INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD
ISSN(O): 2455-0620 [Impact Factor: 9.47]
Monthly, Peer-Reviewed, Refereed, Indexed Journal with IC Value : 86.87
Volume - 10, Issue - 5, May - 2024

DOIs:10.2015/IJIRMF/202405025 --:-- Research Paper / Article / Review

Effectiveness Of Muscle Energy Technique Along With Ultra Sound For Pain And Range Of Motion In Piriformis Syndrome

[1]PRIYA M ., [2]Dr.MANIKANDAN PONNURANGAM., [3]GOKULAKRISHNAN J
[1]Assistant Professor, School Of Physiotherapy, Takshashila University, Tindivanam, Tamilnadu.
[2]Assistant Professor, Department Of Orthopedics,Government Medical College, Viluppuram, Tamilnadu.
[3]Assistant Professor, Thanthai Roever College of Physiotherapy, Perambalur, Tamil Nadu,
[3]Email - janagokul24@gmail.com

Abstract: ***Objective:*** *The piriformis muscle is a small muscle, which runs from the sacrum to the outer hip bone. The muscles in and around the gluteal region help to rotate the hip and leg, assist with balance and help to stabilize the pelvis. Ultrasound is an extremely effective way to stimulate proper tissue healing. Sound waves are generated from a crystal vibrating inside the head of the ultrasound wand and then transmitted through sound conducting gel to the tissue.* ***Methods****: The research was a quasi-experimental study with a pre–post test design.Random sampling was used to enroll 20 patients.The participants were randomly allocated to the Muscle energy technique. All participants were given an explanation of the objective of the study and its requirements, and all those who participated provided written informed consent.* ***Results****: At the beginning the pain was assessed by numerical pain rating scale the value is 6.3 and post test value is 1.05 , The range of motion was assessed by goniometry the value is 27 and the post test value is 44.* ***Conclusions****: According to the results of the present study, it appears that the practice of muscle energy technique along with ultra sound for pain and range of motion in piriformis syndrome is more effective method of intervention.*

Key Words: *Muscle Energy Technique , Piriformis Syndrome , Pain , Ultra Sound.*

1. INTRODUCTION:

The piriformis muscle is a small muscle, which runs from the sacrum to the outer hip bone. The muscles in and around the gluteal region help to rotate the hip and leg, assist with balance and help to stabilize the pelvis. The sciatic nerve, the largest nerve in the body, generally passes underneath the piriformis muscle as it travels down the leg. Piriformis syndrome occurs when the piriformis muscle becomes tight or cramps and compresses the sciatic nerve which causes pain. Typically, the pain of the piriformis syndrome is increased by contraction of the piriformis muscle, prolonged sitting, or direct pressure on the muscle. Buttock pain is common. The piriformis syndrome is one of the causes of sciatica**.** Ultrasound is an extremely effective way to stimulate proper tissue healing. Sound waves are generated from a crystal vibrating inside the head of the ultrasound wand and then transmitted through sound conducting gel to the tissue. This allows the sound waves to break down unwanted scar tissue, increase circulation to the area, and help relax the musculature. This can be extremely beneficial in the case where the Piriformis Syndrome has caused soft tissue irritation to the back. Ultrasound can only be used in the presence of a licensed health practitioner. Post isometric relaxation refers to the subsequent relaxation experienced by a muscle, or group after brief periods of an isometric contraction. It is latent hypotonic state of a muscle following isometric activity, as introduced by Karel Lewitt.

When a muscle is isometrically contracted, its antagonist will be inhibited, and will relax immediately following this. In achieving the PIR, the effect of asustained contraction of the golgi tendon seems pivotal, since their response to such a contraction seems to set the tendon and the muscle to a new length by inhibiting it Moritan et al. MET a product of variety of schools, originated by Fred L. Mitchell Sr,an osteopathic physician Mitchell et al.,and refinements brought about by the work of people such as Karel Lewit and Vladimir Janda are a set of neuropsychological principles to relax over active muscles and stretch chronically shortened muscles.Measurements of the Hoffman reflex shows that the activity is decreased for 25-30 seconds following MET, whereas inhibition from static stretching lasts only for 3-5 sec. PIR and RI are two components of muscles energy technique.

