



# **“EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE VERSUS STATIC STRETCHING IN SUBJECT WITH TIGHT PIRIFORMIS IN MALE OFFICE GOING SUBJECTS: A RANDOMIZED CLINICAL TRIAL”**

Sumeet Roy & Nirali Solanki, Shivam Acharya (MPT), Arvind Chauhan (Phd)

Research Candidate, Assistant Professor, Principal & Professor  
Venus Institute of Physiotherapy,  
Swarnim Startup & Innovation University, Gandhinagar, India

## **ABSTRACT**

### **TITLE:**

EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE VERSUS STATIC STRETCHING IN SUBJECT WITH TIGHT PIRIFORMIS IN MALE OFFICE GOING SUBJECTS: A RANDOMIZED CLINICAL TRIAL.

### **BACKGROUND:**

Piriformis tightness is an uncommon problem within our society affecting individual's physical and social functioning and interfering sufferer's daily activities. The tightness is very difficult to diagnose in an early period due to lack to symptoms. But this leads to reduction of ROM and affects flexibility. If notdiagnose earlier than it may exacerbate to Pirifromis Syndrome. This study is helpful for both diagnosis of Pirifromis tightness and to release the tightened structures using MET and Static Stretching.

### **METHODOLOGY:**

Subjects will be selected based on the inclusion criteria from various hospitals of Ahmedabad. LEFS will be used to determine the present condition of the subjects. Then the subjects will be divided into 2 groups using convenience sampling method. Group A comprised of 15 subjects will be given MET for 4 weeks, 7 sessions per week with 10-15 minutes of treatment time. Group B comprised of 15 subjects will be given Static stretching for 4 weeks, 7 sessions per week with 10-15 minutes of treatment time.

**RESULT:**

On comparing the Mean values of Group A & Group B on ROM & LEFS, group A showed a highly significant difference in Mean values at  $P < 0.001$ .

**CONCLUSIONS:**

The study reveals that Muscle Energy Technique is more effective comparing to Static Stretching for subjects with tight piriformis muscle.

**KEYWORDS:**

Piriformis syndrome,

**INTRODUCTION***INTRODUCTION***INTRODUCTION**

Piriformis tightness is an uncommon problem within our society affecting individual's physical and social functioning and interfering sufferer's daily activities but neglected because of incapability of self- diagnose of the root cause which keeps getting worse by time.

MET or Muscle Energy Technique are a class of soft tissue osteopathic manipulation methods that incorporate precisely directed and controlled patient initiated, isometric or isotonic contractions, designed to improve musculoskeletal function and reduce pain.<sup>1</sup> MET evolved out of osteopathic procedures developed by pioneer practitioners such as T.J Ruddy (1961), who termed this approach

-resistive duction, and Fred Mitchell Snr (1967).<sup>1</sup> MET emerged squarely out of osteopathic tradition, although a synchronous evolution of treatment method, involving isometric contractions and stretching was taking place independently in physical therapy called proprioceptive neuromuscular facilitation.<sup>1</sup>

The piriformis muscle is a muscle of the posterior pelvic wall and gluteal region of the lower limb.<sup>1</sup> There are different types of variations of MET available which are supposed to use for different purpose these variations are Mitchell's view, Janda's view, Ruddy's methods – 'pulsed MET'.<sup>1</sup>

Stretching is the elongation of the pathologically shortened or tightened soft tissues with the help of some therapeutic techniques.<sup>2</sup>

Types of stretching are:<sup>3</sup>

1. Static Stretching
2. Cyclic/ Intermittent stretching
3. Ballistic stretching
4. PNF stretching
5. Manual stretching
6. Mechanical stretching
7. Self- stretching

## 8. Passive stretching

## 9. Active stretching

Among the different types of the techniques static stretching is a commonly used method of stretching in which soft tissues are elongated just beyond the point of tissue resistance and then held in the lengthened position with a sustained stretch force over a period of time. The duration of static stretching can be predetermined prior to stretching or be based on the patient's tolerance and response during the stretch. Static stretching is well accepted as an effective method to increase flexibility and ROM and is considered safer than the ballistic stretching.<sup>3</sup>

## ANATOMY:

- **Origin:** Anterior surface of the sacrum between anterior sacral foramina.<sup>4</sup> Gluteal surface of ilium near posterior inferior iliac spine.<sup>4</sup>
- **Insertion:** Medial side of the superior border of greater trochanter of femur.<sup>4</sup>
- **Innervation:** Branches from S1 & S2.<sup>4</sup>
- **Action :** Laterally rotates the extended femur at hip joint; abducts flexed femur at hip joint.<sup>4</sup>

The piriformis is a flat muscle; Pyramid in shape lying almost parallel with the posterior margin of the gluteus medius.<sup>5</sup> It is a muscle that lies deep within the gluteus maximus. The muscle passes out of the pelvis through the greater sciatic foramen.<sup>5</sup>

➤ The structures passing below the piriformis:<sup>4</sup>

- Inferior gluteal nerve
- Inferior gluteal vessels
- Sciatic nerve
- Posterior cutaneous nerve of thigh
- Nerve to Quadratus Femoris
- Nerve to Obturator Internus
- Internal pudendal vessels
- Pudendal nerve

Above All the structures passing below the piriformis muscle the sciatic nerve is the greater concern. It is found in the studies that 6% of patients who are diagnosed with low back pain actually have piriformis syndrome.<sup>6,7</sup> Piriformis syndrome is a neuromuscular condition characterized by hip & buttock pain.<sup>8</sup> This syndrome is often overlooked in clinical settings because its presentation may be similar to that of Lumbar Radiculopathy, Primary Sacral Dysfunction or Innominate Dysfunction.<sup>8</sup> Piriformis syndrome is most often caused by macro trauma to the buttocks, leading to inflammation of soft tissue, muscle spasm, or both, with resulting nerve compression. Micro trauma may result from overuse of the piriformis muscle, such as in long-distance walking or running or by direct compression. An example of this kind of direct compression is "wallet neuritis" (i.e., repetitive trauma from sitting on hard surfaces).<sup>9, 10, 11, 12, 13</sup>

*Different treatment methods that are available for PIRIFORMIS SYNDROME:*

Throughout the physical evaluation of patients, clinicians should maintain a high index of suspicion for piriformis syndrome. Early conservative treatment is the most effective treatment, as noted by Fishman et al<sup>14</sup>, who reported that more than 79% of

patients with piriformis syndrome had symptom reduction with use of nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, ice, and rest.

