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"EFFECT OF MYOFASCIAL RELEASE ON SPASTIC MUSCLES AND FUNCTIONAL OUTCOME IN CHRONIC STROKE SUBJECT"- A RANDOMIZED CONTROL TRIAL

Physiotherapy

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ABSTRACT

Background: Stroke is damage to the brain from interruption of blood supply causing altered sensations, reduced muscle power and tone, reduced joint mobility and stability, balance, gait impairment leading to plegia or paresis. Hemiplegia causes paralysis of one side of the body leading to inactivity, impaired movements, posture and gait pattern. Spasticity is increase in tonic stretch reflexes with exaggerated tendon jerks. Myofascial release is a manipulative treatment that helps reduce fascial tension.

Purpose: The aim of study was to find out the effectiveness of Myofascial Release on spasticity of hamstrings, calf, adductors and biceps muscles in spastic hemiplegic subject.

Methodology: A total 30 participants of middle aged group were diagnosed with chronic spastic hemiplegia. They were divided in two groups by randomized sampling, of which 15 (controlled group) and 15 (experimental group) who were treated with MFR and conventional treatment. Pre and Post treatment measures of Modified Ashworth Scale, Modified Tardieu Scale, Functional Independence Measure and Berg Balance Scale were evaluated. MFR was given to hamstrings, calf, adductors and biceps muscles for 5 days a week for 12 weeks.

Result: MFR and conventional physiotherapy treatment had an excellent effect on the experimental group as compared to the controlled group.

Conclusion: The current study concludes that MFR along with conventional treatment has significant effect in reducing spasticity and improving the functional activities.

KEYWORDS

Hemiplegia, Myofascial release, Spasticity, Stroke.

INTRODUCTION

Stroke is outlined as injury to the brain from interruption of its blood provided. A sudden, non-convulsive loss of medical specialty perform because of ischaemic injury or intracranial tube event.[1] This can cause any dysfunction of the full body or partial body. There's lack of awareness about few specific deficit in sensory, perceptual, motor, affectional or psychological feature functioning because of a brain lesion. This self awareness deficit has been studied primarily in stroke subjects.[2]

Hemiplegia is a condition caused because of brain injury causing dysfunction of 1 aspect of the body. This definition notably applies to the acute part of the tube insult and doesn't embody less recent strokes.[3] This leads to weakness, muscle problem and stiffness in muscles and joints resulting in jerkiness that results in inactivity and impaired movements, posture and gait pattern.

Spasticity, a motor disorder that is characterized by speed dependent increase in tonic unconditioned reflexes with exaggerated connective tissue jerks ensuing from hyper excitability of the stretch reflex.[4] Spasticity is one amongst the foremost common and doubtless disabling and vexatious complications moving people with neural structure lesion (SCL). Roughly, seventieth of persons with SCL are spastic, one year once injury, and around 1/2 these receive antispastic medication.[5]

The physical options of spasticity or jerkiness primarily are pain, involuntary movements, abnormal postures and resistance to movement that results in secondary issues like amendment in muscle length that causes the event of contractures and deformity.[6] The main 3 aims of treating this area unit is mainly as follows; to boost perform, to scale back the chance of complication and to eliminate pain.

There area unit alternative ways in numerous aspects to treat spasticity or jerkiness, that embody the medical, surgical and therapy management. The common physical therapy approaches to scale back spasticity or jerkiness area units stretching, strengthening of the antagonistic muscles, positioning, inhibitive casting and bracing, PROM, vibrating stimulation and weight bearing exercises. Some manual techniques like massage, stretching, myofascial release technique (MFR), and accupressure are used in conjunction with different therapy techniques.

MFR technique or medical aid may be outlined as "the facilitation of mechanical, neural and psychotic person physiological adaptation as interfaced by the myofascial system". It's a secure low load stretch that helps spasticity or emotional jerkiness, muscle shortness and tightness. MFR techniques may be utilized in alternative ways like manually or with tools like ball, rollers, sticks etc. Self-myofascial release technique (SMFR) may be a style of muscle unleashing performed by the individual themselves instead of by a practitioner, usually employing a tool.[8]

An important facet of implementing evidence-based study, observes the assessment of objective and person-centered outcomes. Additionally, the employment of outcome measures permits for increased communication between role players at intervals, the sector of rehabilitation as these outcome measures area unit standardized.[9]

Commonly used medical specialty outcome measures were originally developed in high-income countries and valid to be used are Berg Balance Scale, Functional Independence measure scale.[9] Some of the used outcome measures embody Modified Ashworth Scale and Modified Tardieu Scale. They varied different outcome measures however these four are globally additional, reliable and valid.