2. NEED FOR THE STUDY:

Pain caused by piriformis syndrome is usually treated by static stretching in the clinical setup. MET is a new emerging 'hands on' technique which is proved to relieve pain in case of muscle spasm by autogenic inhibition.
This study has been conducted to find out the effect of MET along with ultrasound for pain reduction in subjects with piriformis syndrome.

3. AIMS AND OBJECTIVE:

AIMS

- To find out the effectiveness of Muscle energy technique along with ultrasound on reducing pain in piriformis syndrome.

OBJECTIVES:

- To evaluate the pain by using numerical pain rating scale.
- To evaluating the range of motion performance by using goniometer.

4. MATERIALS AND METHODOLOGY:

MATERIALS

- Goniometer
- Couch
- Paper and Pen
- Numerical pain rating scale
- Ultrasound
- Gel
- Cotton

METHODOLOGY:

STUDY DESIGN

Experimental study design

STUDY SETTINGS

The study was conducted at Dr.G.S.Memorial Hospital&Physiotherapy.,Perambalur.,Tamilnadu.

SAMPLING TECHNIQUE

Random sampling

STUDY SAMPLE SIZE

Total 20 patient are taken for study

STURDY DURATION

The study was conducted for a period of Eight month

INCLUSION CRITERIA

- Age : 20 and Above
- Sex : Both Male and Female.
- People diagnosed with piriformis syndrome through FAIR TEST (+)L

EXCLUSION CRITERIA

- Infections and Inflammatory lumbar spine diseases
- Lumbar disc pathology.
- Lumbar Spondylolisthesis.
- Lumbar Spondylolysis.
- Spine Fracture
- Hip Fracture

- Hip Dislocation.
- Lumbar canal stenosis.
- Sacroiliac Joint Strain.
- Lumbosacral facet syndrome.
- Trochanteric Bursitis
- Sensory deficit over the area

STUDY PROCEDURE:-

- A total of 20 patient between 20 and above of age who agreed to participate in the study. The subjects were selected under the condition of people diagnosed with piriformis syndrome and being prescribed physical therapy. Patients with Sacro-ilaic Joint Strain, Lumbar canal stenosis, Lumbar Spondylolysis, Lumbar Spondylolisthesis, hip dislocation, Spine Fracture excluded.
- The participants were randomly allocated to the Muscle energy technique. All participants were given an explanation of the objective of the study and its requirements, and all those who participated provided written informed consent.

OUTCOME MEASURES

NUMERICAL PAIN RATE SCALE

Position of Patients:-

Sitting position

Position of therapist:-

Standing beside to the patient

Application:-

- The NPRS was used to capture the patient's level of pain. Patients were asked to indicate the intensity of their current pain level using an 11- point scale, ranging from 0 (no pain) to 10 (worst pain imaginable) (2).The minimal detectable change (MDC) ranges from 2.1 to 4.3, whereas the MCID ranges from 1.3 to 4.5 points change in patients with neck pain with or without radiculopathy
- The patients were instructed to check the duration time of their pain. A stick mark indicated the duration time of their pain. The closer the stick mark was to 0, the lesser the duration time of pain lasted; 0 indicated a state of absent duration time of pain, while 24 indicated that pain lasted all day long (24 h).

GONIOMETER:

Position of Patients:-

Sitting position.

Position of therapist:-

Standing beside to the patient

Application:-

- Axis: Tip of the patella is taken as the axis.
- Movable arm: It is placed over the midline of the anterior aspect of the leg and is holding By the therapist's right hand.
- Stable arm: Stable arm is placed straight line to the movable arm and holding by the therapist's left hand
- Procedure: Therapist right hand is performing the medial and lateral rotation movement of the hip with the goniometer and measuring the angle to see the passive range of motion and the active range of motion is measured by patient himself performing the movement

FAIR TEST

Position of Patients:-

Position the patient in the side lying with the tested hip on top.

