



A COMPARATIVE STUDY OF IMMEDIATE EFFECT OF MUSCLE ENERGY TECHNIQUE (MET) AND POSITIONAL RELEASE THERAPY (PRT) ON PECTORALIS MINOR TIGHTNESS IN HEALTHY COLLEGIATE INDIVIDUALS

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INTRODUCTION

Chronic narrowing of the subacromial space results in the compression of the soft tissues within that space, which has been implicated in shoulder pain. This reduction in the subacromial space during humeral elevation will likely predispose an individual to clinical impingement of the rotator cuff.¹ There is a potential relationship of scapular position and motion to shoulder disorders. In patients with subacromial impingement, there is decreased scapular posterior tilting, upward rotation.² Poor upper body posture, also called, "forward head posture", "slouched posture", or "rounded shoulder posture", is a potential etiological factor in the pathogenesis and perpetuation of many clinical syndromes involving the shoulder.³ Rounded shoulder is a bent posture in which the scapulae are elevated and the acromion is protruded forward as compared to the centre of gravity of the body. This is most commonly seen in healthy college individuals who use a computer or write in inappropriate posture for a long time. In such position, the centre line of the head moves forward and upward, which causes an increase in the weight of the head supported by the neck, which results in changes in the head, neck, and shoulder region.⁴ This results in a poor upper body posture, leading to various clinical conditions involving the shoulder like the shoulder impingement syndrome.³

Background

According to various studies conducted by Vishwa M., and Chinmayee Patel, Shweta Patel, there is a high percentage presence of pectoralis minor tightness found in healthy collegiate individuals.^{3,5} A study by Chinmayee Patel and Shweta Patel suggests that there is a very high prevalence of pectoralis minor tightness

(67.92%), when assessed by the tabletop test method among healthy college students. When assessed through a digital vernier calliper length measurement, 75% of healthy college individuals had tightness of the pectoralis minor muscle.⁵

Pectoralis Minor Muscle

The Pectoralis Minor muscle is the only scapulo-thoracic muscle with an anterior thoracic attachment.¹ It connects the scapula and the anterior side of the thoracic region.⁸ (Fig. 1)

Origin- The pectoralis minor muscle originates from the from the outer surface of the 3rd to 5th ribs and the adjoining intercostal fascia.^{1,2,3,5}

Insertion- The pectoralis minor inserts on the medial inferior border of the coracoid process.^{1,2,3,5}

The pectoralis minor receives its blood supply from the Thoracoacromial Artery and its nerve supply from the Medial Pectoral Nerve and also by the Lateral Pectoral Nerve via a communicating branch known as the 'Ansa Pectoralis'.²

The pectoralis minor muscle functions to depress the scapula.⁸ The fibre orientation of the pectoralis minor favours scapular Internal Rotation, Downward Rotation, and Anterior Tilt (AT), therefore, it is considered as an antagonist to the necessary scapular motions during arm elevation.^{3,8}

Repetitive use of the upper extremity for activities that protract and downwardly rotate the scapula may contribute to the adaptive shortening of the pectoralis minor muscle. During arm elevation, individuals with a relatively short pectoralis minor resting length exhibit decreased posterior tipping and external rotation, compared to a group with a relatively long pectoralis minor resting length.¹ Adaptive shortening of the pectoralis minor muscle leads to changes in the resting position of the scapula and altered scapular motions and kinematics. These changes can cause imbalance between the agonist and the antagonist muscles of the shoulder joint.³ Shortening of the pectoralis minor muscle can also lead to scapular dyskinesis. Because of the anatomical position of the pectoralis minor muscle, shortening can lead to an anterior scapular tilting and internal rotation, and a decrease in the upward rotation of the scapula. This can be a predisposed condition for the shoulder impingement syndrome.^{3,8}

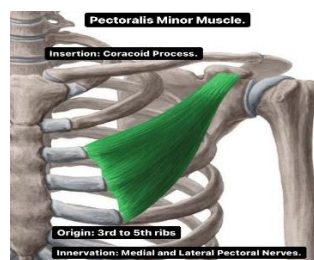


Fig. 1. Pectoralis Minor Muscle.

