from this flexion (Smith et al. 2011).

Patients with CP have been documented to exhibit changes in gait, balance, and force production. With CP, the knee extensor force declines, which can considerably limit the movement. In general, voluntary force output is reduced. There is also evidence that with CP, there is more cocontraction, which is also the simultaneous activation of a muscle and its antagonist. Contractures form in spastic CP muscles, limiting joint range of motion and making muscles appear functionally "short" (Mathewson & Lieber et al. 2015).

When a muscle is stretched for a long period of time, it is stretched to a mild tension rather than pain. The activation of muscle spindles or stretch receptors is prevented by using a slow, prolonged stretch. Muscles rest and do not contract when the spindles of the muscles are not engaged, promoting muscular lengthening (Halbertsma et al. 1999).

Splinting is mostly applied to knee contractures. In this study sphygmomanometer is used as a pressure splint. Splints are believed to function by opposing the spastic muscle action, applying a line of mechanical pull to favor rotation and decreasing spasticity through prolonged stretch and cutaneous stimulation from tight skin contact and stimulating mechanoreceptors to improve joint positioning sense and body awareness (Kumar & Senapoti 2012).

Methodology

Inclusion criteria included an age group of 3-12 years of spastic diplegic type, both male and female, children diagnosed by neurologist and pediatrician to be cerebral palsy subjects excluded was ambulatory patients, subjects not willing to collaborate in the study, mentally retarded. 20 children with the consent of their parents\ caregivers were included for the study.

All parent/caretakers received information regarding the study's findings and methodology. After receiving informed consent, the individuals were split into two groups using convenient sampling method. The hospital protocol of the subjects is not disturbed. Interventional group (GROUP-A) received an inhibitory pressure application of about 35 to 50 mmHg for 20 minutes with the help of sphygmomanometer over the hamstring muscle for 4 weeks under supervision. Conventional group (GROUP-B) received sustained slow stretch over the hamstring muscle for about 20 minutes per session for 4 weeks under supervision.

Pre and post-test values of tone was measured using Tardieu scale and the results were interpreted. Tardieu scale is used for measuring spasticity, the scale ranges from 1-5 where the spastic muscle was examined.

All parameters were averaged and subjected to mean and standard deviation. A paired t-test was conducted to ascertain whether there were any significant variations between pre- and post-test measurements, and an unpaired t-test was conducted to determine whether there was a significant difference between the two groups. A *p*-value of 0.0001 was utilized as the statistically significant cut-off.

Results and Discussion

From statistical analysis made with the quantitative data revealed that there is significant difference between slow stretch group and pressure application group. The post test mean value of slow stretch group was 2.80 and pressure application group was 1.80. This shows that there was only slight difference between the groups and it was statistically significant there was only minor difference between the groups when compared statistically and it was clinically significant. Hence both the groups are clinically significant, and it is reliable and applicable for the condition.

Table 1. Pre and post-test values slow stretch group

Subjects	Mean	SD	<i>t</i> value	<i>p</i> value
Pre-Test	3.80	1.23	3.873	0.0038
Post Test	2.80	0.79		

Table 2. Pre and post-test values of pressure application group

Subjects	Mean	SD	<i>t</i> value	<i>p</i> value
Pre-Test	3.70	1.16	8.1429	0.0001
Post Test	1.80	0.79		

The goal of the study was to determine whether slow stretch or pressure application using a sphygmomanometer, induces length over the hamstring muscle. A total number of 20 participants were included in the study with the consent of their parents\caregivers. The normal hospital protocol, i.e the ongoing treatment of the participant was not disturbed. The samples were divided into two categories interventional and conventional groups, interventional group (10) received slow stretch and the conventional group (10) received pressure application as a splint using sphygmomanometer. On statistical view in, Table 1, it was noted that pre-test mean value of 3.80 ± 1.23 and a post test value, mean value of 2.80 ± 0.79 which was statistically significant. In Table 2, it was observed that in pretest value, mean of 3.70 ± 1.16 and post-test value, mean of 1.80 ± 0.79 which was considered statistically significant. On comparison of two group's Table 3, post-test value a mean of 2.80 ± 0.79 (slow stretch group) a mean of

1.80±0.79 (pressure application group) which was noted to be statistically significant. It had only minor difference. For further treatment it can be suggested that more orthoses, splints along with sustained slow stretch would give great results.

Table 3. Post test values of slow stretch and pressure application groups

Subjects	Mean	SD	t-value	p-value
Pre-Test	2.80	0.79	2.8347	0.0110
Post Test	1.80	0.79		

To achieve proper motor development, prevent postural anomalies and deformities, and boost functional ability, several physiotherapy treatments have been used. The foundation for CP is based on neurodevelopmental techniques, which differ depending on the clinical kinds. The goal of treatment is to improve corrective and balancing reactions, reduce excessive muscular tone, and increase postural tone by preventing aberrant muscle tone (Valvono & Long, 1991; Semans et al., 1995).

Herbert et al (2002) have stated that, in healthcare approach, the idea is that stretching repeatedly over the course of weeks or months can increase muscle length and decrease stiffness by providing the necessary stretch stimulus that causes the muscle to lengthen.

Conclusion

From this result it has been concluded that the effect of sustained slow stretch and pressure application using a sphygmomanometer over hamstring muscle shows slight variation, hence both the treatments are applicable for treating the condition.

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Not applicable.

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