Position of therapist:-

Standing beside to the patient.

Application

Passively move the patient's lower extremity into flexion (90 degrees), adduction, and internal rotation. The examiner stabilizes the hip and applies downward pressure to the knee to internally rotate and adduct the hip ,Thus placing the piriformis on a stretch that compresses the sciatic nerve. A positive test occurs when pain is produced in the sciatic / gluteal area. Due to the position of the test, pain may produce in the anterior thigh as well as a result of femoral acetabular impingement, so it is important to ask where they are feeling the pain.

MUSCLE ENERGY TECHNIQUE

Position of Patients:-

Side lying close to the edge of the table.

Position of therapist:-

Standing beside to the patient.

Application:-

- The affected side legs flexed at hip and knee.Therapist stands facing at the hip level.Therapist places cephalad elbow tip gently on access point behind trochanter, where piriformis inserts.
- Patient should be close enough to the edge of the table for the therapist to stablize the pelvis against his trunk. At the same time therapist's caudal hand grasps ankle and brings upper leg / hip into internal rotation ,stretching piriformis.
- A degree of inhibitory pressure is applied via the elbow for 5 to 10 seconds while the muscle is kept at a reasonable but not excessive degree of stretch .The operator maintains contact but eases pressure and ask the patient to introduce an isometric contraction in piriformis by bringing the lower leg towards the table against resistance
- After the contraction ceases and the patient relax, reapply elbow pressure after taking the lower limb to its new resistance barrier ,allowed by release of piriformis tension Repeat until no further gain is achieved.

  Holding time : 5 – 10 Sec.
  Repetitions : 3 – 5 Sec.
  Sessions : 2 Sessions per day.
  Duration : 5 – 10 Minutes.

ULTRASOUND THERAPY

Position of Patients:-

Side lying.

Position of therapist:-

Standing beside to the patient.

Application:-

Position of the patient : Side lying

Area of the application : Insertion of piriformis muscle in to greater trochanter / site of maximum

tenderness in piriformis muscle

Treatment duration : 10 – 15 Minutes
Intensity : 2.25-2.5 Watts / cm2
Frequency of machine : 1 MHz
Mode : Pulsed (1:4)
Method : Direct
Coupling agent : Aquasonic gel
Frequency of treatment : Twice a day

5. DATA ANALYSIS:

A Sample of 20 subjects where included for the study. Mean and mean difference calculated the test was applied to the group Pre and Post treatment values.

FORMULA OF MEAN:-
$M = \sum X/N$
M = Mean
$\sum$ = Sum of all subjects
N = Number of all subjects

