

“Comparitve Study of Foam Roller and Met on Myofascial Trigger Points of Calf Muscles in Clinical Nurses”

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Abstract

Background: Musculoskeletal disorders (MSD) are one of the greatest frequently occurring occupational disorders seen in nurses. Lower extremity musculoskeletal disorders (MSD) are more prevalent, but understudied. Calf pain is common among nurses and is associated with individual and work-related factors such as long standing and continuous movement. Nurses have to always be on their toes to provide the optimal treatment to the patients. Activities such as repetitive standing, walking take up most of their day and is an integral part in patient care. So much so that they neglect their own health to such a level that they experience calf pain this occurs mainly due to the presence of trigger point. Aim: To compare the effectiveness of Foam Rolling and Muscle Energy Technique (MET) on active Myofascial Trigger Point of calf muscles in clinical nurses Study setting and design: Interventional study conducted at Dr. D.Y. Patil College of Physiotherapy OPD, Dr D.Y Patil Vidyapeeth.,pune Methods and Materials: 30 female nurses, 28-40 years with an experience of at least 1 year in clinical nursing working for a minimum of 8 hours per day with an exclusion of any orthopedic or neurological disorder, leg of foot trauma. The primary outcome measures pain pressure threshold with pressure algometer, pain with numerical pain rating scale and disability with lower extremity functional scale. Results: Results revealed statistical significance in pain pressure threshold ($p < 0.05$), pain and disability in Group A Foam Roller than Group B MET. Conclusion: It can be concluded that both Foam Roller and MET are effective individually but in comparison of both, Foam Roller is most effective in reducing pain, increasing pain pressure threshold and reducing impairments in Trigger points of Calf Muscles.

1. Introduction

The **CALF MUSCLES** are a group of muscles that are situated at the back of the leg. Gastrocnemius soleus and plantaris are a superficial group that is prone to injuries¹. Gastrocnemius is a large muscle that consists of two heads one which originates from the posterior of the medial condyle i.e. medial

head and the lateral head from the lateral condyle of femur. Soleus on the other hand is a fusiform bone that originates from the proximal one third of the fibula and lies along the gastrocnemius. Both soleus and gastrocnemius fuse to form TendoAchilles that gets inserted on the middle of the posterior surface of the calcaneum².



Figure 1 calf muscles

TRIGGER POINTS are hyperirritable point in a taut overused muscle that produce indigenus and referred pain, among other occurring symptoms. A Trigger point is composed of numerous contraction knots which can be either latent that only cause's pain only on palpation or active pain even without palpation³.

Latent Trigger point's affects reciprocal inhibition, increases muscle cramps, and produces changes in muscular activity. Latent Trigger Points can also cause restriction in range of motion in this case of the ankle specifically³.

Diagnostic criteria for Myofascial Trigger Points were the following

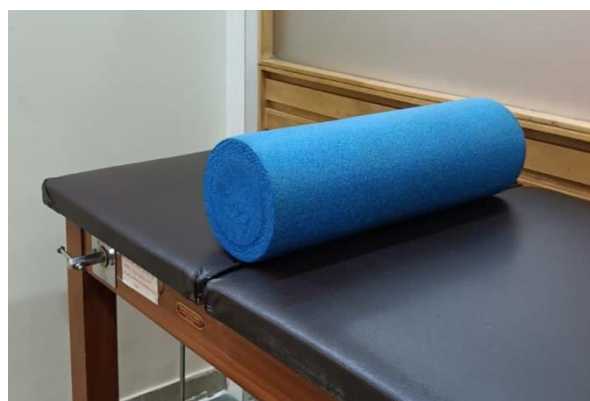
1. A skeletal muscle that has a palpable taut band
2. The taut band should have a hypersensitive point
3. Snapping palpation that provokes a local twitch response
4. Compression of tender spots produces a typical referred pain pattern

5. Typical referred pain pattern is present

If only the first four characteristics are satisfied the trigger point is latent and if all the characteristics are present then the trigger point is active⁴.

