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Research Article

IMMEDIATE EFFECT OF POST-ISOMETRIC RELAXATION V/S RECIPROCAL INHIBITION ON TENDOACHILLES TIGHTNESS

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ABSTRACT

Aim: Immediate effect of Post-Isometric Relaxation (PIR) V/S Reciprocal Inhibition (RI) on tendoachilles tightness.

Background: Tendoachilles tightness affects its efficiency thus restricting ankle dorsiflexion in normal individuals. Muscle Energy Techniques is a method for soft tissues involving isometric and/or isotonic contractions of a muscle i.e. using a muscle's own energy for best results. Thus MET is known to play a vital role in improving muscle tightness. Also very scarce literature is present on the effect of MET for increasing ankle dorsiflexion by improving tendoachilles tightness.

Methodology: Randomized clinical trial 60 subjects between 18-30 years of age were included and randomly divided into 2 groups of PIR and RI. Each group consisted of 30 subjects. Tendoachilles tightness was assessed using squat screening test. Ankle dorsiflexion range was measured using a universal full scale goniometer pre and post-intervention.

Results: There was significant improvement in tendoachilles flexibility in both PIR and RI groups. Statistically when compared PIR showed greater improvement than RI.

Conclusions: PIR and RI were both found to be effective in improving tendoachilles tightness, but PIR was more effective than RI.

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INTRODUCTION

The gastrocnemius and soleus are the muscles typically thought of as the calf muscles. They come together to form the Achilles tendon at the back of our ankle¹. The Achilles tendon transmits the force of the muscle across the ankle joint, allowing for both concentric and eccentric motion. Both of these motions are vital for ankle movements².

When muscles get tight, they are actually getting less pliable, meaning that they cannot lengthen properly and therefore restrict the motion of the ankle joint. When calf muscles gets tight the ankle cannot move properly especially during dorsiflexion.⁴

Muscle energy technique (MET) is a manual therapy technique which uses a muscle's own energy in the form of gentle isometric contractions to relax muscles and lengthen the muscle³. MET is an active technique in which subject is an active participant.

MET Includes its Two Types

1. Post-isometric Relaxation (PIR)
2. Reciprocal Inhibition (RI)³.

Post-isometric relaxation is MET used to lengthen a shortened muscle involving contraction of agonist muscle. It is a very effective method of dealing with tension in a soft tissue problems. Reciprocal inhibition refer to the relaxation of antagonist muscle when an agonist muscle contracts. Relaxation occurs when certain muscles are inhibited from contracting due to activation of Golgi tendon organ and muscle spindles. When GTO inhibits (agonist) muscle's contraction and allows antagonist muscle to contract more readily, muscle can be stretched further and easier. Muscle spindles located in the muscle fibres of agonist muscle are triggered when agonist muscle contracts and relaxes antagonist muscle.³

MATERIALS AND METHODS

Study Design

Type of study : comparative study
Population : 18-30 age group
Duration of study: 12 months

Sample Design

Type of sampling: Random sampling
Sample size : 30

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Location : Metropolitan city

Materials Used

- Universal Goniometer
- Stool
- Plinth
- Towel
- Pen

Inclusion Criteria

1. Subjects willing to participate.
2. Age between 18-30 years.
3. Subjects with tendoachilles tightness.
4. Subjects with ankle dorsiflexion range <20 degree.

Exclusion Criteria

1. Subjects unwilling to participate.
2. Lower limb fracture
3. Any ankle injury
4. Subjects doing regular gyming and stretching exercise.
5. Swelling of feet
6. Any neurological disorder

Procedure

- Individuals in the age group 18-30 were screened by squat screening test as per the inclusion and exclusion criteria out of which 60 subjects with tendoachilles tightness were included in the study and written consent of the subject was taken.
- The subjects were then divided into two groups of 30 each, one group was given post-isometric relaxation (PIR) technique and other reciprocal inhibition (RI) technique.

Technique

- Subject were made to sit on the plinth placing the hip and knee at 90 degree flexion.
- Range of motion of ankle dorsiflexion was assessed before the application of technique using a goniometer.
- Subject were then made to lie in supine and according to the division of subjects, PIR and RI technique was given.
- For PIR, subjects were asked to dorsiflex the ankle and from the point of barrier, subjects were instructed to plantar flex and the movement was resisted by the therapist. (contraction of Agonist)
- Contraction was held for 30 seconds and repeated 3 times.
- The next two contraction were commenced from the new barrier obtained after the previous contraction.
- Subjects were asked to apply 20% of his effort.
- A deep inspiration was taken while contraction and exhalation with slow release after 30seconds.
- For RI, subjects were asked to dorsiflex and from the point of barrier , further dorsiflexion was attempted by subject and movement was resisted by the therapist (antagonist contraction)
- Rest procedure was similar as PIR.
- After performing the technique, ankle dorsiflexion range was assessed using goniometer in the sitting position with hip and knee at 90 degree flexion.

Squat Screening Test

- The subject is asked to squat with the trunk in slight flexion, feet placed shoulder width apart, so that the buttocks rest between the legs.
- Under normal conditions it is possible to go fully into this position with the heels remaining flat on the floor.
- If not and the heels rise on the floor as the squat is performed, the tendoachilles tendon is considered to be shortened.