Pectoralis minor tightness can be examined using pectoralis minor length test (Tabletop Test). This test measurement has demonstrated clinical intra- rater reliability. This test measures distance from the treatment table to the posterior aspect of acromion.^{8,19,20,21,22}

Common physiotherapy treatments for pectoralis minor tightness include stretching, soft tissue mobilisation, strengthening of the lower trapezius and serratus anterior muscles, and kinesiology and rigid taping. Passive stretching of 15-30 second duration and frequency of 2-4 repetitions is considered to be effective to improve the flexibility of the pectoralis minor muscle, thus reducing its tightness.⁶ Short term rigid and kinesiology taping have been shown to improve the resting pectoralis minor length. In Kinesiology taping, one Y-strip is applied to the origin and insertion of the supraspinatus muscle, and one I- strip is applied from the coracoid process to the posterior deltoid. This positioning helps in lengthening of the pectoralis minor muscle.⁷ Self-stretching of the pectoralis minor muscle for 2 weeks has also proven to be helpful in reducing the rounded shoulder posture.

Muscle Energy Technique (MET)

MET is a manual therapy intervention in which the patient actively contracts a targeted muscle against a precise, clinician-controlled counterforce, followed by relaxation and a passive stretch.⁹ It is a manual therapy developed by the osteopaths.¹⁰ It is essentially a mobilization technique using muscular facilitation and inhibition.¹¹ According to a study, MET may assist in preventing and treating various shoulder injuries associated with forward shoulder posture and pectoralis minor tightness among college swimmers.¹²

There are two forms of MET, i.e., Post Isometric Relaxation (PIR) and Reciprocal Inhibition (RI).¹¹

Post Isometric Relaxation (PIR) states that after a muscle is contracted, it is automatically in a relaxed state for a brief, latent period, while Reciprocal Inhibition (RI) states that when one muscle is contracted, its antagonist is automatically inhibited.¹¹

There are two aspects to MET. First is the ability to relax an overactive muscle. The second is the ability to enhance stretch of a shortened muscle or its associated fascia when connective tissue or viscoelastic changes have occurred.¹¹

One of the objectives of MET is to induce relaxation of the hypertonic musculature and, where appropriate, the subsequent stretching of the muscle.¹¹

MET is commonly used to strengthen and lengthen muscles, decrease oedema, improve circulation, and mobilize restricted articulations.⁹ MET may be used to decrease pain, stretch tight muscles and fascia, reduce muscle tonus, improve local circulation, strengthen weak musculature, and mobilize joint restrictions.¹¹ MET is effective for a variety of purposes including lengthening of shortened muscles, as a lymphatic or venous pump to aid the drainage of fluid or blood and increasing the range of motion (ROM).¹⁰ MET has proved to be more effective than static stretching to improve the extensibility of the shortened muscles.⁹

Post Isometric Relaxation (PIR) technique is used to relax acute muscular spasm or contraction, mobilise restricted joints, and to prepare the shoulder joint for manipulation. The systemic protocol for PIR involves identifying a restrictive barrier within the normal range of joint motion, which is then followed by an isometric contraction of the agonist muscle, and a passive stretch is then applied to the muscle for a short period.¹³ In

this technique, the therapist's and patient's forces are matched. 20%-50% of patient's strength is used for muscle contraction against the therapist's force.¹¹

MET can be used when a muscle is shortened, and there is joint restriction; when the shortening of muscle is associated with myofascial trigger points or palpable fibrosis; when there is palpable periosteal pain, indicating stress at the associated muscle's origin and/or insertion; in cases of muscular imbalance, in order to reduce hypertonicity when weakness in a muscle is attributable, in part or totally, to inhibition deriving from a hypertonic antagonist muscle.¹¹

MET has shown positive effects for improving range of motion in the cervical, thoracic, and lumbar regions of the spine and the upper extremity. MET has been commonly used to treat painful conditions, but it can also be used on asymptomatic individuals.⁹

Positional Release Therapy (PRT)

Positional Release Therapy (PRT) is a type of manual therapy that is used effectively in treating chronic and sub-acute muscle spasm and disability that is often associated with it. PRT makes use of updated positioning while preserving the original purpose and strategy of Strain and Counter strain.¹⁴

Strain-Counter strain puts a dysfunctional tissue in a slacked position to decrease activity from proprioceptors. Whereas, PRT uses tender points and a position of comfort to decrease the associated dysfunction. The tender points differ from Myofascial trigger points. Myofascial trigger points are hyperirritable bands of tissue, whereas tender points are discrete areas of tissue tenderness that can occur anywhere in the body.¹⁴