FOAM ROLLER is on the techniques used in myofascial release that was proposed by Barnes. The main motive is the break the existing adhesion present between muscle and fascia. The presence of adhesions in the fascia causes imbalance, over activation of the muscle fibers, multiple micro trauma as well as inflammation⁵. In this technique the patient uses their own body weight to apply pressure and doing a to and fro motion⁶. Researchers suggest one to three sets of Foam Roller movement over the affected, with durations of 30–120 s per set to attain the best effects of Foam Roller⁷.

The movement of the Foam Roller over the muscle and fascia causes direct pressure and sweeping pressure over the soft tissue structures which in turn increase lubricity between the fascia and muscles increases tissue extensibility by breaking adhesion⁸.



5'9inch 18'3inches

Figure 2 Foam Roller

On the other hand **MUSCLE ENERGY TECHNIQUES** has been exhibited to be increasingly successful in improving the extensibility of abbreviated muscle than static stretching⁹. It is a non-invasive, direct, manual therapy technique, is also used to standardize

muscle length and increase range of motion, and its main objective is to induce relaxation of tight shortened musculature⁴. It is used to elongate shortened muscle, reduce localized edema, to help relieve passive congestion and to mobilize an articulated restricted mobility⁹.

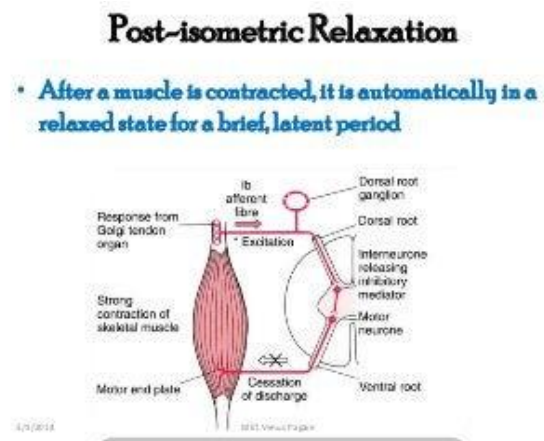
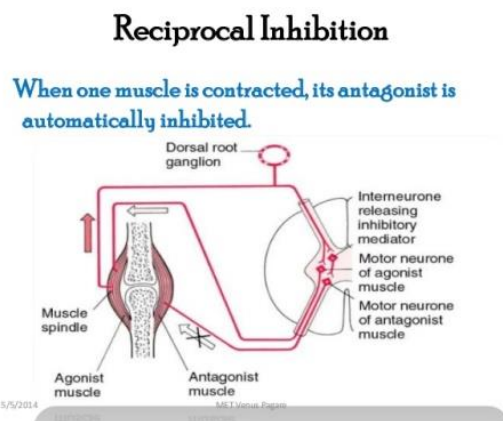


Figure 3 reciprocal inhibition and post isometric relaxation

2. Methodology

Design study and setting

This is an experimental study conducted on clinical nurses having latent trigger points in the calf muscles. This study was conducted in 2022, at DR. D. Y. Patil college of Physiotherapy OPD, DR. D.Y. Patil Vidyapeeth, Pune. The proposal of this research study was scrutinized and cleared vide Ref. No. DYP/CPT/ISEC/30/2022 from administrative and ethical issues.

Participants

The participants who met the inclusion criteria- Have latent trigger point in unilateral calf muscle, between the age of 28 to 40 years, Female nurses who have one or more years of experience who are work for 8 hours per day in a hospital. Participants who have had a history of injury to the lower limb, Any diagnosed case of systemic and or local

infection, History of neurological or psychological or orthopedic disorder, Fracture, malignancy, Open wound in the calf areas were excluded. Participants who met the inclusion criteria were well-versed about the purpose and nature of the study and a written consent was taken. A whole of 30 participants were carefully chosen and were randomly allocated into two groups- Group A Foam Roller and Group B Muscle Energy Technique via chit method. The sample size was calculated using Winpepi Software Version 11.38.