Stretching of the piriformis muscle and strengthening of the abductor and adductor muscles should also be included in patient treatment plans.<sup>16</sup> A manual medicine approach may combine muscle stretches, Gebauer's spray and stretch technique, and soft tissue, myofascial, muscle energy, and thrust techniques to address all somatic dysfunctions in the patient with piriformis syndrome.<sup>16,17</sup> If the patient does not respond adequately to manual treatment, then acupuncture and trigger point injection with lidocaine hydrochloride, steroids, or botulinum toxin type A (BTX-A) may be considered.<sup>18</sup>

If all of the pharmacologic and manual medicine treatments fail, the final treatment option is surgical decompression.<sup>18</sup> The goals of osteopathic manipulative treatment (OMT) for patients who have piriformis syndrome are to restore normal range of motion and decrease pain. These goals can be achieved by decreasing piriformis spasm. Indirect osteopathic manipulative techniques have been used to treat patients with piriformis syndrome. The two indirect OMT techniques most commonly reported for the management of piriformis syndrome are counterstrain and facilitated positional release.<sup>19,20</sup> Both techniques involve the principle of removing as much tension from the piriformis muscle as possible. As a last resort, surgery has been occasionally used in cases that have failed to resolve with the use of other treatment measures. The goal of surgery in these cases is to reduce any tension under which the piriformis muscle may be placed, as well as to explore the sciatic notch to ensure that there are no fibrous bands or constrictions compressing the sciatic nerve. Among all the treatment methods static stretching and MET are more concerned and so their effectiveness comparison is focused in this study.

#### REVIEW OF LITERATURE

### REVIEW OF LITERATURE

#### **1. EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE VERSUS STRETCHING IN SUBJECT WITH PIRIFORMIS SYNDROME VANI VIJAYAN, PAVITHRA S (2019)<sup>21</sup>**

- The study reveals that there is more significant difference in the muscle energy technique along with short wave diathermy is effective when compared to the stretching with short wave diathermy on subjects with piriformis syndrome.
2. COMPARITIVE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE & STATIC STRETCHING FOR TREATMENT OF SUBACUTE MECHANICAL NECK PAIN RICHA MAHAJAN ET AL (2012)<sup>22</sup>
- This study concluded that both the treatment techniques, muscle energy technique and static stretching were effective in alleviating the mechanical neck pain in terms of decreasing pain intensity and increasing active cervical range of motion as there was no significant difference between the two groups, however MET was superior than static stretching in decreasing pain intensity and increasing active cervical range of motion.
3. HAMSTRING FLEXIBILITY IN YOUNG WOMEN FOLLOWING PASSIVE STRETCH & MUSCLE ENERGY TECHNIQUE AZADEH SHAHMEHR, ET AL (2009)<sup>23</sup>

- The present study demonstrated that the two methods of passive static stretch and active muscle energy technique were not significantly different for improving hamstrings flexibility. Although we didn't observe any significant differences between two methods, the finding of this study may help future randomized clinical trials to compare various stretching methods with different parameters. Also, our observations tend to indicate that muscle energy technique has an early effect on improving the muscle's flexibility compared with the passive stretch method.
4. MUSCLE ENERGY TECHNIQUE FOR NON-SPECIFIC LOW BACK PAINH FRANKE, G FRYER (2015)<sup>24</sup>
- The quality of research related to testing the effectiveness of MET is poor. Studies are generally small and at high risk of bias due to methodological deficiencies. Studies conducted to date generally provide low-quality evidence that MET is not effective for patients with LBP. There is not sufficient evidence to reliably determine whether MET is likely to be effective in practice. Large, methodologically-sound studies are necessary to investigate this question.
5. MUSCLE ENERGY TECHNIQUE IN PATIENTS WITH ACUTE LOW BACK PAIN: A PILOT CLINICAL TRIAL E.WILSON, O PAYTON ET AL (2003)<sup>25</sup>
- Results from this pilot study suggest that MET of combined with supervised neuromuscular re- education and resistance training exercises may be superior to supervised neuromuscular re- education ns and resistance training exercises alone for decreasing f- disability and improving function in patients with acute low back pain. The MET and the neuromuscular re-education and resistance training are exercises were operationally defined to allow the intervention to be easily reproduced in the clinical n setting. The reader must keep in mind that this is an initial study and while the results are clinically relevant, they should not be over generalized. Much more needs to be learned to clarify the role of manual therapy, MET, and neuromuscular re-education and resistance training exercises in the management of acute low back pain.
6. THE EFFECTIVENESS OF MYOFASCIAL RELEASE OVERSTRETCHING ON PAIN AND RANGE OF MOTION AMONG FEMALE COLLEGE STUDENTS WITH PIRIFORMIS SYNDROME S.RAJENDRAN,SS SUNDARAM (2020)<sup>26</sup>
- Myofascial release is a manual treatment approach done by physical therapists. Stretching, on the other hand, is a conventional treatment approach that is simple and easy to be carried out without the need for supervision. In this study, both groups were treated with standard physical therapy approach e.g.: group 1 with myofascial release and group 2 with stretching. Both these treatments have reached the conclusion of being beneficial in reducing pain and improving range of motion. There were no significant improvements for myofascial release over stretching between the two groups.
7. PREVALENCE OF PIRIFORMIS TIGHTNESS IN HEALTHY SEDENTARY INDIVIDUALS: A CROSS SECTIONAL STUDY MALAIKA MONDAL ET AL (2017)<sup>27</sup>

- Prevalence of piriformis muscle tightness in sedentary individuals was found to be 79.5% in this study which concludes that person who have long hour of sitting and certain period of standing and walking are affected mostly with piriformis tightness. Young adults mostly in third decade were found to be most affected with piriformis muscle tightness than any other age group. So, the preventive measures such as proper sitting posture, strengthening of abductor muscles and change in walking habits etc. could be explained to sedentary population to prevent piriformis tightness which further prevent the piriformis syndrome and the episodes of low back pain.
8. PREVALENCE OF PIRIFORMIS SYNDROME IN CHRONIC LOW BACK PAIN PATIENTS : A CLINICAL DIAGNOSIS WITH MODIFIED FAIRTEST CHEE KEAN CHEN ET AL (2012)<sup>28</sup>
- Piriformis syndrome is a painful condition that is often overlooked in the differential diagnosis of chronic buttock or low back pain. The modified FAIR test together with piriformis muscle injection is potentially a reliable method for the clinical diagnosis of piriformis syndrome.