PRT can be used in patients with a history of trauma, recent or long past. It can also be used in patients who upon evaluation demonstrate limited Range of Motion (ROM), muscle hypertonicity, fascial tension, and/or joint hypomobility.¹⁵

PRT should not be used directly in areas of open wounds, haematoma, hypersensitive skin, systemic or localised infection, sutures, healing fractures. Except in the case of significant systemic infection, using PRT in areas which surround the affected tissue is not contraindicated.¹⁵

PRT treatment begins by identifying a tender point, then positioning the patient in a position of comfort that is typically obtained by shortening tissues around the tender point, while a light touch monitors the position.¹⁴ This position of comfort or minimal discomfort is usually a position where the muscle is at its shortest length.¹⁶ The position is held for 90 seconds then slowly returning the patient to normal resting position.¹⁴

The resultant relaxation of tissue in PRT leads to an improvement in vascular circulation and removal of chemical mediators of inflammation. Thus, it helps to eliminate the peripheral and central sensitization. Pain relief due to PRT is thought to have occurred due to decrease in the intrafusal and extrafusal fibre disparity and reset of the inappropriate proprioceptive activity.¹⁷ As a result of treatment using PRT, there is a decrease in muscle tension, fascial tension, and joint hypomobility, which in turn result in a significant increase in the functional range of motion and decrease in pain.¹⁸

NEED OF THE STUDY

Pectoralis Minor muscle shortening is associated with common shoulder pathologies like impingement syndrome and postural changes like stooped shoulder or forward head posture. Muscle Energy Technique and Positional Release Therapy have known to be effective in reducing pectoralis minor tightness than conventional methods like stretching, thus reducing the incidences of pathologies.

However, there is no study conducted which determines which of the two techniques is more effective. Therefore, the need of the study is to compare the immediate effect of Muscle Energy Technique (MET) and Positional Release Therapy (PRT) in healthy collegiate individuals.

- To compare the immediate effect of Muscle Energy Technique (MET) and Positional Release Therapy (PRT) on Pectoralis Minor Tightness in healthy collegiate individuals.

OBJECTIVES

- To study the immediate effect of Muscle Energy Technique (MET) on Pectoralis Minor tightness in healthy collegiate individuals.
- To study the immediate effect of Positional Release Therapy (PRT) on Pectoralis Minor Tightness in healthy collegiate individuals.
- To compare the immediate effect of Muscle Energy Technique (MET) and Positional Release Therapy (PRT) on Pectoralis Minor Tightness in healthy collegiate individuals.

HYPOTHESIS

Muscle Energy Technique (MET) is more effective than Positional Release Therapy (PRT) on Pectoralis Minor Tightness in healthy collegiate individuals.

ALTERNATE HYPOTHESIS

Positional Release Therapy (PRT) is more effective than Muscle Energy Technique (MET) on Pectoralis Minor Tightness in healthy collegiate individuals.

NULL HYPOTHESIS

Muscle Energy Technique (MET) and Positional Release Therapy (PRT) are equally effective on Pectoralis Minor Tightness in healthy collegiate individuals.

REVIEW OF LITERATURE

1. Effects of the Muscle Energy Technique and the Self- Stretching Exercise of the Pectoralis Minor on the Pulmonary Function of Young Adults with Thoracic Kyphosis. Jae-woo Park, BSc; Sung-dae Choung, PT, PhD. (2020)

Conclusion: The two intervention methods, the muscle energy technique and the self- stretching exercise, can be applied as effective treatment programs to improve pulmonary function of the subjects with thoracic kyphosis.

2. The effects of shoulder stabilization exercises and pectoralis minor stretching on balance and maximal shoulder muscle strength of healthy young adults with round shoulder posture. Mi-Kyoung Kim, MS, Jung Chul Lee, PhD, Kyung-Tae Yoo, PT, PhD. (2018)

Conclusion: The shoulder stabilization and stretching exercises improved the static balance, dynamic balance, and muscle strength.

3. Multiple-joint exercises using elastic resistance bands vs. conventional resistance-training equipment: A cross-over study. Vegard M. Iversen, Paul Jarle Mork, Ottar Vasseljen, Ronny Bergquist & Marius S. Fimland (2017)

Conclusion: Elastic Resistance Bands generally produced similar muscular activation levels as Conventional Resistance Equipment in the end ranges where the bands were stretched.