Outcome measures

Pressure algometer: It is a clinically reliable, valid, feasible and cost effective tool that is used to measure the tenderness and treatment effects in myofascial and musculoskeletal pain. The test-retest reliability is excellent (mean ICC =0.84) and the intraclass correlation coefficient (ICC) is good (mean ICC =0.75)



Figure 4 Pain Pressure Threshold assessed by Pressure Algometer

Numeric Pain Rating scale (NPRS): The 11 point scale that ranges from 0 (no pain) to 5 (medium pain) and 10(maximum pain). The subjects select a whole number that reflects the intensity of their pain. Pre and Post treatment sessions value will be noted

Lower Extremity Functional Scale: The aim of the Lower Extremity Functional Scale (LEFS) is to quantify "patients' initial function, ongoing progress, and outcome" over a wide range of lower-extremity conditions. It is a self-report questionnaire

Intervention

Demographic data of all the participants of both groups was taken and pre-treatment . For Group A

participants, foam roller treatment was administered thrice a week, alternate days for 2 weeks. Patient was in high sitting with unaffected leg flexed at the knee and the affected leg calf region kept over the foam roller. The patient is asked to maneuver their body weight with the help of their arms and unaffected leg over the foam roller to do a to and fro motion 30 repetition 2 sets. Subjects were asked to ice the area post the treatment session. For Group B, Muscle Energy Technique was given for the calf muscle. Start from when you can identify the restriction barrier the patient has to apply 20% force in dorsiflexion and the therapist will apply 20% force in plantarflexion. Hold for 7 to 10s continue until there is no give



Figure 5 Group A Foam Roller Technique



Figure 6 Group B Muscle Energy Technique

3. RESULTS

Data of 30 participants (female) was analyzed using the statistical package SPSS 26.0 (SPSS Inc., Chicago, IL) and level of significance was set at $p < 0.05$. Descriptive statistics was performed to assess the mean and standard deviation of the

respective groups. Normality of the data was assessed using Shapiro Wilkison test. Inferential statistics to find out the difference between the groups was done using Mann Whitney u test and within group analysis was done using Wilcoxon sign rank test.

TABLE 1: Comparison of side

INVOLVMENT OF SIDE	R	L
TOTAL NUMBER	19	11

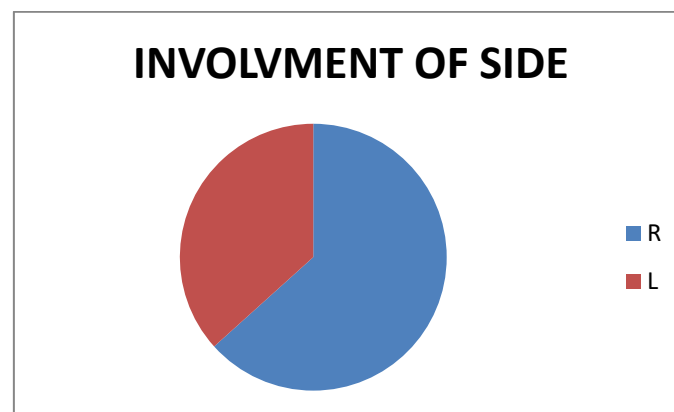


TABLE 2- Comparison of NPRS between MET and Foam Roller

		M.E.T	Foam roller	P VALUE (MANN WHITNEY U TEST)
NPRS	PRE	5.8±1.6	5±2.31	0.27 (t=1.11)
	POST	3.06±0.99	1.2±0.75	0.0001*(t=5.8)
DIFFERENCE		2.74±0.61	3.8±1.56	

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Z VALUE		5.64	6.12
P VALUE (WILCOXON SIGN RANK TEST)		0.0001*	0.0001*

