A Protocol on Effect of Cryotherapy and Myofascial release Technique in Calf Muscle Spasticity of Spastic Diplegic Cerebral Palsy Children

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Abstract

Background: Cerebral Palsy is been one of the developmental disorders affecting the infants brain. The most common form of Cerebral Paralysis being Spastic Cerebral Palsy affects children functionally and prevents their social functioning. Most of the physiotherapy interventions to treat spasticity are Cryotherapy, Myofascial Release technique. Cryotherapy is effective in reducing Spasticity and some suggest Myofascial Release Technique is also effective in reducing spasticity. **Aim:** To find out the effect of Cryotherapy and Myofascial Release Technique in calf muscle of Spastic Diplegic Cerebral Palsy Children. **Methods:** 30 Participants with Spastic Diplegia will be selected on the basis of inclusion as well as exclusion criteria. The patients will be evaluated using Modified Ashworth Scale and Modified Tardieu Scale for calf muscle prior to the treatment. The 30 participants will be divided into 3 groups. All the groups will receive Cryotherapy, MFR technique and combined effect of both the techniques separately. The patients will be again evaluated after the treatment by using MSA and MTS. **Conclusion:** This Study Concluded that there may be significant reduction in calf muscle spasticity in spastic diplegic cerebral palsy children by using combine effect of both Cryotherapy and Myofascial Release technique ore one of the method.

Keywords: *Cerebral palsy, Spastic Diplegia, Cryotherapy, Myofascial Release Technique, Modified Ashworth Scale, Modified Tardieu Scale.*

Introduction

Cerebral palsy (CP) identifies a category of chronic movement and posture developmental disorders that cause impairment of activity due to nonprogressive disorders in the development of the fetal or infant brain [(1)]. More than 15 million people worldwide have already been estimated to have cerebral palsy (CP). According to statistical reports of PSO, 1-2 cases per 1000 existing infants are reported with Cerebral Palsy. The incidence of Cerebral Palsy in various countries around the world though differs from 1.5 to 2.5 cases per thousand infants[(2)].

With about 70-80 percent of all diagnosed cases, the most common form of Cerebral Paralysis being Spastic Cerebral Palsy. It is the most leading cause to impairment in children, which prevents movement and thus suppresses the social functioning. Hence, that spasticity is one of the key challenges in the care of these children [(3)]. There are many approaches to treat spasticity, including treatment of medical, physical and surgical therapy. Important physiotherapy techniques for spasticity lowering include stretching, strengthening the antagonistic muscle, positioning, bracing and casting inhibitors, as well as exercises for weight bearing. Several physical therapies were widely used in combination with certain types of physical therapy, such as massage,

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myofascial release as well as **cryotherapy** [2].

Myofascial therapy is definable by "the facilitation of mechanical, neural and psycho physiological adaptive potential as interfaced by the myofascial system". Deep Myofascial Release is meant for reducing the barriers in the deepest parts in fascia. This will be obtained by trying to stretch the muscle flexible structures of a fascia, and increasing the viscosity of just the base tissue of a fascia. Myofascial release strategies is used in a broad range of conditions or diagnoses; pain, obstruction of movement, spasm, spasticity, neurological dysfunction, such as cerebral palsy, head and birth injury, cardiovascular problems, scoliosis[2].

Ice or cold therapy is a therapeutic procedure commonly used for treating various types of acute and chronic conditions. There is several tissue-based effects that is facilitated with cold therapy, including postinjury swelling and reduction of oedema, increased local circulation, decreased tissue-induced acute inflammation, reduced muscle spasm and pain suppression. Other result with cold therapy is a time-related spasticity reduction after administration of the ice for a while. Ice may be given to the body in various ways: indulging itself within cool water, using ice cubes or ice packs, or cooling sprays like ethyl chloride [4].

The Modified Ashworth Scale for subjects with neurological disorders is considered the main clinical indicator of muscle spasticity. The Modified Ashworth Scale is applicable to all muscles in the upper and lower body. The Modified Ashworth Scale indicates contradictory findings in terms of reliability and validity [2].

Tardieu scale is a spasticity measurement scale which takes into consideration passive movement resistance at slow along with fast speeds. Using Improved Tardieu Scale (Morris, 2002), the frequency of muscle response at accelerations and the degree with which the muscle resistance appears are shown in the spasticity calculation. R1 and R2 being determined by Modified Tardieu; R1 is degree of muscle reaction, and R2 is maximum PROM. At a very low velocity (V1) the full ROM angle (R2) is taken. The angle of muscle reaction (R1) is defined as the degree to which a catch either clonus is observed throughout a fast stretch (V3). R1 is deducted from R2, and it also implies the dynamic tone portion of the muscle. The Tardieu Scale is highly accurate and valid, varying from spasticity to contracture [2].

Aim: To find out the effect of cryotherapy and myofascial release technique in calf muscle spasticity of Spastic Diplegic Cerebral Palsy children.

