

# Immediate Effect of Muscle Energy Technique (MET) and Positional Release Therapy (PRT) on SLR90<sup>0</sup>-90<sup>0</sup>, Ankle Dorsiflexion Range and Y-Balance Test - An Experimental Study

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## ABSTRACT

**Background:** Flexibility is an important physiological component of physical fitness; reduced flexibility can cause inefficiency at workplace and is also a risk factor for conditions like low back pain, plantar fasciitis, etc. Tightness of muscle affects static and dynamic balance of individual. The measurement of dynamic balance that has increased in frequency of use is the Y-Balance Test. So aim of this study is to compare immediate effect of MET and PRT on SLR90<sup>0</sup>-90<sup>0</sup>, Ankle dorsiflexion ROM and Y-Balance test.

**Method:** 30 subjects fulfilling selection criteria were selected between the age of 18-30, then were randomly divided in to either of two groups (MET/PRT). Pre data for all outcomes were taken after which either MET or PRT was given according to group classified and then immediately post data was taken for all outcome measures.

**Result:** Result of present study shows a significant difference for Pre-Post treatment values of all outcome measures ( $p < 0.05$ ) for both groups. Inter group comparison shows no significant difference for SLR90<sup>0</sup>-90<sup>0</sup>, and Ankle dorsiflexion ROM, but significant difference ( $p < 0.05$ ) for Y-Balance test.

**Conclusion:** This study concludes that individual receiving MET has more beneficial effect on Y-balance test while there is no significant difference on SLR90<sup>0</sup>-90<sup>0</sup>, and Ankle dorsiflexion ROM between two groups.

**Keywords:** Flexibility, Dynamic balance, Range of motion, MET, PRT.

## INTRODUCTION

Flexibility is an important physiological component of physical fitness. [1] Limited muscle extensibility is a common problem that affects various patient populations as well as healthy able bodied individuals. [2] The ability of an individual to move smoothly depends on his flexibility, an attribute that enhances both safety and optimal physical activities. [1] Flexibility is an important physiological component of physical fitness, and reduced flexibility can

cause inefficiency in the workplace and is also a risk factor for low back pain, [1] plantar fasciitis, etc. [3] Tightness of muscle and balance of individual are significantly correlated. [4]

Overactivity of the hamstring muscles can produce decreased knee extension in late swing and at ground contact during gait. [3] Hamstring tightness is reportedly associated with a posterior rotation of the pelvis in standing. [3] A posterior rotation of the pelvis tends to

flatten the lumbar spine, which may increase the risk of low back pain. [3] Gastrocnemius tightness results in a significant increase in knee flexion at initial contact and mid-stance. [3] During stance phase of gait forward movement of the thigh and trunk on a tibia that is unable to move forward produces an extension moment on the knee and a tendency to hyperextend the knee. [3] A tight gastrocnemius (with increased compensatory pronation) also predisposes patients to plantar fasciitis. [5]

There are various techniques that can improve flexibility of muscles, like dynamic stretching, PNF stretching, MET, PRT, etc.

Muscle energy technique (MET) is a manual technique developed by osteopaths that is now used in many different manual therapy professions. Muscle energy techniques (MET) describe those manipulative treatments in which a patient, on request, actively uses his or her muscles from a controlled position and in a specific direction against a distinct counterforce. [6] It is claimed to be effective for a variety of purposes, including lengthening a shortened muscle or muscle contracture, strengthening muscles, as a lymphatic or venous pump to aid the drainage of fluid or blood, and increasing the range of motion (ROM) of a restricted joint. [6]

Positional release therapy (PRT) is an indirect and passive treatment accomplished by placing the involved tissues in an ideal position of comfort (POC). [7] It acts on the muscle spindle and associated with reflex mechanism which controls the muscle spasm. As a result of treatment using PRT, there is a decrease in muscle tension, facial tension, and joint hypo-mobility. These changes in turn result in a significant increase in functional range of motion and decrease in pain. [7]