#### NEED OF STUDY

#### *NEED OF STUDY*

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### **NEED OF STUDY**

Both Static stretching and MET are useful for treating tightened muscle. But to know whether which is more effective for a subject with a piriformis tightness side by side comparison is required to get the proper knowledge of which one should be used more often. This study focuses on the effectiveness between MET and Static Stretching so that those with tightened piriformis can utilize the best technique to prevent Piriformis Syndrome.

#### OBJECTIVES OF THE STUDY

#### *OBJECTIVES OF THE STUDY*

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### **OBJECTIVE OF THE STUDY**

#### **AIMS OF THE RESEARCH: -**

Comparison of effectiveness of MET versus Static stretching for piriformis tightness in office going male subjects of Ahmedabad.

## **OBJECTIVE OF RESEARCH:-**

To compare the effects of static stretching and MET on hip joint ROM and LEFS

### HYPOTHESIS

*HYPOTHESES*

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## **HYPOTHESIS**

### **NULL HYPOTHESIS –**

There will be no significant effect of MET or Static Stretching on subject with piriformis tightness

### **RESEARCH HYPOTHESIS –**

There will be significant effect of MET or Static Stretching on subject with piriformis tightness

### **MATERIALS & METHOD**

*MATERIALS*

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- 1) Goniometer
- 2) Plinth
- 3) LEFS
- 4) Pen



Photograph 1: Materials for Research

## *METHOD*

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### *Inclusion Criteria:*

- 1) Male Office going subjects
- 2) Age 25-45 years
- 3) Positive test for Active Piriformis Test

### *Exclusion Criteria:*

- 1) Age below 25 and above 45
- 2) H/O Fracture of Pelvis, Femur, Sacrum
- 3) Subjects with skin infections, any cardiopulmonary condition, any neurological condition.

## METHODOLOGY

### *METHODOLOGY*



## METHODOLOGY

### **11 PROCEDURE/METHODOLOGY:-**

#### **PROCEDURE:-**

Subjects will be selected based on the inclusion criteria from various hospitals of Ahmedabad. The subjects will be explained about the complete procedure.

LEFS will be used to determine the present condition of the subjects.

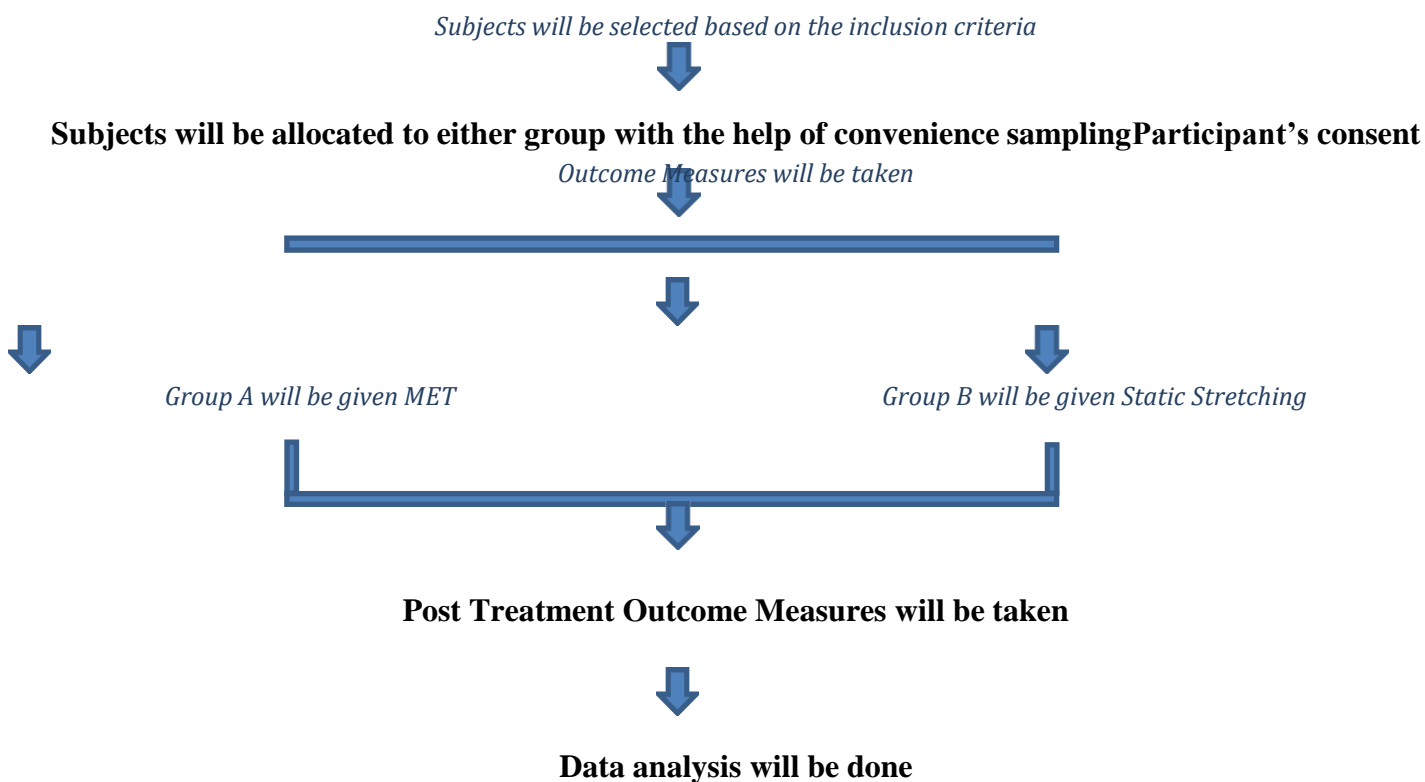
Then the subjects will be divided into 2 groups using convenience sampling method.