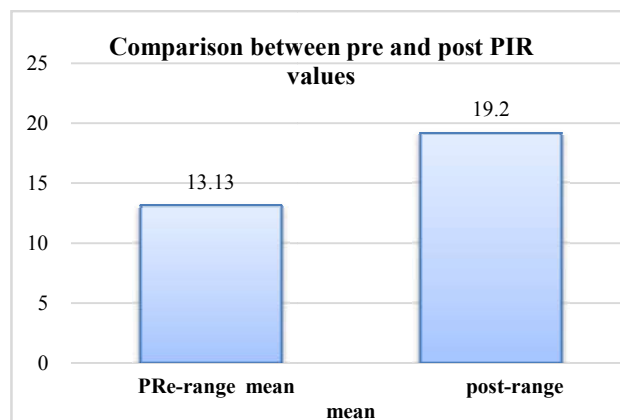
RESULTS

There was statistical significant difference between immediate effect of post-isometric relaxation and reciprocal inhibition on tendoachilles tightness.

Statistical analysis

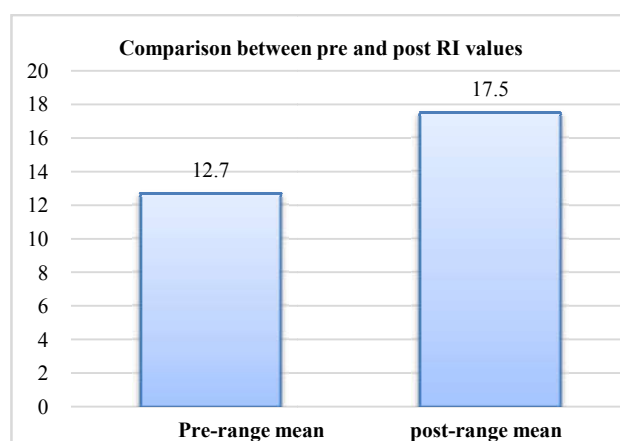
AGE	MEAN
PIR	24.26
RI	24.83

The above table shows descriptive statistics of age group.



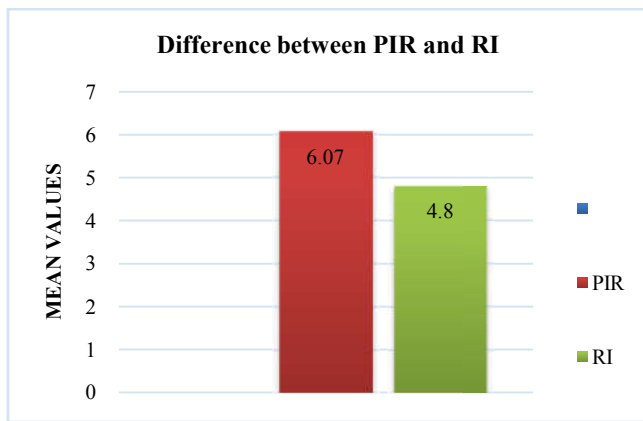
Graph 1

	Mean	P value	Significant
Pre range	13.13		Yes
Post range	19.2	<0.0001	Yes



Graph 2

	Mean	P value	Significant
Pre range	12.7		Yes
Post range	17.5	<.0001	Yes



	Mean	P value	Significant
PIR	6.07		Yes
RI	4.8	<0.0251	Yes

DISCUSSION

The study was conducted among 60 individuals in the age group 18-30. The MET techniques, Post Isometric Relaxation (PIR) and Reciprocal Inhibition (RI) were administered³. The subjects were divided into two groups of 30 and were randomly assigned with PIR and RI. Ankle dorsiflexion range was assessed pre and post performing the techniques. PIR was found to have better improvement.

The purpose of the study was to compare the immediate effect of Post Isometric Relaxation and Reciprocal Inhibition on tendoachilles tightness. Muscle when shortened due to tightness loses its flexibility to perform efficiently. This restricts mobility of joint.⁴

In PIR, the agonist (TA) muscle is made to contract in the lengthened position. This isometric contraction of the muscle in lengthened position stretches the elastic components of the muscle and the intramuscular connective tissue. The constant stretching results in creep and loss of energy from tissue which further leads to permanent elastic deformation. The Golgi tendon organ (GTO) located in the tendon of muscle are sensitive to stretch reflex. When muscle is contracted it triggers GTO and thus inhibits further muscle contraction and relaxes the muscle³.

Reciprocal Inhibition (RI) involves relaxation of the antagonist (TA) muscle when agonist contracts. Muscle spindles located in the muscle fibres are triggered when the muscle contract and sends nerve impulses which inhibit the motor neurons in antagonist muscle thus relaxing it³.

Study conducted by Nisha Yadav et al showed improvement in ankle dorsiflexion range when post isometric relaxation technique was applied on muscle⁹. Also, reciprocal inhibition was found to improve muscle flexibility in a study conducted by Akbari Asghar et al¹⁹.

In this study significant improvement was seen by both PIR and RI, PIR showing greater improvement which can be correlated with study conducted by Agrawal Sonal S. The study showed significant improvement in hamstrings flexibility with PIR.⁵ Our study concluded that PIR is more effective as compared to RI in improving tendoachilles flexibility. The probable reason for this is that PIR is a technique that directly

targets the agonist muscle and facilitates a better relaxation as compared to RI that targets the antagonist muscle and indirectly relaxes the agonist muscle.

CONCLUSION

This study concluded that PIR and RI were both effective in improving the flexibility of tendoachilles tendon but PIR was found to have greater improvement results than RI.

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