Methodology

The study will be carried out in Ravi Nair Physiotherapy College and AVBRH, Sawangi (Meghe), Wardha after getting approval from Institutional Ethical Committee of Datta Meghe Institute of Medical Sciences (Deemed to be University). This Interventional study will be included 30 participants which will be selected randomly from Ravi Nair Physiotherapy College and AVBRH, Sawangi (Meghe), Wardha on the basis of the inclusion and exclusion criteria. The male and female Spastic diplegic CP children between the age group of 3-7 years with Modified Ashworth Scale 3 or less than 3 for both genders will be included. Those participants who have an orthopaedic operation before, given injection of botulinum toxin in the last 6 months, have endured serial casting during the last six months, taking oral or intrathecal myorelaxant drugs, with extreme limitations on the passive range of motion at the lower extremities, with certain cognitive and perceptional disabilities and contractures will be excluded. Before the Intervention the participants will be explained about the objectives and approaches of the study and a written informed consent forms will be signed by them. The participants will be divided into three groups i.e. 10 for group A receiving Cryotherapy, 10 for group B receiving Myofascial Release Technique and 10 for group C receiving combine effect of both Cryotherapy and Myofascial release technique (Fig./Table 1). The participants will be assessed pre and post treatment by using Modified Ashworth Scale (MAS) and Modified Tardieu Scale (MTS).

Procedure:

Selection of Patients visiting RNPC and AVBRH, Sawangi (Meghe), Wardha

30 subjects will randomly selected based on inclusion and exclusion criteria.

Assessment of Patients on Modified Ashworth Scale and Modified Tardieu Scale.

Patient will Receive Cryotherapy and Myofascial Release Technique.

Patients will be divided into three groups.

Group A (10 Patients) Group B (10 Patients) Group C (10 Patients)

(Cryotherapy) (Myofascial Release Technique) (Combine effect of both techniques)

Figure/Table 1. Showing the theme of conducting the current study.

DATA COLLECTION AND TREATMENT TOOLS:

A) Modified Ashworth Scale: The Modified Ashworth Scale for subjects with neurological disorders is considered the main clinical indicator of muscle spasticity. The Modified Ashworth Scale is applicable to all muscles in the upper and lower body. The Modified Ashworth Scale indicates contradictory findings in terms of reliability and validity.

The reliability of AS and MAS interrupters ranged from moderate to excellent, in accordance with ICC rankings. 0.54 to 0.87 AS ICC grades.

B) Modified Tardieu Scale: Tardieu scale is a spasticity measurement scale which takes into consideration passive movement resistance at slow along with fast speeds. Using Improved Tardieu Scale (Morris, 2002), the frequency of muscle response at accelerations and the degree with which the muscle resistance appears are shown in the spasticity calculation. R1 and R2 being determined by Modified Tardieu; R1 is degree of muscle reaction, and R2 is maximum PROM. At a very low velocity (V1) the full ROM angle (R2) is taken. The angle of muscle reaction (R1) is defined as the degree to which a catch either clonus is observed throughout a fast stretch (V3).R1 is deducted from R2, and it also implies the dynamic tone portion of the muscle. The Tardieu Scale is highly accurate and valid, varying from spasticity to contracture. Intrarater and interrater reliability of Modified Tardieu Scale is good to excellent.

C) MFR technique: Patients in prone position with a hold of 120 seconds, were given MFR for the calf muscle. Finger pads have been destined to fall into the middle part of calves to deliver the MFR. This would sustain the tissue softening for 120 seconds, and then extend laterally myofascial structures until the first fascial barrier. MFR will be given 15 minutes.

D) Cryotherapy: Cryotherapy to the calf muscle will be given with patient in prone position. The entire lower limb must be carefully and decently exposed and all children will be checked for the sensation of the skin to ensure that none of them has an impaired skin feel. Cold pack (Compress Reusable Cold Gel Pack) is applied to the skin of the treated region over a wet towel to prevent unnecessary local cooling (ice burning); dry toweling will keep this pack in place. Upon application, the skin underneath the cold pack is examined over one minute and check for adverse effects and sometimes irregular skin color changes. It would be repeated after 5 minutes, if the initial test did not reveal any adverse reactions. For 20 minutes, the cold pack will be applied apply, then remove and dry the skin.

After completing the treatment the immediate result will be seen and the participants will then be tested with Modified Ashworth Scale and Modified Tardieu Scale.

Statistical Analysis

The data will be collected and analyse utilizing inferential and descriptive statistics by using Chi-Square test and students 't' test (unpaired and paired) & software for analysis will be SPSS 22.0 version and Graph pad prism 6.0 version & level of significance will be considered as $P<0.05$.

Discussion

Cerebral palsy (CP) identifies a category of chronic movement and posture developmental disorders that cause impairment of activity due to nonprogressive disorders in the development of the fetal or infant brain [(1)].