Group A comprised of 15 subjects will be given MET for 4 weeks, 7 sessions per week with 10-15 minutes of treatment time

Group B comprised of 15 subjects will be given Static stretching for 4 weeks, 7 sessions per week with 10-15 minutes of treatment time.

Post treatment Outcome measure will be taken using both Goniometer and LEFS.

Data Analysis will be done.

**FLOW CHART:-****GROUP A WITH MET:**

*Within the MET there are 4 different techniques for the treatment of piriformis tightness these are.<sup>29</sup>*

**1. Method (i)**

- The patient should be in a side lying position, close to the edge of the table, affected side uppermost both legs flexed at hip and knee.
- The practitioner stands facing the patient at hip level.
- The practitioner places his cephalad elbow tip gently over the point behind the trochanter, where piriformis inserts.
- The patient should be close enough to the edge of the table for the practitioner to stabilise the pelvis against his trunk.
- At the same time, the practitioner's caudal hand grasps the patient's ankle and uses this to bring the upper leg/hip into internal rotation, taking out all the slack in piriformis.
- A degree of inhibitory pressure is applied via the elbow for 5-7 seconds while the muscle is kept at a reasonable but not excessive degree of stretch.
- The practitioner maintains contact on the point, but eases pressure and asks the patient to introduce an isometric contraction for 5-7 seconds to piriformis by bringing the lower leg towards the table against

resistance.

## 2. Method (ii)

- This method is a variation on the method described by TePoorten (1960) which calls for longer and heavier compression, and no intermediate isometric contractions.
- The patients lying on the non-affected side with knees flexed and hip joints flexed to 90 degree.
- The practitioner places his elbow on the piriformis musculotendinous junction, and a steady firm pressure is applied.
- With his other hand the practitioner abducts the foot in order to force an internal rotation of the hip.
- The leg is held in this position for up to 2 minutes with sustained compression by the elbow of the piriformis attachment area.
- The entire procedure is repeated two or three times.
- The patient then placed in the supine position and piriformis is retested.

## 3. Method (iii)

- In this method with the patient supine, the treated leg is placed into flexion at the hip and knee, so that the foot rests on the table lateral to the contralateral knee (the leg on the side to be treated is crossed over the other, straight leg).
- The angle of hip flexion should not exceed 60 degree.
- The practitioner places one hand on the contralateral ASIS to prevent pelvis motion, while the other hand is placed against the lateral flexed knee as this is pushed into resisted abduction to contract piriformis for 7-10 seconds.
- Following the contraction the practitioner eases the treated side leg into adduction until a sense of resistance is noted; this is held for 10-30 seconds.

## 4. Method (iv)

- In this method the hip is flexed beyond 60 degree and the hip fully externally rotated to its barrier.
- The patient attempts- using minimal effort to internally rotate the hip against resistance.
- Following this the hip is flexed further and externally rotated further and held for 30 seconds, before repeating the sequence.



Photograph 2: Muscle energy technique for Piriformis

## GROUP B WITH STATIC STRETCHING :-

## 1. Method (i)

In this method practitioner manual stretches the piriformis:

- The patient lies in supine position the affected leg is placed into flexion at hip and knee so that the foot rests on the table lateral to the contralateral knee.
- The practitioner places one hand over the contralateral ASIS to stabilize the pelvis during the exercise and passively adducts and internally rotates the hip medially till the pain is bearable.
- The process is repeated 3-5 times with a 30 seconds hold.

## 2. Method (ii)

These are self-stretching manoeuvre that subjects can also perform without any supervision:

- *While sitting:*
- Subject will be sitting in chair with affected leg resting above the non-affected leg externally rotated and hip flexed to 90 degree.
- While keeping the spine straight, forward flex the trunk towards the affected knee till pain is felt
- Hold the position for 30 seconds.
  
- *While lying supine :*
- Subject will be in lying in the side lying position with the affected leg on top.
- The subject will then flex the hip till 60 degree and tuck the affected foot in the popliteal surface of the unaffected leg.
- Then the subject has to touch the affected knee to the surface of the floor and stabilize the affected knee with the corresponding shoulder.
- The subject has to abduct the contralateral shoulder till it touches the floor so that trunk rotation takes place and stretching applies to the muscle.



Photograph 3: Piriformis Self stretching technique

## DATA ANALYSIS:-

The collected data was analyzed using Statistical Package of Social Science (SPSS) version 28. Paired T-Test was utilized to find the statistical difference within the groups & Independent T-Test (Student T- Test) was used to find the statistical difference between the groups.

**Table 1:** Comparison of ROM between Group – A and Group - B in pre and post test (intergroup test).

ROM	Group A		Group B		t-Test	Df	SIGNIFICANCE
	Mean	S.D	Mean	S.D			
Pre test	30.06°	7.62°	31.8°	4.85°	0.781	14	.224*
Post test	42.8°	2.95°	41.3°	2.76°	1.603	14	.000*

Group A - Muscle Energy Technique, Group B - Static Stretching (\*\*\*- P < 0.001).

This table shows that there is no significant difference in pre test values of the ROM between Group A & Group B (\*P > 0.05).

This table shows that there is statistically high difference in post test values between Group A & Group B (\*\*\*- P < 0.001).

**Table 2:** Comparison of LEFS between Group – A and Group - B in pre and post test (intergroup test).

LEFS	Group A		Group B		t-Test	Df	SIGNIFICANCE
	Mean	S.D	Mean	S.D			
Pre test	34.25	3.12	33.86	2.85	0.404	14	.346*
Post test	79.3	1.11	77	3.22	2.614	14	.000*

Group A - Muscle Energy Technique, Group B - Static Stretching (\*\*\*- P < 0.001).

