

ORIGINAL ARTICLE

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A COMPARATIVE STUDY BETWEEN THE IMMEDIATE EFFECTS OF TENDINOUS PRESSURE TECHNIQUE VERSUS MYOFASCIAL RELEASE IN THE REDUCTION OF SPASTICITY: A CROSS OVER STUDYMiss. Dhanashri N. Marathe¹, Dr. Chetana Kunde², Dr. Suvarna Shyam Ganvir(PhD)³¹Intern²Asst Professor, DVVPF'S College of Physiotherapy.³HOD and Professor, Department of Neurophysiotherapy, DVVPF's College of Physiotherapy, Ahmednagar**ABSTRACT:**

BACKGROUND- Spasticity following stroke is often associated with pain, soft tissue stiffness, decreased quality of life, increased treatment cost, and increased caregiver burden. Myofascial release is a new approach to relieve spasticity. It may act in the future as a facilitator and intensifier of treatment for a more consistent effect. Also, Inhibition techniques are used in spastic patients. In tendinous pressure, manual pressure is applied to the tendinous insertion of the muscle or across long tendons produces an inhibitory effect. **AIM-** To find the immediate effect of tendinous pressure technique versus myofascial release in the reduction of spasticity. **METHOD-** The study was conducted in Vikhe Patil Hospital, Physiotherapy OPD, and Phuntamba Stroke Center. It was a cross over study conducted on spastic stroke patients using a purposive sampling method. Twenty-seven patients were included in the study. The duration of the study was of 6 months. Modified Tardieu scale was the outcome measure used at pre, and post-treatment measurement, and the subject was treated with both the techniques with 2 hours of the interval to see which of the technique is more beneficial for reducing spasticity. **RESULT-** Result of within-group analysis of pre and post-treatment measurement of myofascial release showed clinical and statistical significance, but muscle reaction testing (X) showed no significant difference in MTS whereas the result of within-group analysis of pre and post-treatment measurement, and muscle reaction testing (X) of tendinous pressure showed clinical and statistically significant improvement in MTS. The result of between the post-treatment measurement and muscle reaction testing of myofascial release and tendinous pressure showed no significant difference. In contrast, muscle reaction testing showed a significant difference in MTS of both the techniques. **CONCLUSION-** So the conclusion can be made that tendinous pressure is more effective as compared to MFR in reducing the spasticity of stroke patients. .

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INTRODUCTION

Stroke is one of the leading causes of mortality and morbidity in adults in most of the countries^[1,2,3]. Spasticity is common, but not an inevitable condition, in patients with stroke. Spasticity following stroke is often associated with pain, soft tissue stiffness, decreased quality of life, increased treatment cost, and increased caregiver burden.^[4]

The incidence of spasticity among paretic patients has been reported to be 27% at one month, 28% at three months, 23% and 43% at six months, and 34% at 18 months after stroke.^[5,6]

The onset of spasticity is highly variable in the post-stroke period, and the studies have shown that spasticity develops and peaks at 1-3 months after stroke, although the neuronal components of spasticity peak at three months after stroke, the muscular through an over activation of spindle afferents, and thus, increase spasticity. ^[7]

Spasticity varies from being a clinical sign with no functional impact to being a gross increase in tone interfering with mobility, transfers, and personal care. Untreated, it can cause shortening of muscles and tendons, leading to contractures.

The tone is the resistance of resting muscle to passive movements. Normal tone results from the viscoelastic properties of muscle and neural drive from spinal motor neurons. Viscosity is the resistance of tissue to deforming forces, whereas elasticity is the ability of a tissue to return to its original position after being stretched. Viscosity resists stretch; elasticity pulls the muscle back to its original position. When stretched, muscle spindle Ia afferents excite spinal motor neurons; this results in contraction of agonist and relaxation of antagonist's muscles. This stretch reflex is modulated by supraspinal and spinal pathways, activity, posture, and sensations. Increased tone initially results from the excessive neural drive of spinal motor neurons, and later is partly because of visco-elastic changes in immobilized muscles and joints. In spasticity, motor neurons respond to stretch at a lower threshold than normal, with long discharges as the plateau potentials. This results from a change in the balance between inhibitory and excitatory inputs to spinal motor neurons in favour of excitation. After

immobilization, connective tissue, and fat can replace sarcomeres, left unchecked, this process can end in contractures and permanent loss of joint mobility. ^[8]