Graph 2

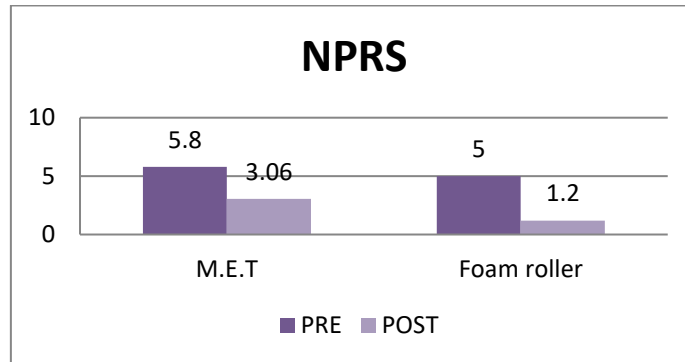


TABLE 3 Comparison of LEFS SCORE in MET and Foam Roller

		M.E.T	Foam roller	P VALUE (MANN WHITNEY U TEST)
LEFS	PRE	50.93±13.77	57.4±8.95	0.13 (t=1.53)
	POST	66.6±4.87	73.47±3.03	0.0001*(t=4.65)
DIFFERENCE		15.67±8.97	16.07±5.92	
Z VALUE		4.18	9.34	
P Value (Wilcoxon Sign Rank Test)		0.0003*	0.0001*	

Graph 3

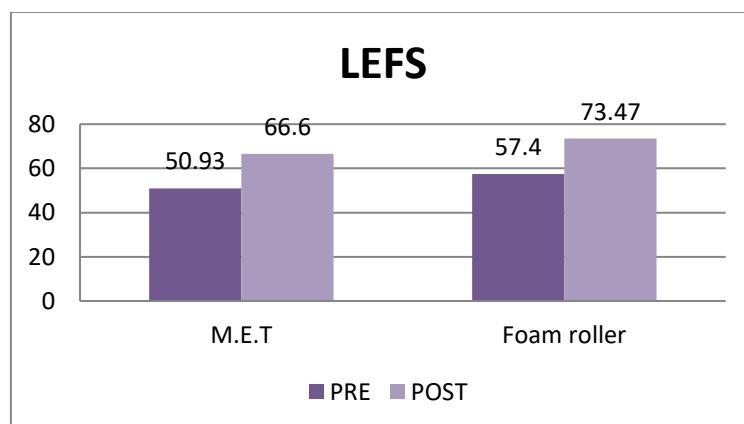


Table 4 Comparison Pain Pressure Threshold in MET and Foam Roller

		M.E.T	Foam roller	P VALUE (MANN WHITNEY U TEST)
PPT	PRE	4.85±1.64	5.66±2.13	0.24 (t=1.17)
	POST	6.83±1.34	9.1±2.55	0.002*(t=3.29)
DIFFERENCE		1.98±0.30	3.44±0.42	
Z VALUE		3.79	4.22	
P VALUE (WILCOXON SIGN RANK TEST)		0.0001*	0.0002*	

Graph 4

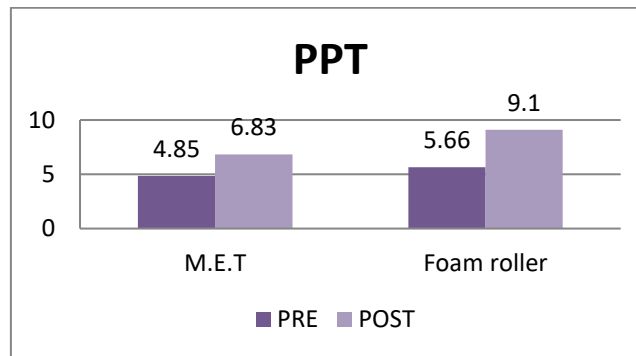


Table 1 and Graph 1 represent the involvement of side.

Regarding NPRS (Table 2 Graph 2), Wilcoxon Sign Rank Test analysis reported statistically significant difference with respect to group MET and group-Foam Roller ($p < 0.05$). Between group analysis by Mann Whitney U test reported statistically significant result at post intervention ($p < 0.05$). Higher mean difference was observed regarding Foam Roller group than MET ($3.8 > 2.74$).

Regarding LEFS (Table 3 Graph 3), Wilcoxon Sign Rank Test analysis reported statistically significant difference with respect to group MET and group-Foam Roller ($p < 0.05$). Between group analysis by Mann Whitney U Test reported statistically significant result at post intervention ($p < 0.05$). Higher mean difference was observed regarding Foam Roller group than MET ($16.07 > 15.67$).