This table shows that there is no significant difference in pre test values of the LEFS score between Group A & Group B (\*P > 0.05).

This table shows that there is statistically difference in post test values of LEFS score between Group A & Group B (\*\*\*- P < 0.001).

**Table 3:** Comparison of ROM within Group – A & Group – B between pre & post test values (intragroup test)

ROM	Pre test		Post test		t-Test	Df	SIGNIFICANCE
	Mean	S.D	Mean	S.D			
Group A	30.06°	7.62°	42.8°	2.95°	-6	14	.000*
Group B	31.8°	4.85°	41.3°	2.76°	-6.6	14	.000*

Group A - Muscle Energy Technique, Group B - Static Stretching (\*\*\*- P < 0.001).

The table shows that, in ROM, there is statistically high significant difference between the pre test and post test values between the Group A & Group B (\*\*\*- P < 0.001).

**Table 4:** Comparison of LEFS score within Group – A & Group – B between pre & post test values (intragrouptest)

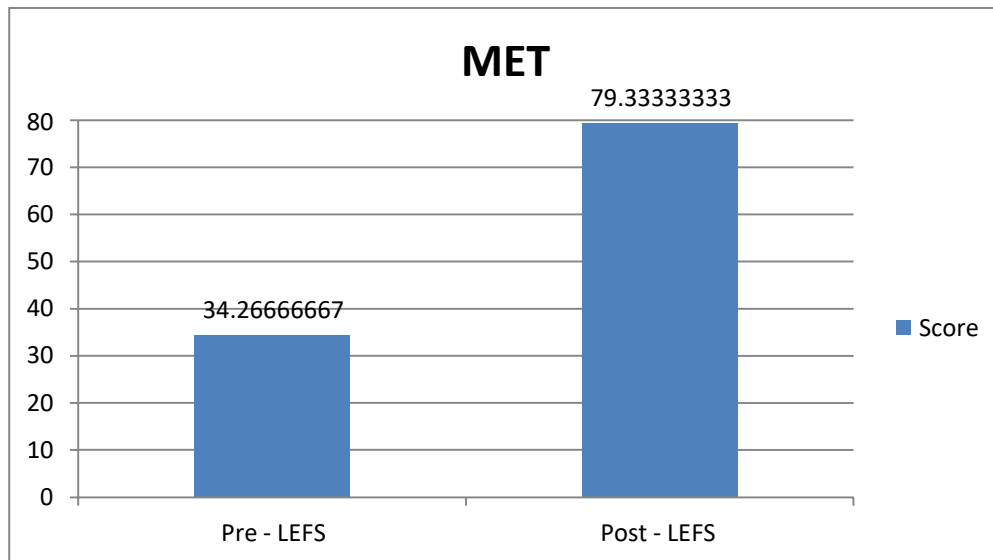
LEFS	Pre test		Post test		t-Test	Df	SIGNIFICANCE
	Mean	S.D	Mean	S.D			
Group A	34.25	3.12	79.3	1.11	-52	14	.000*
Group B	33.86	2.85	77	3.22	-38	14	.000*

Group A - Muscle Energy Technique, Group B - Static Stretching (\*\*\*- P < 0.001).

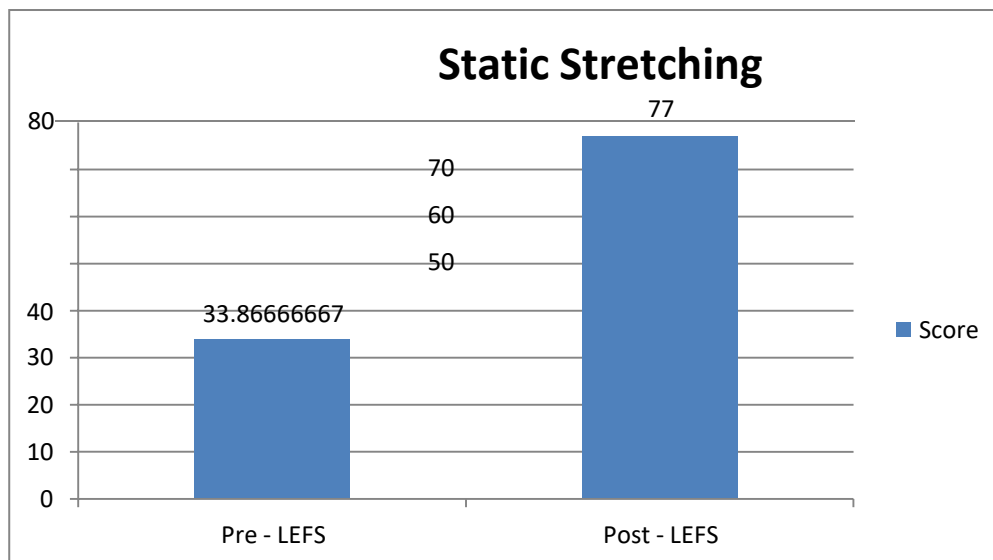
The table shows that, in LEFS, there is statistically high significant difference between the pre test and post test values between the Group A & Group B (\*\*\*- P < 0.001).

GRAPH:-

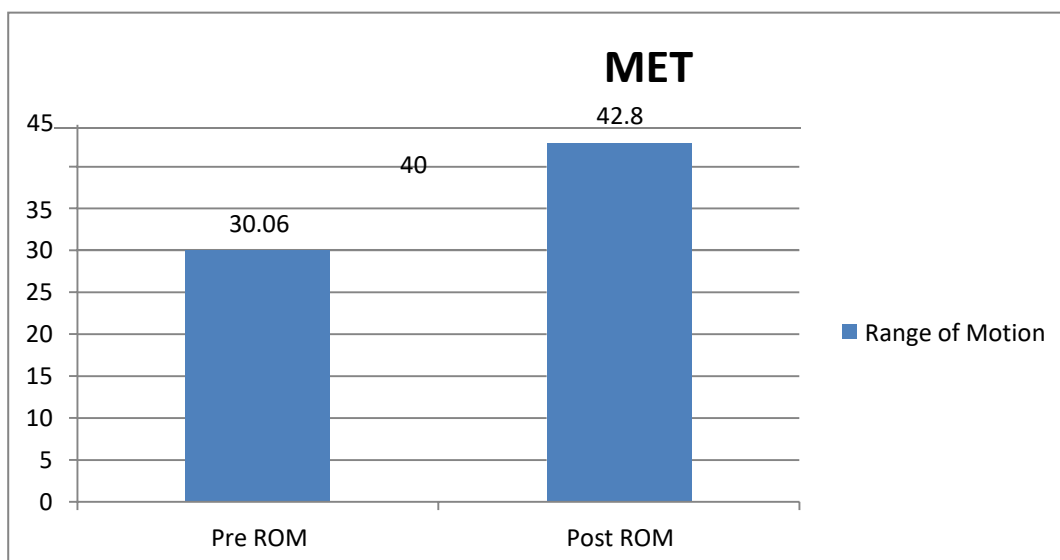
**Graph 1:** Mean LEFS between Pre and Post test results of MET