Spasticity is defined as velocity dependent increased resistance to passive muscle stretch or as abnormal voluntary muscle activity associated with upper motor neurons paralysis [(8)]. The most common clinical type of CP observed was bilateral spastic CP [(9)]. Physiotherapy helps to facilitates developmental skills that are important to the daily life activities [(10)]. Physiotherapy treatment has a beneficial effect on the physical and functional status of children with CP[(11)].

This study protocol detail two physiotherapy intervention in patients with Spastic Diplegic Cerebral Palsy to reduce calf muscle spasticity. The Present study was conducted to see the effect of Cryotherapy and Myofascial release technique in calf muscle spasticity of Spastic Diplegic Cerebral Palsy Children.

The result showed that, all the treatment groups that is Cryotherapy and Myofascial release Technique alone and combined effect of Cryotherapy and Myofascial release technique show significant reduction in calf muscle spasticity. Result also shows that Combined effect of Cryotherapy and Myofascial release technique gives more effect in reducing calf muscle than Cryotherapy and Myofascial release technique alone.

Some Studies shows that and reported that Cryotherapy and wrapping procedures are combined to reduce lower limb spasticity in hemiplegic cerebral palsy children[12]. Cold therapy has been considered useful for spasticity reduction in upper motor neuron lesionand muscle retraining to promote muscle contraction[5].

Several research performed suggests that stretching is used alongside MFR in minimizing spasticity in spastic CP children rather than using stretching simply [6].

Sandra L, et al (2010) in their research, MFR was in some children with cerebral palsy benefits, including decreased spasticity, increased body symmetry range of motion. Myofascial release can be useful in reducing spasticity and improving the quality of life in cerebral palsy children [1].

For children with CP, a report showed the muscle tone measured with the Ashworth scale increases up to 4 years of age and then decreases up to 12 years of age [7].

Conclusion

This Study Concluded that there may be significant reduction in calf muscle spasticity in spastic diplegic cerebral palsy children by using combine effect of both Cryotherapy and Myofascial Release technique ore one of the method.

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References

1. Gazbare P, Pathare V, Palekar T. A Comparative Study On The Effect of Myofascial Release Over Muscle Energy Technique On Calf Muscle Tone in Spastic Diplegic Cerebral Palsy. :4.
2. Snehashri N Vaidya CK. Effectiveness of Myofascial Release on Spasticity and Lower Extremity Function in Diplegic Cerebral Palsy: Randomized Controlled Trial. Int J Phys Med Rehabil [Internet]. 2014 [cited 2020 Mar 6];03(01). Available from: https://www.omicsonline.org/open-access/effectiveness-of-myofascial-release-on-spasticity-and-lower-extremity-function-in-diplegic-2329-9096.1000253.php?aid=36973
3. Sipavicene S, Damasauskas A, Kliziene I, Krutulyte G, Karpaviciene A, Cesnaitis T. The Influence Of Cryotherapy On The Lower Limb Spasticity For Children With Cerebral Palsy. Balt J Sport Health Sci [Internet]. 2012 [cited 2020 Mar 6];2(85). Available from: https://journals.lsu.lt/baltic-journal-of-sport-health/article/view/287
4. Abd El-Maksoud GM, Sharaf MA, Rezk-Allah SS. Efficacy of cold therapy on spasticity and hand function in children with cerebral palsy. J Adv Res. 2011 Oct;2(4):319–25.
5. Saad S. Lower Limb Spasticity Control in Response to Cryotherapy and Wrapping Technique in Hemiplegic Children. 2008;13:8.
6. Bhalara A, Talsaniya D. Short Term Effect of Myofascial Release on Calf Muscle Spasticity in Spastic Cerebral Palsy Patients. Int J Health Sci. 2014;(9):7.
7. Hägglund G, Wagner P. Development of spasticity with age in a total population of children with cerebral palsy. BMC Musculoskelet Disord. 2008 Dec;9(1):150.
8. Shamsoddini A, Amirsalari S, Hollisaz M-T, Rahimnia A, Khatibi-Aghda A. Management of Spasticity in Children with Cerebral Palsy. Iran J Pediatr. 2014;24(4):7.
9. Gowda VK, Kumar A, Shivappa SK, Srikanteswara PK, Shivananda, Mahadeviah M S, Govindraj M, Ramaswamy P. Clinical profile, predisposing factors, and associated co-morbidities of children with cerebral palsy in South India. J Pediatr Neurosci 2015;10:108-13

10. Rana M, Upadhyay J, Rana A, Durgapal S, Jantwal A. A Systematic Review on Etiology, Epidemiology, and Treatment of Cerebral Palsy. Int J Nutr Pharmacol Neurol Dis 2017;7:76-83

11. Sharma R, Sinha AG. Impact of physiotherapy service utilization on physical and functional status of children with cerebral palsy in Jalandhar, Punjab, India. Chrismed J Health Res 2016;3:173-80

12. Chanan Vivek Goyal et al. Lordoscoliosis and hyperlordosis in quadriplegic cerebral palsy. Pan African Medical Journal. 2020;36(242). 10.11604/pamj.2020.36.242.24971.