4. Effect of muscle energy technique and static stretching on pain and functional disability in patients with mechanical neck pain: A randomized control trial. Apoorva Phadke, MPT, Nilima Bedekar, PhD, Ashok Shyam, MS (Ortho), Parag Sancheti, MS (Ortho). (2016)

Conclusion: Muscle Energy Technique was better than stretching technique in improving pain and functional disability in people with mechanical neck pain.

5. Lengthening of Pectoralis minor muscle during passive shoulder motions and stretching techniques: A cadaveric Biomechanical Study. Takayuki Muraki, Mitsuhiro Aoki, Tomoki Izumi, Misaki Fujii, Egi Hidaka, Shigenori Miyamoto (2009)

Conclusion: This study suggests the importance of the pectoralis minor muscle in shoulder motion and provides anatomical and biomechanical evidence that might guide appropriate selection of the stretching techniques.

RELEVANT LITERATURE

The pectoralis minor muscle is triangular in shape and is located below the pectoralis major muscle, and both form the anterior wall of the axilla.² The shortened, tight muscle can be easily palpated there. It is also located close in relation to the brachial plexus and both the subclavian artery and vein, which all run between the muscle and the rib cage. Pectoralis minor and the coracoid process together form a bridge under which the nerves and vessels go to the upper limb.

Anatomy (Fig. 2):

Origin- The base of the pectoralis minor muscle arises from the anterior 3rd to 5th ribs, close to the costal cartilage.

Insertion- The apex of the triangle inserts in the medial border and the upper surface of the coracoid process of the scapula.



Fig. 2. Pectoralis Minor Muscle Anatomy.

Nerve supply- Its main nerve supply is from the medial pectoral nerves (C8-T1). It may also be innervated by the lateral pectoral nerve via a communicating branch known as ‘Ansa Pectoralis’.

Blood supply- The blood vessel which supplies the pectoralis minor muscle in the thoracoacromial artery; a short artery that branches off from the larger axillary artery of the chest and upper extremities.

Function- The primary functions of this muscle include the stabilization, depression, abduction or protraction, internal rotation and downward rotation of the scapula. It elevates the ribs for deep inspiration when the pectoral girdle is fixed or elevated. With the scapula stabilized, in a position of good alignment, the pectoralis minor acts as an accessory muscle of inspiration. When the ribs are immobilized, this muscle brings the scapula forward. Both pectoralis muscles work with the serratus anterior muscles to create full range of movement for the scapula.

The pectoralis minor can be palpated by placing a finger in the axilla and pushing obliquely towards the coracoid process of the scapula.²³

The pectoralis minor muscle creates a passage between the ribs for the transit of the vascular-nerve brachial system. Any abnormal tension on the pectoralis minor muscle can negatively affect the position of the scapula (upwards) and the movement of the shoulder. This can cause thoracic outlet syndrome.²³

Other clinical syndromes associated with short pectoralis minor are Periarthritis Shoulder, Scapular Downward Rotation Syndrome, Scapular winging and tilting syndrome. Pectoralis minor adaptive shortening has been implicated as a mechanism for forward shoulder posture and for shoulder impingement.²¹ (Fig. 3)