Graph 2: Mean LEFS between Pre and Post test results of MET

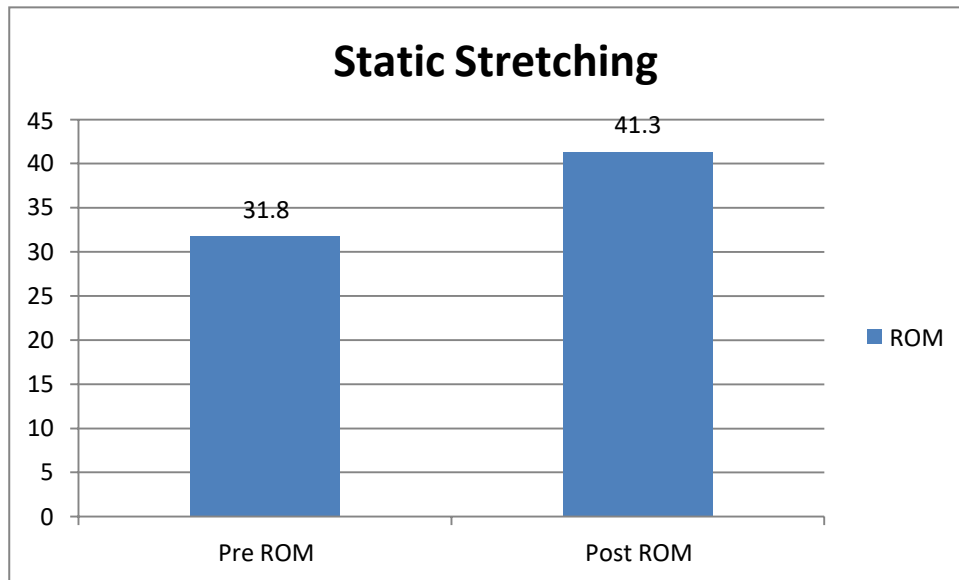


Graph 3: Mean ROM Pre and Post test results of MET

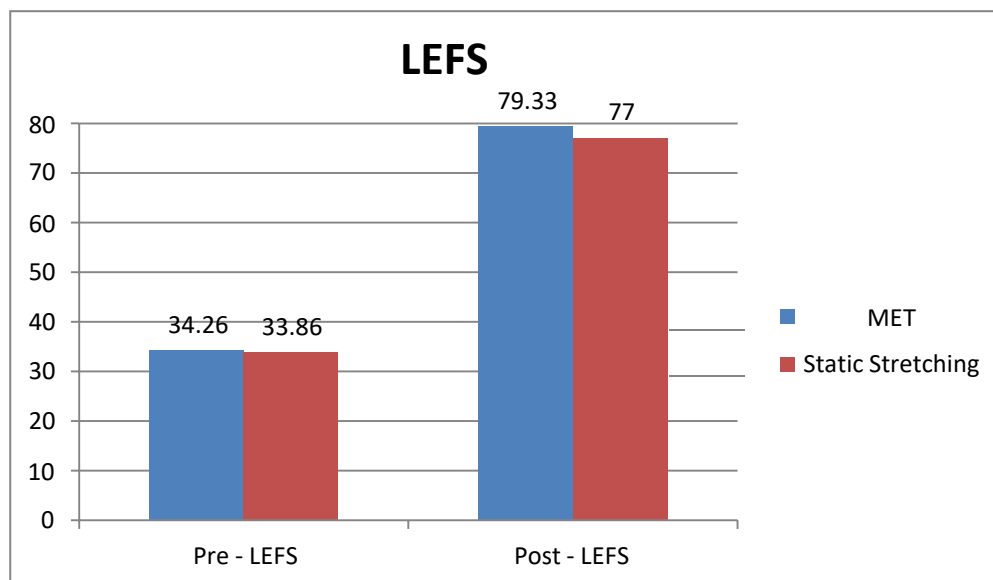


Graph 4: Mean ROM Pre and Post test results of Static Stretching

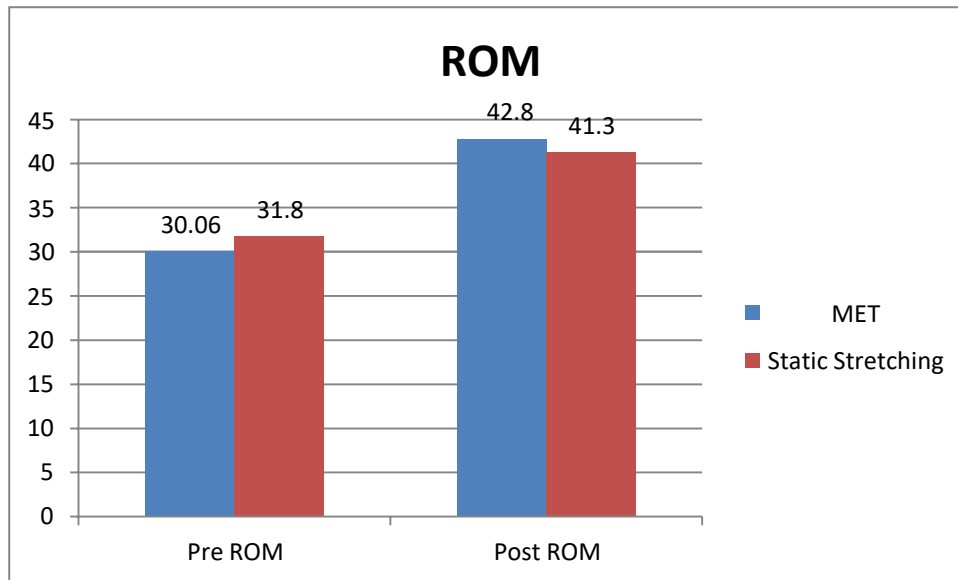




**Graph 4:** Comparison of Mean LEFS between Pre and Post test results of both MET and StaticStretching



**Graph 5:** Comparison of Mean ROM between Pre and Post test results of both MET and StaticStretching



## RESULT

## RESULT

On comparing the mean values of Group A & Group B on ROM, it shows significant increase in posttest Mean values but (Group A - Muscle Energy Technique) shows (42.8°) which has the Higher Mean Value is more effective than (Group B - Stretching) (41.3°) at  $P \leq 0.001$ . Hence Null Hypothesis is rejected. On comparing the Mean Values of Group A & Group B on LEFS, it shows significant increase in Post Test Mean value but (Group A - Muscle Energy Technique) shows (79.3) which has the Higher Mean value is more effective than (Group B - Stretching) (77) at  $P \leq 0.001$ . Hence Null Hypothesis is rejected. On comparing Pretest and Posttest within Group A & Group B on ROM & LEFS shows highly significant difference in Mean values at  $P \leq 0.001$ .

## DISCUSSION

### *DISCUSSION*

## DISCUSSION

This study aimed to determine the effectiveness of Muscle Energy Technique compared to Static Stretching on office going subjects with Piriformis tightness. In this study subjects with positive Active Piriformis Test and those who fulfill inclusion criteria are taken. The outcome was measured using ROM and LEFS. The outcome measures were assessed prior the treatment (pre test) and then after 4 weeks of treatment (post test) for both groups. The data was analyzed statistically. The statistical data reveals that Muscle Energy Technique is effective compared to Static Stretching.

In table-1, ROM between Group A and Group B shows that statistical difference exists between the post test value (.000\*\*\*) when compare to pre test value (.224). In table-2, LEFS score between Group A and Group B also shows that the statistically difference between post test value (.000\*\*\*) when compare to pre test value (.346). In table 3&4 shows that ROM and LEFS score within the Group A and Group B shows statistically high significant difference between pre test and post test (.000\*\*\*)

When a muscle is isometrically contracted, its antagonist will be inhibited and will demonstrate reduced tone immediately following this. Thus as part of an MET procedure, the antagonist of a shortened muscle, or group of muscles, may be isometrically contracted in order to achieve a degree of ease and additional movement potential in the shortened tissues.<sup>1</sup>