Contrary to current beliefs, we have a tendency to hypothesized that a 12-week program of standard task-oriented exercise in conjunction with unleash to the fascia, would improve the extremities muscle strength, cut back spastic reflexes, and normalize the symmetry in motor output between limbs in chronic handicapped person stroke subjects.[10]

There are primarily based practices and varied papers and articles on manual MFR technique for reducing spasticity or jerkiness. However relatively lesser for chronic stroke in adults for multiple muscles. Therefore the aim of this study is to place forth the benefits of MFR technique for each higher and lower limb muscles that area units additional, normally affected within the chronic stroke subject.

Previously several studies has been done that showed positive leads to the topic. The treatment enclosed stretching, massage, MFR and plenty of different techniques and therapies.

Prolonged muscle stretching was given in five to six of the studies to striated muscles. Passive stretching and MFR was enclosed in a number of the studies to encephalopathy, CP subjects.[11,12,13]

A study conducted by Barnes et al. used MFR, myofascial unleash treatments in adults in an effort to revive girdle symmetry, and their

results indicated that this medical aid had the potential to be effective in facilitating an amendment in girdle position toward symmetry. [14]

There were few studies done to analyze the result of MFR on the muscle's elastic properties, stiffness and vary of motion with spasticity. None of the studies mentioned the sole result only of MFR on stroke subject.

2. METHODOLOGY:

A study was done between 14th December 2020 to 6th March 2021. A total 30 participants including male and female of middle age group were diagnosed with chronic spastic hemiplegia. The subjects were taken from Nootan General Hospital, Visnagar. They were selected on the basis of the inclusion and exclusion criteria and were divided in two groups by randomized sampling. Out of which 15 were Group A (experimental group) and 15 were Group B (controlled group). The Group A was treated with MFR and conventional treatment for 5 days a week for 12 weeks. MFR was specifically given to the biceps, hamstring, calf and adductor muscles. The group B was given no treatment as it was the controlled group. Pre and Post treatment measures and data of Modified Ashworth Scale (MAS), Modified Tardieu Scale (MTS), Functional Independence Measure (FIM) and Berg Balance Scale (BBS) were evaluated and mentioned.

RANDOMISATION CHART

ASSESSED FOR ELIGIBILITY (n=43)

Excluded (n=13)

RANDOMISED (n=30) by toss method

EXPERIMENTAL GROUP	CONTROLLED GROUP
n=15 (male=9 female=6)	n=15 (male= 7 female=8)
PRE-ASSESSMENT At day 1(n=15)	PRE-ASSESSMENT At day 1(n=15)
POST ASSESSMENT At 12 weeks (n=15)	POST ASSESSMENT At 12 weeks (n=15)
FOLLOW UP At 14 weeks (n=15) (Reason: regular at OPD)	FOLLOW UP At 14 weeks (n=00) (Reason: unreachable)

OUTCOME MEASURE:

The primary outcome measures used were, Modified Ashworth Scale[15,16,17] and Modified Tardieu Scale[18,19,20]. These scales were used to measure the spasticity of the muscles.

The secondary outcome measures used were, Functional Independence Measure[21,22,23] and Berg Balance Scale[24,25,26]. These scales were used to measure the functional activity of the subjects.

PROCEDURE:

Ethical approval was granted from the institutional ethical committee and the subjects gave an informed written consent signed. All the 30 subjects demographic data, physical examination were recorded. The Myofascial release technique was first and foremost demonstrated to the subjects. All the subjects were known and willingly signed the consent form. The subject's position was supine on the plinth and the subject were made to relax. The MFR Technique along with conventional treatment was given to the calf, hamstrings, adductors, and biceps brachii muscles for 5 days a week for 12 weeks.[27] Pre and post treatment data is taken and statistical analysis is also performed and mentioned. The conventional treatment will mainly include strengthening, weight bearing and functional activities. The intervention is explained and mentioned in the figures below, Fig.1,2,3,4, which shows MFR to calf, adductor, hamstring and bicep muscles.