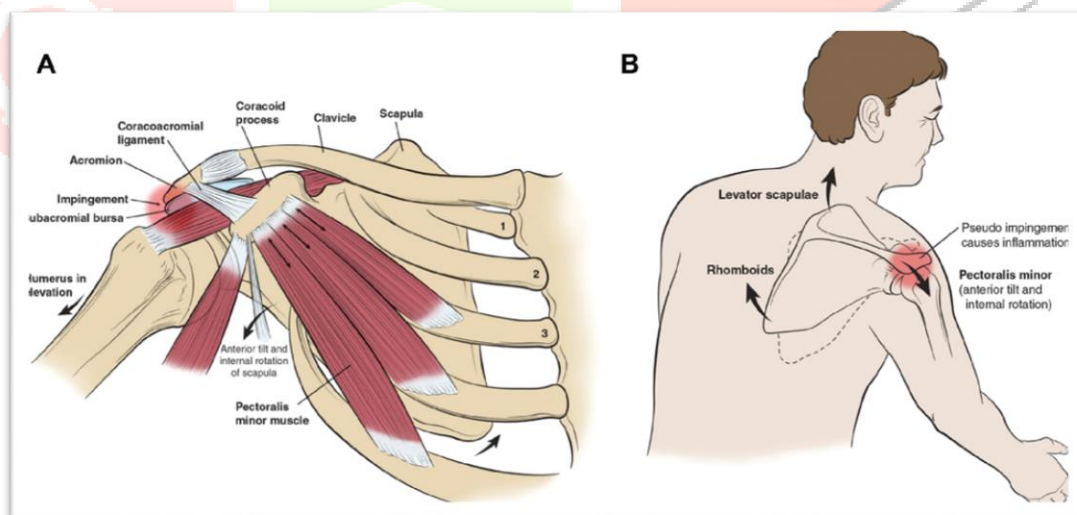


Fig. 3. Shoulder Pathologies

RESEARCH DESIGN AND METHODOLOGY

- **Type of Study:** Comparative Study.
- **Study Setting:** Dr. Vasantrao Pawar Hospital (Physiotherapy OPD).
- **Type of Sampling:** Convenient Sampling.

- **Sample Size:** Total- 60
- **Method of Allocation:** Randomly allocated by chit method.
- **Duration of study:** 6 months.
- **Ethical Clearance:** Obtained from Institutional Ethical Committee.

INCLUSION CRITERIA

- Subjects who are willing to participate and signed the written informed consent.
- Age: 18-25 years.
- Both Males and Females were included.
- Healthy college individuals.
- Subjects with pectoralis minor tightness (acromion to table distance > 2.6 cm).

EXCLUSION CRITERIA

- Any surgical history on cervical vertebrae or upper limb.
- Any neurological impairment.

MATERIALS USED

- Pen.
- Paper.
- Plinth.
- Plastic transparent scale.
- Consent form.

OUTCOME MEASURE

- **Tabletop Test (Acromion to table test)**^{8,19,20,21,22}

The “Tabletop Test” is a method to measure the length of the pectoralis minor muscle using the table to acromion distance.

Procedure- The linear distance is measured in centimetres using a rigid standard plastic transparent scale. The subject was in supine position, arms by the side, elbows flexed and was instructed to relax. Without exerting any downward pressure into the table, the base of the scale was placed on the treatment table, so that it was perpendicular to the table, and placed on the lateral aspect of the

acromion. The distance was measured from the table to the posterior aspect of the acromion process (Fig. 4).

Interpretation- A distance greater than 2.6 cm suggested that the pectoralis minor muscle had shortened.



Fig. 4. Tabletop Test.

PROCEDURE

- The subjects were selected on the basis of the inclusion and exclusion criteria. The subjects were randomly allocated to either of the two intervention groups.
- The study was conducted in colleges in and around Nashik.
- Informed consent was taken from the patient.
- Tabletop Test (Acromion to table test) was measured before and after the treatment session.
- Group A was given Muscle Energy Technique (MET) for 3 times in one session.
- Group B was given Positional Release Therapy (PRT) for 1 session. (Fig. 5)