TABLE 2 : MEAN VALUE OF NUMERICAL PAIN RATING SCALE

	N	MEAN	MEAN DIFFERENCE
PRE	20	6.3	5.39
POST	20	1.05	

GRAPH 1: MEAN VALUE OF NUMERICAL PAIN RATING SCALE

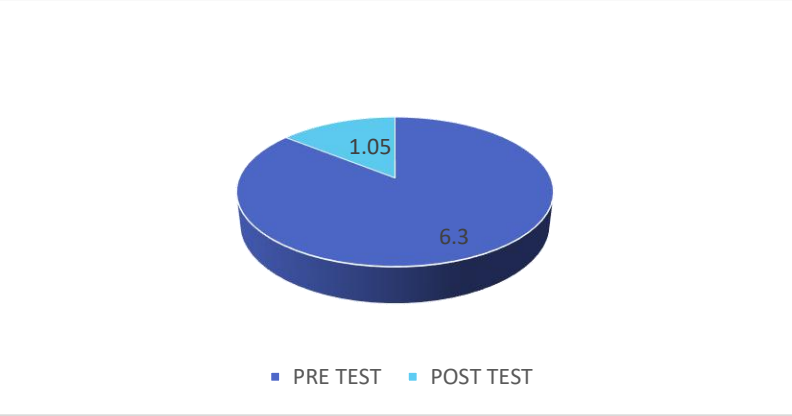
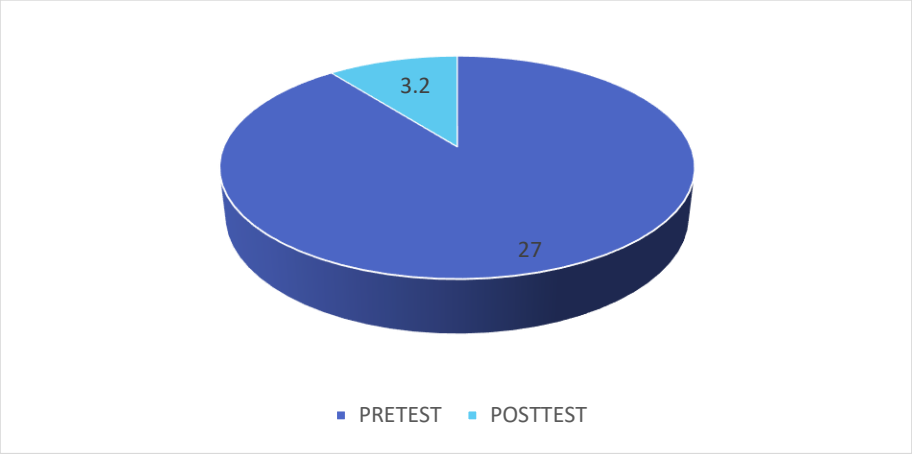


TABLE 4 : MEAN VALUE OF GONIOMETRY MEASUREMENT IN HIP INTERNAL ROTATION

	N	MEAN	MEAN DIFFERENCE
PRE	20	27	11.8
POST	20	44	

GRAPH 2: MEAN VALUE OF GONIOMETRY MEASUREMENT IN HIP INTERNAL ROTATION



6. RESULT:

At the beginning the pain was assessed by numerical pain rating scale the value is 6.3 and post test value is 1.05 , The range of motion was assessed by goniometry the value is 27 and the post test value is 44.

7. DISCUSSION:

MET is a therapy method that can effectively provide positive neuro-physiological and mechanical influences for the strengthening of a shortened or contracture muscle, edema reduction, and the treatment of joints that have a restricted range of motion or a functionally fixated joint). Choi and Yoon applied MET to women in their twenties who complained about buttock and lower extremity pain due to piriformis muscle syndrome. The study report that pain decreased from 4 points to 2 points. Current study revealed that muscle energy technique along with ultrasound interventions has shown significant improvement in reducing pain and lower extremity function and increase range of motion.

PIR refers to the subsequent reduction in tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors (Golgi tendon organs). These receptors react to overstretching of muscle by inhibiting further muscle contraction. This is naturally a protective reaction, preventing rupture and has a lengthening effect due to the sudden relaxation of the entire muscle under stretch. RI refers to the inhibition of the antagonist muscle when agonist contract isometrically. This happens due to stretch receptors within the agonist muscle fibres – muscle spindles. Muscle spindles work to maintain constant muscle length by giving feedback on the changes in contraction, in this way muscle spindles play a part in proprioception. In response to being stretched, muscle spindles discharge nerve impulses, which increase contraction, thus preventing overstretching. Previous studies also had shown greater relief in pain; spasm and tenderness in the affected muscle with MET applied while the muscle is in a stretched position. Probably all the above effect of MET have helped in resolution of pathological changes of piriformis muscle and decrease stress on the sciatic nerve by piriformis muscle. In this study more importance is given to privacy and emotional aspects of patients care by avoiding exposure of treated area. Advantage of using MET is of having active participation of the patient during the course of treatment as well as allowing progression in treatment as per their comfort. This study was done on acute cases of Piriformis syndrome further studies should be done with the same treatment protocol for chronic cases of Piriformis syndrome. There is no provision of long term follow up in this study further studies should include long term follow up.

