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Research Article

### COMPARISON OF MUSCLE ENERGY TECHNIQUES VERSUS STATIC STRETCH FOR IMMEDIATE OUTCOMES IN IMPROVING FLEXIBILITY OF SHORTENED GASTROCNEMIUS MUSCLE IN OTHERWISE HEALTHY FEMALE

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**Abstract:**

*Introduction:* Calf decreased range of motion is most common complaint of healthy subjects. The common factor of this decrease ankle range of motion is shortened gastrocnemius. With progression of physiotherapy profession trend of modality usage is replaced by new manual techniques for treating somatic dysfunction. This study basically focused on the effectiveness of Muscle Energy Technique in comparison of static stretching. **Methodology:** It is quasi experimental trial in which total 50 patients, by using convenient sampling patients were allocated into two groups. In-group-A patients were handled with Muscle Energy Technique and in group-B; the technique applied on patients were stretching. Every Patient was taken interventions according to her group allocation. Standardized Goniometer was used to check the pretreatment and after treatment range of motion of dorsiflexion. Pain was measured by using Numeric rating pain scale **Results:** Results regarding within group comparison of ROM (range of Motion) for MET (Muscle Energy Group) Group showed that there was mean of 14.72 with standard deviation of 2.44 in pre reading while the post treatment mean is 19.6 with standard deviation of 1.31. While those of for Static stretch group, mean, standard deviation were 15.2, 2.50 respectively for pre reading and 17.52 and 2.859 respectively for post treatment. Results regarding comparison of means at pre-intervention level between MET group and Static Stretch group for Pain of leg showed that assuming equal variances mean difference was 0.400 having p value 0.347. At post intervention level MET and Static stretching group the mean difference was 1.720 having p value .000. **Conclusion:** This study concludes that Muscle Energy Technique in individuals with shortened gastrocnemius will show more flexibility in gastrocnemius muscle as compared to static stretching.

**Key Words:** Muscle Energy Technique, Slow sustained stretching, Gastrocnemius Muscle

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**INTRODUCTION:**

Most common and safest method of measuring Muscle length is Static Stretching. This is applied slowly and gradually at a relatively constant force to avoid stimulating a stretch reflex. Evidence supports that a session of 3 repetitions each of 30 seconds increases the muscle length sufficiently.(1)

Muscle energy technique (MET) which is used by different manual therapists was originally developed by osteopaths. The other name for the Muscle energy technique is active muscular relaxation which was originally designed for the treatment of soft tissues (although it makes a major contribution towards joint mobilization).(2) It has multiple functions which covers a lot of domains for example: flexibility of shortened muscles, lymphatic or venous drainage of fluids and blood and to improve ROM.(3)

Evidence said that there is an immediate effect in increasing range of motion at knee joint. This change is most probably due to the increased endurance of muscles to bear the stress of stretching as there is no evidence available for the change in viscoelasticity. Most of the studies available on MET are done on neck muscles and hamstring muscles.

MET is normally used to treat patients with intense low back agony. No randomized controlled trials analyzing the results of this treatment in symptomatic populations have been accounted for in the writing. MET joined with regulated engine control and resistance activities might be better than neuromuscular re-instruction and resistance preparing for diminishing inability and enhancing capacity in patients with intense low back agony.(4) The utilization of the muscle strength procedure to increment cervical scope of movement in typical, asymptomatic subjects was inspected in this trial-controlled investigation.

A number of stretching procedures have been shown to increase flexibility of short muscles. Previous research suggests muscle energy techniques produces increments of motion, but there are many variations of muscle energy techniques. There are several researches available for the effects of muscle energy technique and static stretching on hamstring muscles but the combine effect of these two techniques is yet to be evident on calf muscle. Researchers have shown that decrease use of muscle can cause reduce flexibility in otherwise healthy individuals. When we talk about females particularly high heel users have a reduced flexibility of calf muscles. Evidence has great deal of these two techniques in improving flexibility of different muscles.