Myofascial therapy can be defined as “the facilitation of mechanical, neural, and psychophysiological adaptive potential as interfaced by the myofascial system”^[9]. Myofascial release is a new approach to relieve spasticity^[10]. It involves the treatment of neuromuscular somatic unit as a whole and release of somatic dysfunctional related imbalances, which affect a discrete region, vertebral level, an entire limb, or the whole body. MFR (Myofascial Release) may act in the future as a facilitator and intensifier of treatment for a more consistent effect.^[11]

Roods devised a technique developed for facilitation and inhibition of movement through various stimuli in the year 1950. Patients with neurologic dysfunction may have muscle tone ranging from hypotonic to hypertonic. Inhibition techniques are mainly used in spastic patients. In tendinous pressure, manual pressure is applied to the tendinous insertion of the muscle or across long tendons produces an inhibitory effect^[12].

Tardieu is a scale for measuring spasticity that takes into account resistance to passive movement at both slow and fast speed. The quality of the muscle reaction at specified velocities and the angle at which the muscle reaction occurs are incorporated into the measurement of spasticity using the Modified Tardieu Scale (Morris, 2002). Modified Tardieu describes R1 and R2; R1 is the angle of muscle reaction, R2 is the full PROM. The angle of full ROM (R2) is taken at a very slow speed (V1). The angle of muscle reaction (R1) is defined as the angle in which a catch or clonus is found during a quick stretch (V3). R1 is then subtracted from R2, and this represents the dynamic tone component of the muscle. The Tardieu Scale differentiates spasticity from contracture and having had good reliability and validity^[13].

As compared to medical and surgical treatment for spasticity, MFR (Myofascial Release) and tendinous pressure techniques are less expensive, safe, and have very few side effects. So, this study means to compare the effectiveness of these two methods- tendon pressure versus myofascial release- in the reduction of spasticity and to apply the

results in making the treatment of Stroke patients more effective and affordable.

The main purpose of the study is the treatment of spasticity that requires a specifically focused approach, which is the basic principle of myofascial release and tendon pressure. However, the immediate effect of both these approaches has not been studied in the past. Establishing this evidence will help to structure a more targeted exercise program in patients with neurological dysfunction. Hence this study is taken up to investigate the immediate effect of myofascial release and tendinous pressure in a cross over study design, which will facilitate choosing a better treatment option to hasten functional recovery as also so that spasticity doesn't interrupt in between the conventional treatment

METHODOLOGY

The study was conducted in Vikhe Patil Hospital, Physiotherapy OPD, and Phuntamba Stroke Center. It was a cross over study conducted on spastic stroke patients using a purposive sampling method. Twenty-seven patients were included in the study. Both male and female subjects diagnosed as stroke those who had spasticity in biceps and with intact cognition were included in the study. Patients who received pharmacologic drugs for reducing spasticity, frequent epilepsy, and hypersensitivity of skin were excluded from the study. Ethical clearance from Dr. Vitthalrao Vikhe Patil College of Physiotherapy was taken. After getting informed consent from the patients, all the selected subjects underwent a pre treatment assessment for spasticity and range of motion using the Tardieu rating scale in which the patient's position was in supine lying and therapist position was sitting in the side on the patient. The measurements were taken, and the grade of pre-treatment was noted. The subject was treated with any one of either technique for myofascial release the pressure was given for 120 seconds with the cross hand method using an ulnar border of therapist's hands were allowed to sink into the central portion of the biceps allowing the tissue to soften to release the fascial barrier. Again the position was held till the release of barrier and procedure was continued to follow the tissue through each subsequent barrier (Fig 1). Immediately again, the modified Tardieu scale was taken to see the difference between pre and post-treatment in

the technique that was used, and the grade of post-treatment was noted. Later after 2 hours of the interval, as the patient gets relaxed and spasticity reappears second technique was used on the same subject. For tendon pressure, four sets of 30 seconds were given (Fig 2). Again the same procedure was carried out using a modified Tardieu scale. Finally, the comparison was made on which technique is more beneficial and effective. The study was conducted for six months of duration in which the outcome measure was Modified Tardieu scale.