During passive stretch both longitudinal and lateral force transduction occurs. When initial lengthening occurs in the series elastic (connective tissue) component, tension rises sharply. After a point, there is mechanical disruption (influenced by neural and biochemical changes) of the cross bridges as the filaments slide apart, leading to abrupt lengthening of the sarcomeres.<sup>3</sup>

# **CONCLUSION AND SUMMARY**

## CONCLUSION & SUMMARY

## **CONCLUSION**

The study reveals that there is a significant difference between the techniques. Muscle Energy Technique is more effective compared to the Static Stretching for subjects with tight piriformis muscle. Hence Muscle Energy Technique should be used more often than static stretching.

## **SUMMARY**

The purpose of the study was to compare the effectiveness of Muscle Energy Technique with Static Stretching in order to determine whether which technique is more effective and should be used more frequently for better results.

### **LIMITATIONS**

#### *LIMITATIONS*

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### **Limitations**

The limitation of this study was only office going subjects has been taken that too with an age restriction.

### **Future recommendation**

A recommendation for further study would be a larger sample size with a larger age group which would provide accurate mean values and detect differences more effectively. This would help Physiotherapists to utilize these techniques much more and to treat the patients with Piriformis tightness.

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**ANNEXURE A****Master Chart**

Sr. No.	Individual	Age	ROM		LEFS	
			Pre Test	Post Test	Pre Test	Post Test
	<b>MET</b>					
1	Ramesh Hatra	33	30°	44°	37	80
2	Vaskar Biswas	38	27°	45°	37	79
3	Prasenjit Dutta	42	15°	38°	33	80
4	Mukund Purabiya	42	32°	40°	37	80
5	Madhai Sardar	37	35°	45°	34	78
6	Pradeep Pal	30	40°	44°	39	79
7	Pranay Bhattacharya	36	28°	40°	32	80
8	M.S Vadher	43	20°	37°	33	80
9	Chirag Patel	27	25°	43°	33	76
10	Tarun Shrimali	28	36°	45°	34	79
11	Suryakumar Chal	45	32°	45°	38	79
12	Shiv Shankar Sarkar	45	39°	45°	35	80
13	Amit Singh	36	23°	45°	28	80
14	Dharmendra More	37	42°	40°	35	80
15	Anoop Ranawat	28	27°	46°	29	80
	<b>Static Stretching</b>					
1	Shailesh Solanki	25	30°	40°	34	75
2	Krunal Solanki	25	28°	36°	34	77
3	Jaydeep Parmar	29	32°	40°	35	80
4	Piyush Anand	33	36°	42°	32	72
5	Bhavesh Chavda	42	29°	38°	30	70
6	Om Anand	25	39°	45°	37	80
7	Yashraj Anand	27	35°	43°	36	80
8	Umesh Chauhan	29	27°	39°	30	78
9	Tarang Dave	40	33°	40°	38	80
10	Shivam Dave	32	20°	40°	29	76
11	Krupal Soni	39	33°	43°	34	79
12	Harsh Prajapati	36	34°	45°	37	80
13	Mahesh Solanki	35	30°	44°	31	79
14	Dharmesh Solanki	40	32°	40°	36	75
15	Jay Kateliya	38	39°	45°	35	74