Apparently, both the techniques have role in improving extensibility of gastrocnemius. After the treatment session in both the groups with static stretch and MET there was significant change in flexibility with only one session of treatment with MET. This research showed that there is significant improvement in reducing pain and increasing flexibility by using Muscle energy technique.(5)

The objective of this study was to compare immediate effects of muscle energy techniques versus static stretch for improving flexibility of shortened gastrocnemius muscle in otherwise healthy female. The study was particularly for the females using high heels and having pain in the ankle with planter flexion (involving calf Muscle).

**METHODOLOGY:**

This study was a quasi-experimental trail conducted in Riphah Rehabilitation Center, Lahore, linked with Riphah College of Rehabilitation Sciences, Lahore during June, 2017 till September, 2017. A sample of 50 females were taken, 25 in each group by using

consecutive sampling later on, the group allocation is done by simple random sampling technique (coin toss method was used for group allocation). Females in age range of 20-30 years, with compromised flexibility of gastrocnemius measured with goniometer less than 20 degree at dorsiflexion, was included after screening from normal population with claim of symptoms like frequent pain in gastrocnemius and prolonged use of high heels with positive knee to wall test. Patient with History of calf injury within one year, fracture of lower extremity, with any Systemic and chronic Illness (e.g. Rheumatism), low back pain, the history of trauma within last 6 months, congenital and acquired deformities at hip knee or ankle on affected side were excluded. Informed consent was taken in which all the rights of patient about his or her safety were reserved so that if patient was not willing he/she can withdraw at any time.

At the time of evaluation major Demographic details were noted along with the essential medical history i.e. patient age, sex, weight, height and occupation. By using Random sampling patients were allocated into two groups. In-group-A patients were treated with Muscle Energy Technique and in group-B; the technique applied on patients were stretching. Each

Patient was receiving interventions as per group allocation for 3 minutes. For the collection of relevant information about the patient, researcher was used pre designed questionnaire. So the concerned detail is easily summarized. Goniometer was used to measure the range of motion while pain was measured by numeric rating pain scale. Knee to wall test was used to screen the patients for shortened/tightened gastrocnemius. The data was analyzed using SPSS for Windows software, version 20. Statistical significance was set at  $P = 0.05$ . Paired  $t$ -test was performed to detect any differences between baseline and post-treatment ankle ROM measurements in plantar flexion/dorsiflexion dimension and Numeric Rating Pain Scale.

### RESULTS:

The total numbers of patients were 50. The mean age for MET group was 24.88 while for static stretch group was 24.14. Occupation of females in muscle energy group was Students 84% and working lady 12% house wife 1%. Occupation of females in muscle energy group was Students 80% and working lady 16% house wife 4%. Independent sample  $t$  test for both pain and ROM are given table 1 & 2 for pre and post treatment.

**Table 1: Numeric Rating pain scale pre & post intervention**

Numeric Rating Pain Scale Pre Intervention Reading				
Group	Mean	Std. Deviation	P Value	Mean Diff
Muscle Energy Group	6.2800	1.86011	.347	-.40000
Static Stretch Group	6.6800	.98826		
Numeric Rating Pain Scale Post Intervention Reading				
Group	Mean	Std. Deviation	P Value	Mean Diff
Muscle Energy Group	1.8400	1.28062	.000	-1.72000
Static Stretch Group	3.5600	1.26095		

**Table 2: Range of motion Pre and Post Treatment:**

Pre Intervention Reading for ROM				
Group	Mean	Std. Deviation	P Value	Mean Diff
Muscle Energy Group	14.7200	2.44131	.428	-.56000
Static Stretch Group	15.2800	2.50865		
Post Intervention Reading for ROM				
Group	Mean	Std. Deviation	P Value	Mean Diff
Muscle Energy Group	19.6800	1.31403	.001	2.600
Static Stretch Group	17.5200	2.85949		

**Table 3: Within the group improvement in Range of Motion**

Group of Patients			Mean	Std. Deviation	Sig
Muscle Energy Group	Pair 1	Pre Intervention Reading of the Leg for ROM	14.7200	2.44131	
		Post Intervention Reading of the Leg for ROM	19.6800	1.31403	.000
Static Stretch Group	Pair 2	Pre Intervention Reading of the Leg for ROM	15.2800	2.50865	
		Post Intervention Reading of the Leg for ROM	17.5200	2.85949	.000