Fig 1: Myofascial release over biceps muscle.



Fig 2: Tendinous pressure over biceps muscle.

STATISTICAL ANALYSIS

Descriptive analysis of pre and post-treatment techniques of Myofascial release and Tendinous pressure was done by using paired t-test and comparison between the post-treatment of Myofascial release and Tendinous pressure was done by unpaired t-test.

RESULT

27 patients having spasticity in biceps were involved in the study, in which 13 females and 14 males were included.

Patients involved in the study went through both treatment techniques like Myofascial release and Tendinous pressure in which 15 patients had left-sided hemiparesis and 12 patients with right-sided hemiparesis. Seven patients had grade 1 spasticity and 20 patients who had grade 2 spasticity in biceps Table 1).

Table no.1: Demographic data of the subjects included in the study.

Demographic data	N = 27	Mean	SD
Age		50.11	12.71
No. Of female	14 (51%)		
No. Of male	13 (48%)		
Side of Hemiparesis Left Right	14 (51.8%) 13 (48%)		
Duration of stroke (in years)	Range (18 - 70) years	2	1.86
No. Of patients having spasticity in muscles Biceps	27		
	No. Of patients.		Grades of muscle reaction
	7		1
	20		2

Comparison between the pre and post-treatment measurement and muscle reaction testing of Myofascial release done using paired t-test. Which p-value showed a significant difference in pre and post-treatment after Myofascial release, but no significant difference between the muscle reaction testing as it remained the same in pre and post-treatment (Table 2).

Table no.2: Comparison between the pre and post-treatment and muscle reaction testing (X) of Myofascial release.

Muscle	MFR				P value	
	Mean±SD				Diff.	X
	Pre	X	Post	X		
Biceps	50.6 6±17 .04	1.66 ±0.5 5	39.9 6±16 .14	1.55± 0.69	0.02	0.52

Comparison between the pre and post-treatment measurement and muscle reaction testing of Tendinous pressure done using paired t-test. In which p-value showed a significant difference in both pre and post-treatment after Tendinous pressure as also in muscle reaction testing (Table 3).

Table no.3: Comparison between the pre and post-treatment and muscle reaction testing (X) of Tendinous pressure.

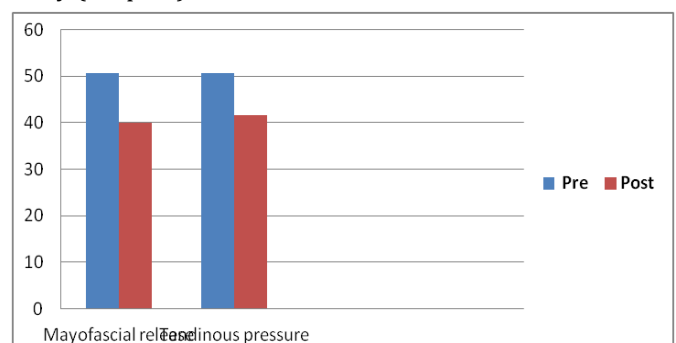
Muscle	Tendinous Pressure				P value	
	Mean±SD				Diff.	X
	Pre	X	Post	X		
Biceps	50.7 4±1 7.22	1.6 6±0 .55	41.6 2±1 5.76	0.85 ±0.5 3	0.04	<0.000 1

Comparison between the post-treatment measurement and muscle reaction testing of Myofascial release and Tendinous pressure was made using unpaired t-test. In which p-value showed no significant difference, but a significant difference in muscle reaction testing of both the techniques (table 4).