Fig. 1: MFR to Calf

Fig.2: MFR to Adductors

Fig.3: MFR to Hamstring

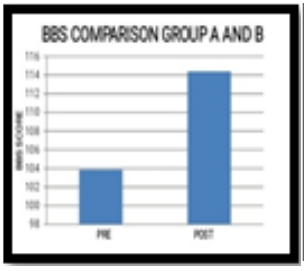
Fig.4: MFR to Bicep

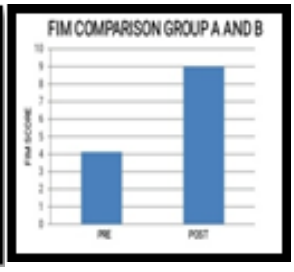
RESULT:

Total 30 subjects participated in this study, data analysis of all the 30 subjects had been carried out as per the procedure. All the test and data showed significant difference in the pre and post outcomes and data. The p value was justified as <0.01 for all the data. This study revealed that, 50% of the experimental group who received MFR and conventional treatment had an excellent improvement in spasticity. The rest 50% were controlled group and hence they did not received the treatment and did not had an appropriate improvement.

Table 1: Comparison of BBS and FIM between groups (paired t-test)

Outcome measure	(Mean ± SD)		P Value		T Value	
	Pre	Post	Pre	Post	Pre	Post
BBS	-0.20 ± 1.97	11.53 ± 5.75	0.700	<0.001	-0.393	7.761
FIM	-1.53 ± 5.66	9.00 ± 5.18	0.312	<0.001	-1.048	6.726



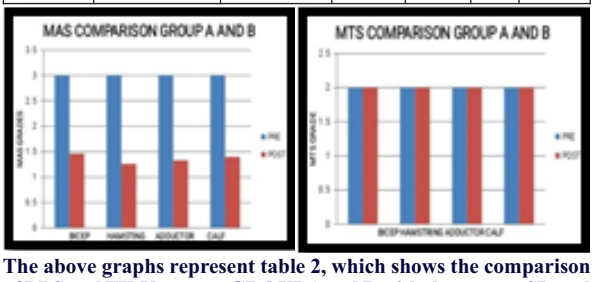


The above graphs represent table 1, which shows the comparison of BBS and FIM between GROUP A and B with the mean ± SD and significant value of p < 0.01 in GROUP A and the value of p = 1 in GROUP B, which shows significant effect in GROUP A as compared to GROUP B.

Table 8: Comparison of MAS and MTS between groups (paired t-test)

Bicep						
Outcome Measure	(Mean ± SD)		P Value		T Value	
	Pre	Post	Pre	Post	Pre	Post
MAS	3.00 ± 0.00	-1.46 ± 0.63	1.00	<0.001	0.00	-8.887
MTS	2.00 ± 0.00	2.00 ± 0.00	-	-	-	-
Hamstring						
Outcome Measure	(Mean ±SD)		P Value		T Value	
	Pre	Post	Pre	Post	Pre	Post

MAS	3.00 ± 0.00	-1.26 ± 0.59	1.00	<0.001	0.00	-8.264
MTS	2.00 ± 0.00	2.00 ± 0.00	-	-	-	-
Adductor						
Outcome Measure	**(Mean ± SD)**		**P Value**		**T Value**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
MAS	3.00 ± 0.00	-1.33 ± 0.61	1.00	<0.001	0.00	-8.367
MTS	2.00 ± 0.00	2.00 ± 0.00	-	-	-	-
Calf						
Outcome Measure	**(Mean ± SD)**		**P Value**		**T Value**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
MAS	3.00 ± 0.00	-1.40 ± 0.50	1.00	<0.001	0.00	-10.693
MTS	2.00 ± 0.00	2.00 ± 0.00	-	-	-	-



The above graphs represent table 2, which shows the comparison of BBS and FIM between GROUP A and B with the mean ± SD and significant value of p < 0.01 in GROUP A and the value of p = 1 in GROUP B, which shows significant effect in GROUP A as compared to GROUP B.

DISCUSSION:

The present study was carried out to find out effectiveness of myofascial release along with conventional treatment in the chronic stroke subjects with spasticity. The Bicep Brachii, Calf, hamstring and adductor muscles were considered for the study. as the subjects usually have spasticity in these muscles. A total 30 subjects of middle age group; i.e., 36-55 years old male and female with spasticity in the mentioned muscles were selected for the study as per the inclusion and exclusion criteria. They were divided into 2 groups with 15 subjects each; of which one was the experimental group and the other was the controlled group. They were all evaluated at the initial day and then after 12 weeks of intervention period.

We found significant markdown in the symptoms of the experimental group then the controlled group. This could be due to improved functional activity, reduction in spasticity and improvement in muscle strength. We reviewed a few articles related to the current study, of which 99% of the article's states that MFR has significant effect in reducing spasticity and also helps improving the functional and motor activities.