**Table 4: Within the group improvement in Numeric Rating Pain scale**

Group of Patients			Mean	Std. Deviation	Sig
Muscle Energy Group	Pair 1	Numeric Rating Pain Scale Pre Intervention Reading	6.2800	1.86011	
		Numeric Rating Pain Scale Post Intervention Reading	1.8400	1.28062	.000
Static Stretch Group	Pair 2	Numeric Rating Pain Scale Pre Intervention Reading	6.6800	.98826	.000
		Numeric Rating Pain Scale Post Intervention Reading	3.5600	1.26095	

**DISCUSSION:**

The present study was undertaken to evaluate the effect of MET and static stretching for improving flexibility of shortened gastrocnemius muscle in otherwise healthy female. Both groups showed significant improvement in post-treatment ankle ROM measurements in plantar flexion/dorsiflexion dimension and Numeric Rating Pain Scale after receiving their respective treatments. Study concluded that MET reduced pain perception by increasing the stretch tolerance. Stretching and isometric withdrawal while happening at the same time empowers the muscle and joint mechanoreceptors and proprioceptors.(6) This comes about acquired for the change of adaptability in the MET gathering could be like the past examinations in the writing survey of the present investigation. An examination found with the expect to research the intense impacts of one-sided lower leg plantar flexors static-stretching on surface electromyography (sEMG) and the focal point of weight (COP) amid a solitary leg adjust task in both lower limbs. Fourteen youthful sound, non-athletic people performed unipodal calm remaining for 30s previously, then after the fact (stretched limb: promptly post-stretch, 10 and 20 minutes and non-stretched limb: quickly post-stretch) a one-sided lower leg plantar flexor static-stretching convention [6 sets of 45s/15s, 70-90% purpose of uneasiness (POD)]. Postural influence was depicted utilizing the COP region,

COP speed (antero-back and medio-sidelong headings) and COP recurrence (antero-back and medio-parallel bearing). (7)

Surface EMG (EMG integral [IEMG] and Median frequency [FM]) was used to describe the muscular activity of gastrocnemius lateralis. In conclusion, our static- stretching protocol effectively increased passive ankle ROM. The increased ROM and flexibility appears to increase postural sway and muscle activity; however these finding were only a temporary or transient effect (8)

In the current study results regarding within group comparison for ROM for MET Group showed that there was mean of 14.72 with standard deviation of 2.44 in pre reading while the post treatment mean is 19.6 with standard deviation of 1.31.

While those of for Static stretch group, mean, standard deviation were 15.2, 2.50 respectively for pre reading and 17.52 and 2.859 respectively for post treatment in the current study results regarding within group comparison for ROM for Static stretch group, mean, standard deviation were 15.2, 2.50 respectively for pre reading and 17.52 and 2.859 respectively for post treatment.

A study shown results on also concluded that MET showed significant improvement in pain and functional status.(9)

There is little evidence showing some differences of efficacy while using different techniques of MET in improving extensibility of Muscles. An examination is found in which Static calf-stretching practices created no huge lessening in the latent mechanical resistance into lower leg dorsiflexion in a gathering of youthful, solid male subjects..(10) The outcomes bolster the proposal that upgrades in lower leg joint dorsiflexion ROM following calf-stretching practices in non impeded subjects may come about because of neuromuscular changes inside the triceps surae muscle. In our study the results regarding within group comparison of pain for MET Group showed that there was mean difference of 4.44, standard deviation 1.35 with significant difference having p value 0.000, while those of for Static stretch group, mean, standard deviation and p value were 3.12, 0.971 and 0.000, respectively.(10)

Apparently, both the techniques have role in improving extensibility of gastrocnemius and there is change within first session of treatment in ROM and pain . This research showed that there is significant improvement in reducing pain and increasing flexibility by using Muscle energy technique.

### CONCLUSION:

The results of this study concludes that Muscle Energy Technique proves to be a better treatment option than static stretching in healthy subjects presented with calf tightness. By taking pre and post treatment measurements of ankle joint through goniometer. A significant increase in range of motion is noticed. Though within the group both techniques shows a remarkable improvement in both ROM and Pain. But in between the group differences The muscle energy technique shows better improvement in both ROM and pain.

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