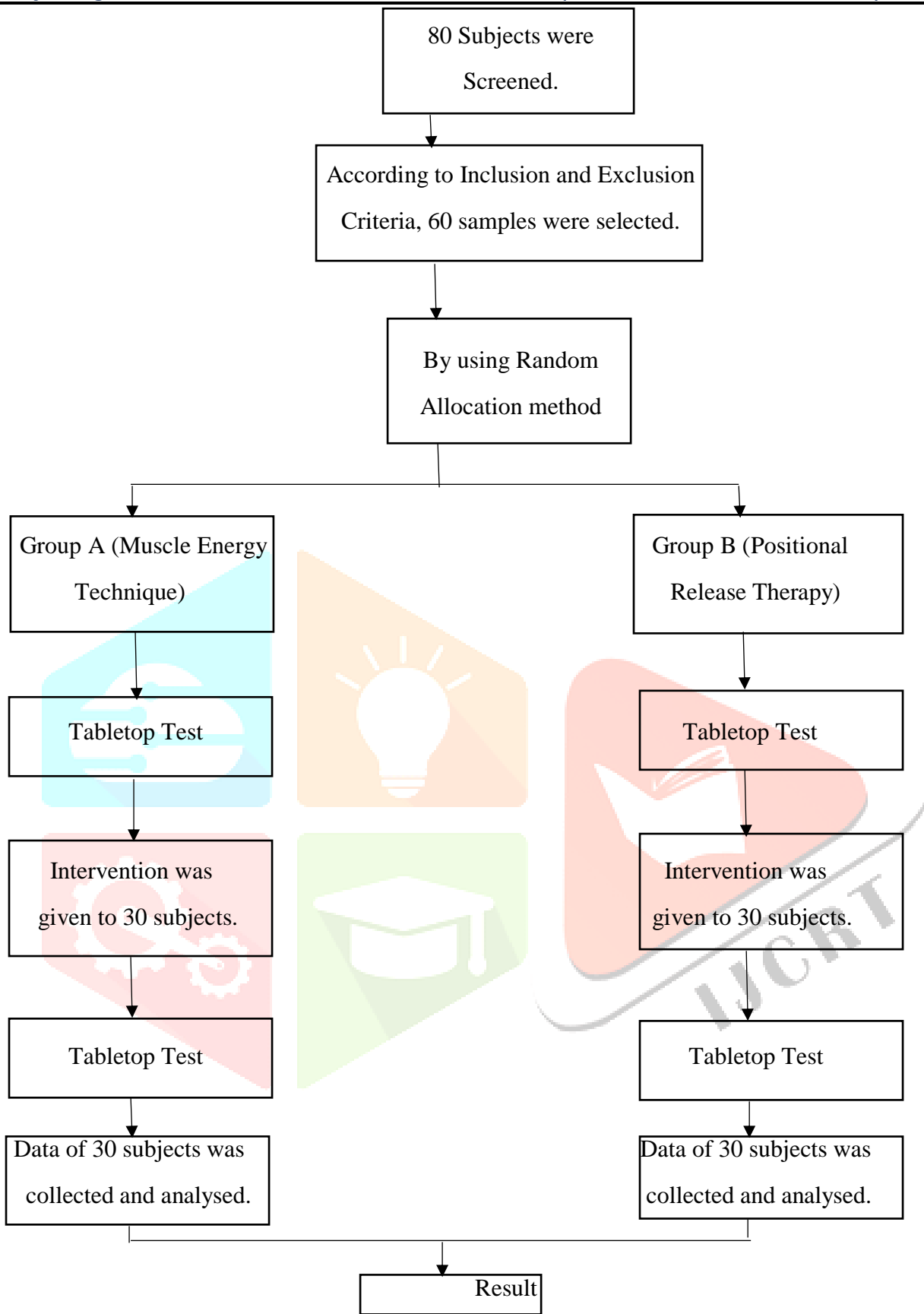


Fig. 5: Procedure.

Group A: Muscle Energy Technique (MET).³

- The subject was in side-lying with arms lightly folded across the lower thorax, with the side to be treated uppermost, and the practitioner was standing behind the patient, close to the edge of the table.
- The therapist threaded his caudad arm anterior to the subject elbow so that his one hand rested on the anterior aspect of the shoulder, with her other hand on the scapula. Posteriorly directed pressure was gradually applied to the shoulder to induce retraction, coupled with a guiding effort from the hand on the scapula.
- The subject was asked to lightly push the shoulder anteriorly, against restraining hand of the therapist, for 7 to 10 seconds.
- After this slack is taken out of the muscle and a small degree of stretch was induced for between 5 and 30 seconds (Fig. 6).
- This was repeated for 3 times in one session.