According to Bhalara A et al. and Talsaniya D et al., they stated that stretching alone and stretching along with MFR showed significant improvement in R1 value of MTS, not in R2 value of MTS and MAS 4 weeks after intervention.[28]

Furthermore, Schleip et al. described the relationship of fascia and autonomic nervous system, saying that stimulation of mechanoreceptors responsive to manual pressure lowered sympathetic tonus resulting in decreased spasticity and stated a significant effect due to MFR.[29]

Overall, the reviews stated and showed that, this low load sustained stretch gradually over time, allow the myofascial tissue to elongate and relax, thus allowing increased range of motion, flexibility and decreased pain. The current study was used to find out the effect of MFR along with conventional treatment in chronic stroke subjects of middle age group.

Current study proved that the MFR and conventional treatment had significant effect in reducing spasticity and improving functional activities of the subjects (p value < 0.01) The treatment had significant effect in group A (experimental group) as compared to group B (controlled group).

However; in current study we are aware about limitations and inability of the cause and effect relationship.

CONCLUSION:

The current study concludes that MFR along with conventional treatment has a significant effect in reducing spasticity and improving the functional activities. MFR had a significant effect in reducing the spasticity of the experimental group as compared to the controlled group. The conventional treatment had an excellent effect in strengthening and improving the functional activity in the experimental group as compared to the controlled group. Further, for the ease of the application, MFR can be a viable treatment option for the chronic stroke subjects.

REFERENCES:

1) Cuomo O, Rispoli V, Leo A, Politi GB, Vinciguerra A, et al. (2013) The Antiepileptic Drug Levetiracetam Suppresses Non-Convulsive Seizure Activity and Reduces Ischemic Brain Damage in Rats Subjected to Permanent Middle Cerebral Artery Occlusion. PLoS ONE 8(11): e80852. doi:10.1371/journal.pone.0080852
2) M. D. Orfei, R. G. Robinson, G. P. Prigatano, S. Starkstein, N. Rüsch, P. Bria, C. Caltagirone, G. Spalletta, Anosognosia for hemiplegia after stroke is a multifaceted phenomenon: a systematic review of the literature, *Brain*, Volume 130, Issue 12, December 2007, Pages 3075–3090, https://doi.org/10.1093/brain/awm106
3) C. M. Fisher, Md**;** H. B. Curry, Md, Pure Motor Hemiplegia Of Vascular Origin Arch Neurol. 1965;13(1):30-44. Doi:10.1001/Archneur.1965.00470010034005
4) Bovend'Eerdt TJ, Newman M, Barker K, Dawes H, Minelli C, Wade DT. The effects of stretching in spastic-ity: a systematic review. Archives of physical medicine and rehabilitation. 2008 Jul 1;89(7):1395-406.
5) Biering-Sørensen, F., Nielsen, J. & Klinge, K. Spasticity-assessment: a review. Spinal Cord 44, 708–722 (2006). https://doi.org/10.1038/sj.sc.3101928
6) Haselkorn J, Loomis S. Multiple Sclerosis and Spasticity. Phys Med Rehabil Clin N. 2005; 16:467-481.
7) Vijay Kage, Pavan Joshi. Immediate Effects Of Triplanar Myofascial Release Vs Suboccipital Release In Subjects With Non-Specific Neck Pain: A Clinical Trial. Int J Physiother Res 2017;5(3):2056-2060. Doi: 10.16965/Ijpr.2016.204
8) Nabila Schoonraad, Outcome measures validated for use in stroke rehabilitation in low- and middle-income countries: A systematic review., Stellenbosch University, March 2020.
9) Gerald V. Smith, Kenneth H. C. Silver, Andrew P. Goldberg, and Richard F. Macko, "Task Oriented" Exercise Improves Hamstring Strength and Spastic Reflexes in Chronic Stroke Subjects,Stroke,Volume 30, Issue 10, October1999, Pages 2112-2118 https://doi.org/10.1161/01.STR.30.10.2112
10) Al-Zamil ZM, Hassan N, Hassan W. Reduction of elbow flexor and extensor spasticity following muscle stretch. Journal of Neurologic Rehabilitation. 1995 Sep;9(3):161-5.
11) Yeh CY, Tsai KH, Chen JJ. Effects of prolonged muscle stretching with constant torque or constant angle on hypertonic calf muscles. Archives of physical medicine and rehabilitation. 2005 Feb 1;86(2):235-41.
12) Hale LA, Fritz VU, Goodman M. Prolonged static muscle stretch reduces spasticity. S Afr J Physiother 1995; 51:3-6
13) Aditi Hari Bhilwade, Suvarna S. Ganvir. Effect of Stretching to Re-lieve Spasticity in Neurological Conditions- A Systematic Review . VIMS J Physical Th. Jun 2020;2(1):3-12
14) Mark F. Barnes, Journal of Bodywork and Movement Therapies (1997) 1(4), 231-238
15) Ansari NN, Naghdi S, Younesian B, Shayeghan M (2008) Inter and intrarater reliability of the Modified Modified Ashworth Scale in subjects with knee extensor poststroke spasticity. Physiotherapy theory and practice 24: 205-213.
16) Tardieu G, Shentoub S, Delarue R (1954) A la recherché d'une technique de mesure de la spasticite. Rev Neurol 91: 143-144.
17) Tardieu G, Rondont O, Mensch J, Dalloz JC, Monfraix C, et al. (1957) Responses electromyographiques a l'etirement musculaire chezl'homme normal. Rev Neurol 97: 60-61.
18) Patrick E, Alda L (2006) The Tardieu Scale differentiates contracture from spasticity whereas the Ashworth Scales is confounded by it. Clinical Rehabilitation 20: 173-182.
19) Russell D, Rosenbaum P, Gowland C, Hardy S, Lane M, et al. (1993) Gross Motor Function Measure Manual (2nd edn). Hamilton: McMaster University.
20) Finch E, Brooks D, Stratford PW, Mayo NE (2002) Physical rehabilitation outcome measures: A guide to enhanced clinical decision making (2nd edn). Hamilton: B. C. Decker.
21) Pamela M. Smith, Sandra Bennett Illig, Roger C. Fielder, Byron B. Hamilton, Kenneth J. Ottenbacher, Intermodal agreement of follow-up telephone functional assessment using the functional independence measure in subjects with stroke, Archives of Physical Medicine and Rehabilitation, Volume 77, Issue 5, 1996, Pages 431-435, ISSN 0003-9993.
22) Wieslaw J. Oczkowski, Susan Barreca, The functional independence measure: Its use to identify rehabilitation needs in stroke survivors, Archives of Physical Medicine and Rehabilitation, Volume 74, Issue 12, 1993, Pages 1291-1294, ISSN 0003-9993.
23) Marianne Beninato, Kathleen M. Gill-Body, Sara Salles, Paul C. Stark, Randie M. Black Schaffer, Joel Stein, Determination of the Minimal Clinically Important Difference in the FIM Instrument in Subjects With Stroke, Archives of Physical Medicine and Rehabilitation, Volume 87, Issue 1, 2006, Pages 32-39, ISSN 0003-9993, https://doi.org/10.1016/j.apmr.2005.08.130.
24) Diana L Kornetti, Stacy L Fritz, Yi-Po Chiu, Kathye E Light, Craig A Velozo, Rating scale analysis of the Berg balance scale, Archives of Physical Medicine and Rehabilitation, Volume 85, Issue 7, 2004, Pages 1128-1135, ISSN 0003-9993.
25) Blum L, Korner-Bitensky N. Usefulness of the Berg Balance Scale in stroke rehabilitation: a systematic review. Phys Ther. 2008; 88:559–566.
26) Rosenfeld J., Jackson C.E. (2014) Outcome Measures and Clinical Assessment Instruments in Neuromuscular Disease. In: Katirji B., Kaminski H., Ruff R. (eds) Neuromuscular Disorders in Clinical Practice. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-6567-6_15
27) Kumar C, Vaidya SN (2014) Effectiveness of Myofascial Release on Spasticity and Lower Extremity Function in Diplegic Cerebral Palsy:Randomized Controlled Trial. Int J Phys Med Rehabil 3: 253. doi:10.4172/2329-9096.1000253
28) Bhalara A, Talsaniya D. Short term effect of myofascial release on calf muscle spasticity in spastic cerebral palsy subjects. Int J Health Sci Res. 2014;4(9):188-194.
29) Amit Abraham, Eric Franklin, Carla Stecco, Robert Schleip, Integrating mental imagery and fascial tissue: A conceptualization for research into movement and cognition, Complementary Therapies in Clinical Practice, Volume 40, 2020, 101193, ISSN 1744-3881, https://doi.org/10.1016/j.ctcp.2020.101193.