SLR 90°-90° [(r=0.93-0.97)] [8] and ankle dorsiflexion range by using universal goniometer can be used to measure flexibility of hamstring and calf muscle. Y-balance test [(r=0.85 to 0.93)] [9] can be used

for measuring dynamic balance of individual. [10]

Long duration sitting is a contributory factor for developing tightness. [11] Flexibility dysfunction is a widespread problem faced by common people as well as sportspersons, especially in case of hamstring group of muscles. [11] Also muscle can affect static and dynamic balance. [4] MET and PRT are the techniques which can efficiently improve the flexibility of muscles. But there are few literatures comparing both these techniques and also showing its effect on Y-Balance test. So the need of the study is to see and compare the immediate effect of both the techniques on flexibility and Y-Balance test performance.

## MATERIALS AND METHOD

An experimental study was conducted at Shri K.K. Sheth physiotherapy college, Rajkot on 30 individuals according to the selection criteria. Inclusion criteria were individuals between 18-30 age, 20°-50° active knee extension loss with hip in 90° flexion (90-90° Straight Leg Raising Test), Ankle Dorsi flexion Range of Motion less than 20°, full passive ROM of knee extension and ankle dorsiflexion, Gender: Male and Female both. Exclusion criteria were Volunteers involved in flexibility or sport activities, history of previous lower limb injury or pain from past one year, history of fracture or surgery of back, pelvis, hip, knee or ankle from past one year. Inflammatory condition that could affect motion, Spinal deformity.

After screening process, procedure was explained to the participants and written consent were taken from them. Pre-measurement of all outcome measures were taken then patient was randomly divided in to either of the two groups – MET (group A) and PRT (group B).

For MET of hamstring muscle, in supine lying the subject's hip was passively flexed and the leg extended until tension was sensed by the therapist, then participant provided a moderate (about 20°) isometric contraction, against the therapist force for

10s. [6] This was followed by 2-3s of relaxation, and then the leg was passively stretched to the palpated barrier and/or tolerance to stretch and held for 30s. The leg was then relaxed for a short resting period (approximately 10s) [figure 1]. And for calf

muscle in supine lying position individual was asked to perform dorsiflexion and barrier was assessed by the therapist then moderate isometric contraction was performed against therapist force followed by relaxation and stretch [figure 3].



Figure 1



Figure 2



Figure 3



Figure 4

This procedure was repeated two more times i.e. total 3 repetitions of this technique were given. [6] For PRT of hamstring muscle subject will lie supine on the plinth with affected leg extended and abducted off the edge of plinth and flexes knee by 40<sup>0</sup>, therapist adds slight varus/valgus force and then rotates the tibia [figure 2]. [7] This position was held for 90 seconds. [7] For calf – patient prone lying knee flexed and ankle plantar flexed then pressing calcaneum and internally rotating tibia [figure 4]. [7] This position was held for 90 seconds. [7] Immediately after treatment session post data for all the outcome measures were taken and noted.

**Statistical Analysis:** statistical analysis was done by SPSS software version 20. Significance level was kept at 5%.

Intragroup comparison was done by paired t-test and intergroup comparison was done by unpaired t-test.

## RESULT

21 females' and 9 males' participants with mean age group 22.86±2.86 years. Comparison of difference in pre-data and post-data for group A: MET is given in table 1 and comparison of difference in pre-data and post-data for group B: PRT is given in table 2. Between group comparison that is between group A and group B is given in table 3.

Table 1 shows mean and standard deviation of Group A before and immediately after the treatment on SLR90<sup>0</sup>-90<sup>0</sup>, Ankle DF ROM, Y-Balance Test.

Table 1

Group A – MET				
	PRE Mean ± SD	POST Mean ± SD	Mean difference	P Value
SLR 90 <sup>0</sup> -90 <sup>0</sup>	38.80±9.60	33.13±8.78	5.67	.000
Ankle DF ROM	14.73±1.94	19.66±2.28	4.93	.006
Y-Balance Test	75.94±7.43	88.40±9.64	12.46	.000

Table 2 shows mean and standard deviation of Group B before and immediately after the treatment on SLR90<sup>0</sup>-90<sup>0</sup>, Ankle DF ROM, Y-Balance Test.