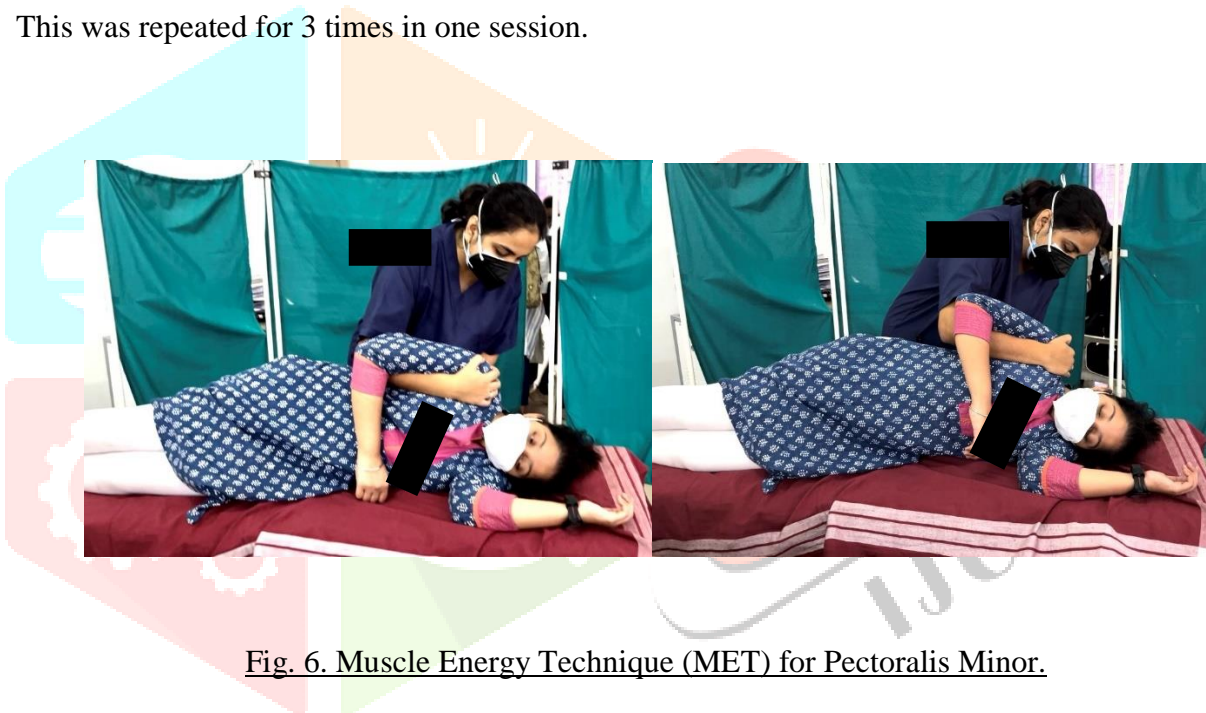


Fig. 6. Muscle Energy Technique (MET) for Pectoralis Minor.

Group B: Positional Release Therapy (PRT).¹⁴

- The participant was placed supine on the table. Using one hand to palpate the tender points, the therapist's other hand grasped the forearm of the treatment side. Upon finding a tender point, the therapist monitored the palpation and began to move the treatment arm across the body towards the opposite hip, and the applied a distraction force with internal rotation to fine tune the position (Fig. 7).
- The position was painless and allowed the participant to relax.
- The therapist held this position for 90 seconds and then slowly returned the arm to the neutral position and re-evaluated the tender point.
- The therapist repeated this procedure for all the tender points located on the pectoralis minor muscle.



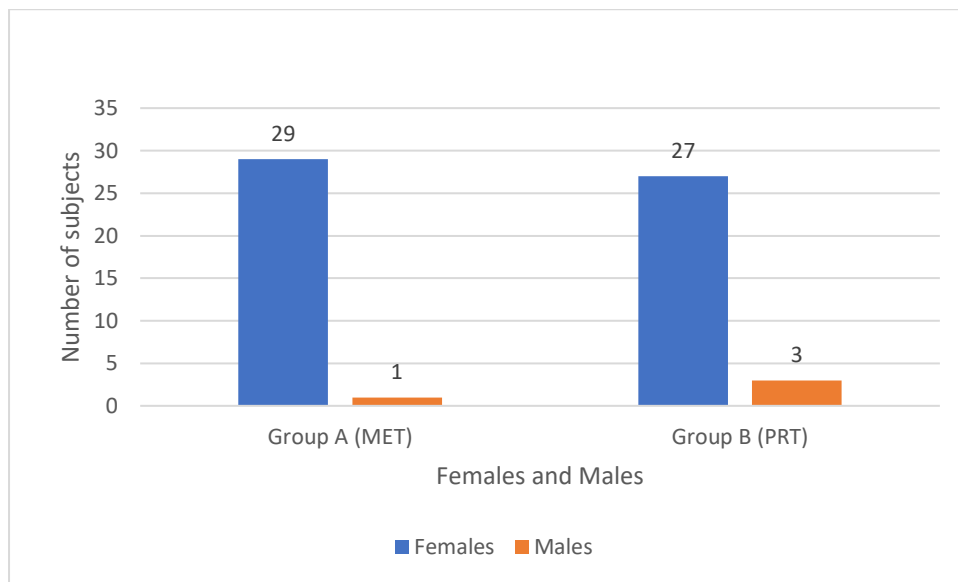
Fig. 7. Positional Release Therapy (PRT) for Pectoralis Minor.