8. CONCLUSIOIN:

In this study concluded that Muscle energy technique highly decreased the pain and improve the range of motion. Based on the finding of the study it can be concluded that the use of muscle energy technique along with ultrasound can reduce pain and improve range of motion.

REFERENCES:

1. Leon Chaitow et al(2006). Muscle Energy Techniques, 3rd edition, New York, Oxford Philadelphia St Louis Sydney Toronto.
2. Shah SS, Consuegra JM, Subhawong TK, et al(2019)Epidemiology and etiology of secondary piriformis syndrome: a single-institution retrospective study. J Clin Neurosci 59:209-12.
3. Ardman C, Fishman Let al(2007) Sciatica solutions - diagnosis, treatment and cure of spinal and piriformis problems. Reprint edition. London: W. W. Norton &Company: P. 208.
4. Buijs E, Visser L, Groen G et al(2007). Sciatica and the sacroiliac joint: a forgotten concept. Br J Anaesth-99(5):713- 6
5. Rahul Krishnan Kutty et al(2014). Neural mobilization a therapeutic efficacy in a piriformis syndrome: An experimental study. International Journal of Physiotherapy and Research-2(3):577-83.
6. Ozaki S, Hamabe T, Muro T et al(1999) state that "Piriformis syndrome resulting from an anomalous relationship between the sciatic nerve and piriformis muscle-22(8):771-2.
7. Douglas kukula K et al(1992). Conservative Management of piriformis syndrome. Journal of Athletic Training-2(27):102-110.
8. Usham Shyam, Kesho Singh et al(2013). Prevalence of piriformis syndrome among the cases of low back/buttock pain with sciatica: A prospective study. Journal of medical society- 27(2):94-99.
9. Boonstra AM, Preuper HRS, Reneman MF, et al(2008). Reliability and validity of the
10. visual analogue scale for disability in patients with chronic musculoskeletal pain. Int J Rehabil Res-31(2):165-9.
11. Chen CK, Nizar AJ,et al(2013). Prevalence of piriformis syndrome in chronic low back pain patients. A clinical diagnosis with modified FAIR test. Pain Pract -13(4):276-81.
12. Parziale JR, Hudgins TH, Fishman LM et al(1996). The piriformis syndrome. Am J Orthop (Belle Mead NJ)-25(12):819-23.
13. Hopayian K, Song F, Riera R, et al(2010). The clinical features of the piriformis syndrome: a systematic review. Eur Spine J -19(12):2095-109.
14. Smoll NR et al(2010).Variations of the piriformis and sciatic nerve with clinical consequence: a review. Clin Anat-23(1):8-17.
15. Cynthia C Norkin et al. Measurements of joint motion, 3 rd edition, New Delhi, Jayee Brothers Medical publications.
16. Filler AG, Haynes J, Jordan SE, et al(2005). Sciatica of nondisc origin and piriformis syndrome: diagnosis by magnetic resonance neurography and interventional magnetic resonance imaging with outcome study of resulting treatment. J Neurosurg Spine - 2(2):99-115.
17. Lewit K, Simons DG(1984). Myofascial pain: relief by postisometric relaxation. Arch Phys Med Rehabil - 65(8):452-6.
18. Peggy A(1948). Houglum, Dolores B. Bertoti. Brunnstrom's Clinical Kinesiology, 6th edition. USA. F.A. Davis Company.
19. Malika Mondal et al(2017). Prevalence of piriformis tightnessin healthy sedentary individuals: Cross sectional study. International Journal of Health Science and Research-7(7):134-142.
20. Hernández-García R, Gil-López MI, Martínez-Pozo D, et al(2020). Validity and reliability of the new basic functional assessment protocol (BFA). Int J Environ Res Public Health -17(13):4845.
21. Parziale JR, Hudgins TH, Fishman LM et al(1996). The piriformis syndrome. Am J Orthop (Belle Mead NJ) - 25(12):819-23.