Table no.4: Comparison between the post-treatment and muscle reaction testing (X) of Myofascial release and Tendinous pressure.

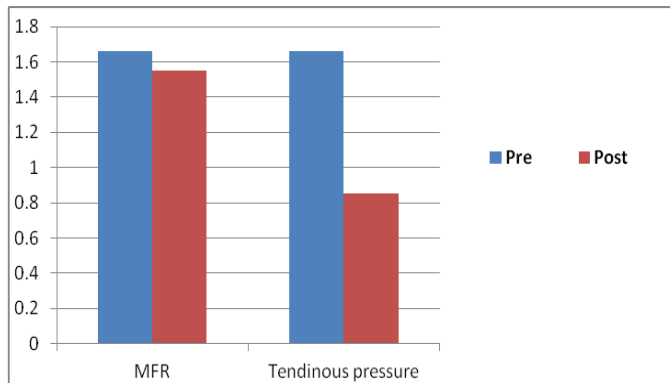
Variables	MFR		Tendinous pressure		P-value	
	Mean±SD		Mean±SD		Diff	X
	Diff	X	Diff	X		
Biceps	39.96 ±16.1 4	1.55 ±0.6 9	41.62 ±15.7 6	0.85 ±0.5 3	0.06	<0.0 001

Comparison between myofascial release and tendinous pressure in pre and post-treatment shows that both techniques are more than equally beneficial for reducing spasticity (Graph 1).



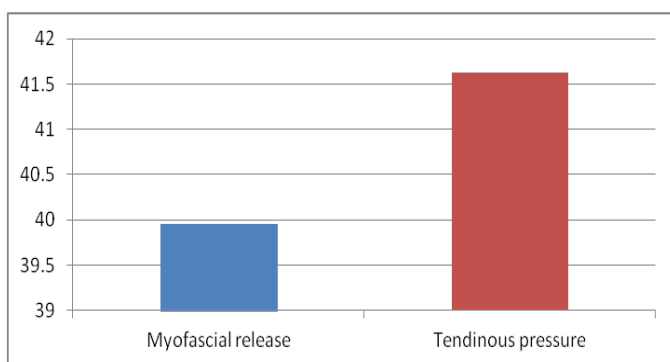
Comparison between myofascial release and tendinous pressure in pre and post-treatment muscle reaction testing (X) shows that tendinous pressure is more effective in reducing spasticity than a myofascial release as the grade changes post-treatment. (Graph 2). The tendinous pressure technique is statistically extremely significant than myofascial release post-treatment.

Graph 2: Pre and Post-treatment muscle reaction testing (X) comparison between Myofascial release and Tendinous pressure.



Comparisons between myofascial release and tendinous pressure in post-treatment shows that both the techniques are more than equally beneficial for treating spastic stroke patients. (Graph 3). As we found that the difference between both the techniques is clinically significant but not statistically significant.

Graph 3: Comparisons between the Myofascial release and Tendinous pressure post-treatment.



DISCUSSION

The present study was conducted to find the immediate effect of tendinous pressure technique versus myofascial release in the reduction of spasticity in stroke patients so that spasticity doesn't interrupt the conventional treatment. . Twenty-seven patients who had spasticity in their

biceps were involved in the study, in which 13 females and 14 males were included. Patients involved in the study went through both Myofascial release and Tendinous pressure. Fifteen patients had left-sided hemiparesis and 12 patients with right-sided hemiparesis. Seven patients had grade 1 spasticity and 20 patients who had grade 2 spasticity in biceps.

According to Modified Tardieu Scale, the results showed that both the treatment techniques, MFR and tendinous pressure showed a significant clinical difference in pre and posted R1 value reducing spasticity as well as in muscle reaction testing (X). In contrast, there was no statistically significant difference in muscle reaction testing in R2 value as there was no change in the R2 value post-treatment in MFR and there was a reduction in spasticity observed in muscle reaction testing after MFR.