**ANNEXURE B****PATIENT INFORMATION FORM****Title of the study:**

EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE VERSUS STATIC STRETCHING IN SUBJECT WITH TIGHT PIRIFORMIS IN MALE OFFICE GOING SUBJECTS: A RANDOMIZED CLINICAL TRIAL

**Introduction:**

Piriformis tightness is an uncommon problem within our society affecting individual's physical and social functioning and interfering sufferer's daily activities. The study compares two different technique MET and Static Stretching to find whether which is more effective in reducing muscle tightness

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## CONSENT FORM

# INFORMED CONSENT FORM

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*TITLE OF THE STUDY:*

EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE VERSUS STATIC STRETCHING IN SUBJECT WITH TIGHT PIRIFORMIS IN MALE OFFICE GOING SUBJECTS: A RANDOMIZED CLINICAL TRIAL

**INVESTIGATOR:** Sumeet Roy & Nirali Solanki

**PURPOSE OF RESEARCH:** I have been informed that this study is to compare the effects of MUSCLE ENERGY TECHNIQUE & STATIC STRETCHING in male office going subject with tight Piriformis muscle.

*PROCEDURE:*

I understand that the study involves me to treat tight Piriformis and to do specific exercises, I am also told that I have to co-operate when the therapist will perform the technique.

**RISKS AND DISCOMFORTS:** I understand that I may experience some discomfort during treatment. I understand that Sumeet Roy & Nirali Solanki will be present during the procedure to ensure that I do not injure myself in any way.

**BENEFIT OF THE STUDY:** If MET or Static Stretching are effective reducing the tightness of the piriformis muscle then, it can be added to the treatment regime for improving the quality of life.

**CONFIDENTIALITY:** I understand that, the medical information produced by this study will be confidential. If the data are used for publication the medical literature or for teaching purpose, no names will be used, and other literature, such as photographs and audio- or videotapes, will be used only with my permission.

*REQUEST FOR MORE INFORMATION: I understand that, I may ask more*

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questions about the study at any time to Sumeet Roy or Nirali Solanki on 9106642492 and 7777926929 respectively and that they will be available to answer my questions or concerns.

I understand that, I will be informed of any significant new findings discovered during the course of the study.

**REFUSAL OR WITHDRAWAL OF PARTICIPATION:** I understand that, my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time.

I also understand that Sumeet Roy & Nirali Solanki may terminate my participation in the study at any time after they have explained the reasons for doing so.

**INJURY STATEMENT:** I understand that in unlikely event of injury to me resulting directly from my participation in the study, medical treatment would be available to me, I understand that by my agreement to participate in this study I am not waiving any of my legal rights.

I have explained to \_\_\_\_\_ the purpose of the research, the procedures required, and the possible risks and benefits to the best of my ability.

\_\_\_\_\_  
Investigator

\_\_\_\_\_  
Date

I confirm that Sumeet Roy & Nirali Solanki has explained me the purpose of the research, the study procedure that I will undergo, and the possible risks and discomforts and the benefits that I may experience. I have read and I understand this consent form, therefore I agree to give my consent to participate as a subject in this research project.

\_\_\_\_\_  
Participant

\_\_\_\_\_  
Date



## ASSESSMENT FORM

### *Demographic Data:*

Name:  
Age:  
Sex: Occupation:D.O.A:  
Chief Complaints:

### *History*

Present History:  
Past History: Medical History:

### *On Observation*

Posture:  
Gait:  
Spasm:

**On Palpation**Tenderness: Spasm:

### *On Examination*

Vital signs:

1. Blood Pressure :
  2. Heart Rate:
  3. Respiratory Rate:
  4. SPO2:
- Investigations:

### *Motor Assessment*

R.O.M:  
Endfeel:  
MMT:

### *Special Test*

Active Piriformis Test

### **Differential Diagnosis**Lumbar RadiculopathySI joint dysfunction Sacralisation

Soft tissue injury  
Hip Joint Osteoarthritis

## SCALES

The lower extremity functional scale (LEFS) is a valid patient-rated outcome measure (PROM) for the measurement of lower extremity function. It was first developed by Binkley et al. (1999) in a group of patients with various musculoskeletal conditions.<sup>31</sup>

The objective of the Lower Extremity Functional Scale (LEFS) is to measure "patients' initial function, ongoing progress, and outcome" for a wide range of lower-extremity conditions.<sup>31</sup>

The LEFS is a self-report questionnaire. Patients answer the question "Today, do you or would you have any difficulty at all with:" in regards to twenty different everyday activities.<sup>31</sup>

Patients select an answer from the following scale for each activity listed:

1. Extreme Difficulty or Unable to Perform Activity
2. Quite a Bit of Difficulty
3. Moderate Difficulty
4. A Little Bit of Difficulty
5. No Difficulty

The patient's score is tallied at the bottom of the page. The maximum possible score is 80 points, indicating very high function. The minimum possible score is 0 points, indicating very low function.

Activities	Extreme difficulty or unable to perform activity	Quite a bit of difficulty	Moderate Difficulty	little bit of Difficulty	No Difficulty
1 Any of your usual work, household, or school activities	0	1	2	3	4
2 Your usual hobbies, recreational or sporting activities	0	1	2	3	4
3 Getting into or out of the bath	0	1	2	3	4
4 Walking between rooms	0	1	2	3	4
5 Putting on your shoes or socks	0	1	2	3	4
6 Squatting	0	1	2	3	4
7 Lifting an object, like a bag of grocery from the store	0	1	2	3	4
8 Performing light activities around your home	0	1	2	3	4
9 Getting into or out of the car	0	1	2	3	4
10 Walking 2 blocks	0	1	2	3	4
11 Going up or down 10 stairs	0	1	2	3	4
12 Standing for 1 hour	0	1	2	3	4
13 Sitting for 1 hour	0	1	2	3	4
14 Running on even ground	0	1	2	3	4
15 Running on uneven ground	0	1	2	3	4
16 Making sharp turns while running fast	0	1	2	3	4
17 Hopping	0	1	2	3	4
18 Rolling over in bed	0	1	2	3	4
Column Total :					