Table 2

Group B – PRT				
	PRE Mean ± SD	POST Mean ± SD	Mean difference	P Value
SLR 90°-90°	40.86±11.07	35.73±10.85	5.13	0.000
Ankle DF ROM	14.20±2.27	10.60±2.00	5.4	0.000
Y-Balance Test	6		.19	0.000

Between group analysis				
	GROUP-A Mean ± SD	GROUP-B Mean ± SD	Mean difference	P Value
SLR 90°-90°	6.00±2.138	5.13±1.99	0.866	0.261
Ankle DF ROM	5.00±1.73	5.60±1.45	0.600	0.313
Y-Balance Test	12.58±4.24	7.19±2.77	5.39	0.000

Table 3 shows mean and standard deviation of between group A and group B immediately after the treatment on SLR90°-90°, Ankle DF ROM, Y-Balance Test.

## DISCUSSION

The purpose of this study was to find the effective treatment for increasing flexibility and improving Y-Balance test performance between MET and PRT. Total 30 subjects were assessed for the tightness and Y-Balance test was taken. Then subjects were divided randomly in to two groups: Group A – MET, Group B – PRT. Both group shows improvement in flexibility and Y-Balance test. But when compared between two groups MET shows better improvement as compare to PRT for Y-Balance test performance. The effects of MET component for increase in ROM post intervention can be explained on the basis of physiological mechanisms behind the changes in muscle extensibility - reflex relaxation, and changes to stretch tolerance.<sup>[6]</sup> Also in MET active muscle contraction on the part of subject is there.<sup>[6]</sup> According to Karel Lewit during relaxation (in which the shortened musculature is taken gently to its new limit without stretching) the stretch reflex is avoided - a reflex which may be brought about even by passive and non-painful stretch.<sup>[6]</sup> Lewit concludes that this method demonstrates the close connection between tension and pain, and between relaxation and analgesia.<sup>[6]</sup> Positional release therapy treatment is accomplished by placing the involved tissues in an ideal position of comfort (POC).<sup>[7]</sup> The purpose

of the POC is to reduce the irritability of the tender point and to normalize the tissues associated with the dysfunction.<sup>[7]</sup> The therapeutic effect of PRT may be explained by several neuromuscular pathophysiological mechanisms: proprioceptive systems, nociceptive pathways, the facilitated segment, and fascial dysfunction.<sup>[7]</sup>

A study by Mohd. Waseem et al.; shows that MET is significant in improving the hamstring flexibility (range of motion) in collegiate males.<sup>[12]</sup> A study by Manivannan M et al.; concluded that no statistically significant differences were found in between two groups (passive stretching and PRT) Post-test values in bringing lumbar flexion movement flexibility more beneficial. Both techniques are equally effective in bringing lumbar flexion range of motion flexibility.<sup>[13]</sup>

Another study by Richa Mahajan et. al, shows that MET was superior than static stretching in decreasing pain intensity and increasing active cervical range of motion in patient with subacute neck pain.<sup>[14]</sup>

A study by Mohamed MN shows that Positional release therapy is considered as an effective treatment for reducing pain, functional disability and increasing lumbar range of motion in individuals with chronic mechanical low back pain.<sup>[15]</sup>

Another study by Roshan Adkitte et. al, on effect of muscle energy technique on flexibility of hamstring muscle in Indian national football players shows that MET increases the flexibility of hamstring muscle in Indian National Football Players and hence it can prevent the injuries and improves their performance. [16]

Limitations of the study were male participants were less as compared to female participants, small sample size. Further studies can be done by focusing on large sample size, same study can be done in another age group also.

## CONCLUSION

This study concludes that individual receiving MET has more beneficial effect on Y-balance test while there is no significant difference on SLR90<sup>0</sup>-90<sup>0</sup>, and Ankle dorsiflexion ROM between two groups.

**Clinical implication:** Thus, based on results both MET and PRT is effective for improving flexibility but, MET is more effective for improving flexibility of tighten muscles. So these techniques can be used for improving flexibility.

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