Regarding PPT (Table 4 Graph 4), Wilcoxon Sign Rank Test analysis reported statistically significant difference with respect to group MET and group-Foam Roller ($p < 0.05$). Between group analysis by Mann Whitney U Test reported statistically significant result at post intervention ($p < 0.05$). Higher mean difference was observed regarding Foam Roller group than MET ($3.44 > 1.98$).

*Muscle Energy Technique, Numerical Pain Rating Scale, Lower Extremity Functional Scale, Pain Pressure Threshold

4. Discussion

The aim of this study was to compare the effectiveness between Foam Roller and MET on Pain Pressure Threshold using Pressure Algometer, Pain with Numerical Pain Rating Scale and Disability with Lower Extremity Functional Scale. This was an experimental study that done on 30 asymptomatic nurses, who were randomly allocated by the chit method, who on assessment

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had latent trigger points in the calf muscle. Group A Foam Roller was given and was asked to ice the area post treatment and Group B was given MET technique. The study was conducted in Dr. D. Y. Patil College of Physiotherapy OPD and Dr. D. Y. Patil Vidyapeeth. Treatment protocol was carried out for 6 sessions over a span of 2 weeks on alternate days. The outcome measures used were NPRS, Lower Extremity functional scale and Pain Pressure Threshold which were taken pretreatment on the first session and sixth session post treatment.

The effects of foam roller have shown noteworthy reduction in pain, increase in range of motion increase in pain pressure threshold value and improvement in disability score. Myofascial release is said to be used for breaking adhesions. Aishwarya Ranbhor et al conducted a study the effect of foam roller on trigger points. An increase in soft tissue extensibility and muscle tendon compliance occurs due to Foam Rolling as it works to decrease tissue adhesion and muscle stiffness. This is reliable with the findings which stated that foam rolling was effective in reducing latent myofascial trigger points⁸. Another study conducted by Okamoto, T et al discusses about how Foam Roller on exerts a favorable effect on arterial function. Self-myofascial release is performed by the individual with his own body weight and leverage upon the area to be treated. A sweeping pressure in addition to direct pressure get applied over the muscle and fascia due to the continuous to and fro movement. This causes rush of blood flow to the affected area in turn facilitates the removal of waste products.as the cutaneous receptors are activated which blocks the nociceptive stimulus thus reducing pain. This furthermore increases tissue extensibility and increases lubricity of the fascial layer by resolving trigger points and breaking adhesions¹⁰.

On the other hand MET has also shown results but not as significant as foam roller. Muscle Energy Technique (MET) has been exhibited to be successful in improving the extensibility of abbreviated muscle than static stretching. MET has been effective in bringing about greater improvement in joint range of motion (ROM) and muscle extensibility. The isometric and isotonic techniques of MET can be used to mobilize joint in which movement is restricted, stretch tight fascia

and muscles, improve local circulation and improve musculoskeletal function⁹. Since local circulation increases, tight muscles and fascia are rushed with blood supply. The trigger point in the tight muscle is flooded with blood supply which a long time resolves the trigger point.

Golnaz sadria a PT. MSc et al conducted a randomized control trial which included 62 subjects who had latent trigger points on the upper trapezius. They were allocated into two groups A)active release techniques and B)Muscle energy technique. The results of this study showed that the application of Active release technique and MET was found to decreased VAS, increase the active cervical lateral flexion and upper trapezius muscle thickness immediately. It also revealed that the improvement of outcome measures in both groups, which had upper trapezius latent trigger points. But neither was found to be superior to the other¹¹. This study showed increase in range of motion of dorsiflexion and plantarflexion, NPRS, Pain Pressure Threshold and improvement in the disability score

Given the results, both the techniques were found to have better effects in term of pain, disability and pain pressure threshold but better results were seen in foam roller group

5. Conclusion

From this study we can conclude that both Foam Roller and MET are effective individually but in comparison of both, Foam Roller is more effective in reducing pain and pain pressure threshold and reducing disability in Trigger Points of Calf Muscle

LIMITATIONS

Both the genders were not taken into consideration.

Exercises could also be incorporated with the treatment

The sample size taken was small.

FUTURE SCOPE

Long term follow up can be incorporated

The study can be carried out in a different population

Other Outcome measure could be used.

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