This is in relevance with the previous study done by Salvi Shah in 2012 on the immediate effect of Myofascial release on spasticity in spastic cerebral palsy subjects suggested that the combination of Myofascial Release with stretching alone on calf muscle has better outcomes in the treatment of spasticity than stretching according to R1 value of MTS. In contrast, no significant improvement was seen in MAS and R2 values of MTS.^[14]

According to Burris Duncan in 2008 conducted a study on MFR showed that MFR could improve motor function in children with moderate to severe spastic CP. Still, they didn't get any improvement in spasticity, which was measured by MAS and themselves had proved subjective to be of the value.^[15]

MFR was proposed to work on neuro reflexive change as the hands-on approach offers afferent stimulation through receptors that require central processing at the spinal cord and cortical levels for a response. Afferent stimulation frequently results in efferent inhibition. This is the principle that is used in the MFR technique when the afferent stimulation of a stretch is applied, and the operator waits for efferent inhibition to occur so that relaxation results.^[16]

Salvi Shah et al. In 2012 reviewed some articles on Myofascial release that concluded Myofascial Release is a very effective, gentle, and safe hands-on method of soft tissue

mobilization; it enhances the body's innate restorative powers by improving circulation and nervous system transmission. This low load sustained stretch gradually, over time, allows the myofascial tissue to elongate and relax, thus allowing an increased range of motion, flexibility, and decreased pain.^[14]

According to Regi Boehme, while giving MFR, one can expect to hold the traction in MFR for at least 90 to 120 sec before the tissues will begin to soften and lengthen. As also, in the present study, MFR was given 120 seconds of a hold.^[17]

Roods devised a technique developed for facilitation and inhibition of movement through various stimuli in the year 1950. Patients with neurologic dysfunction may have muscle tone ranging from hypotonic to hypertonic. Inhibition techniques are mainly used in spastic patients. In tendinous pressure, manual pressure is applied to the tendinous insertion of the muscle or across long tendons produces an inhibitory effect. In the current study, tendinous pressure was given for 30-sec hold in 3 sets.^[12]

This is the fresh study done to see the effectiveness of tendinous pressure on spastic stroke patients that showed a statistically significant difference in R1 value as also in the muscle reaction testing (X) of MTS. MTS is a valid and reliable tool to measure spasticity.^[16] R1 values of MTS have smaller increments than MAS and therefore have the potential to represent a more precise measure of technical changes.^[18]

According to a study done by Emily Patric in 2006, the Tardieu Scale can identify the presence of spasticity more effectively than the Ashworth Scale in both an upper and lower limb muscle. Experimental evidence suggested that increased resistance to movement is not exclusively dependent on the stretch reflex activity but is also due to increased stiffness as a result of contracture. Therefore, by quantifying the resistance to passive movement, the Ashworth Scale measures a combination of neural and peripheral factors, that is because it does not differentiate spasticity from contracture, whereas Tardieu scale identifies the presence of spasticity as well as the presence of contracture, by differentiating both of them from each other. This is most likely because the Tardieu Scale takes

into account the main factor to which the stretch reflex is known to be sensitive, which is the velocity of stretch. This velocity-dependence of the stretch reflex has been well established, with several studies reporting no stretch reflex during slow passive movements.^[19]

CONCLUSION

So the conclusion can be made that tendinous pressure is more effective as compared to MFR in reducing the spasticity of stroke patients. As according to the result of the present study for in between-group analysis showed clinical and statistically significant improvement in the spasticity according to the R1 value of MTS and muscle reaction testing (X) both in Tendinous pressure as compared to MFR, as MFR did not show a statistically significant difference in muscle reaction testing (X).

LIMITATIONS

The major limiting factor of the study was a small sample size, so the future study can be done by taking a larger sample size. In the present study, the immediate effect of myofascial release and tendinous pressure is studied so the future study can be done to see the long term effect. In the present study, improvement in biceps muscle spasticity was seen, so in the future study can also be done to see the effect of myofascial release and tendinous pressure on all affected muscles.

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