DATA ANALYSIS

- A total of 80 subjects were screened. On the basis of the inclusion and exclusion criteria, 60 subjects were selected. On the basis of Random Allocation by chit method, 30 subjects were assigned to Group A (Muscle Energy Technique) and 30 subjects were assigned to Group B (Positional Release Therapy).
- Out of the 60 subjects, 56 subjects were females and 4 subjects were males. In Group A (MET), there were 29 female subjects and 1 male subject. In Group B (PRT), there were 27 female subjects and 3 male subjects (Table No. 1 and Graph No. 1).

	Group A (MET)	Group B (PRT)
Females	29	27
Males	1	3

TABLE NO. 1: NUMBER OF FEMALES AND MALES.



GRAPH NO.1: NUMBER OF FEMALES AND MALES.

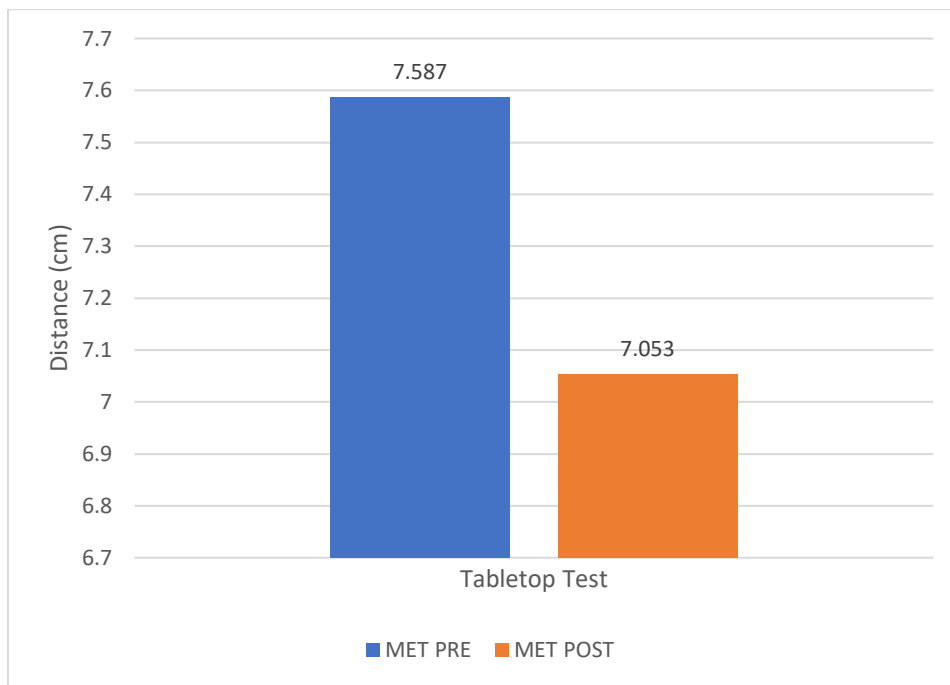
- The baseline characteristics were equal for all the subjects.
- Data was collected from all the subjects. Paired t-test was used to compare the pre and post treatment outcome measure within the group. Unpaired t-test was used to compare the outcome measure between Group A (MET) and Group B (PRT).

RESULT

- For Tabletop Test, the mean for Group A (Muscle Energy Technique) was 7.587 pre-treatment, and it was 7.053 post-treatment. The Standard Deviation for pre-treatment for Group A (MET) was ± 1.339 , and that for post-treatment was ± 1.273 . The two tailed p value for paired t-test for Group A (MET) was < 0.0001 , i.e., extremely statistically significant. The t value for paired t-test for Group A was 12.7317 (Table No. 2 and Graph No. 2).

GROUP A (MET)	MEAN \pm SD		P VALUE	T VALUE
	PRE - TREATMENT	POST TREATMENT		
TABLETOP TEST	7.587 \pm 1.339	7.053 \pm 1.273	<0.0001	12.7317

TABLE NO. 2: MEAN OF PRE AND POST TREATMENT VALUES OF GROUP A (MET).

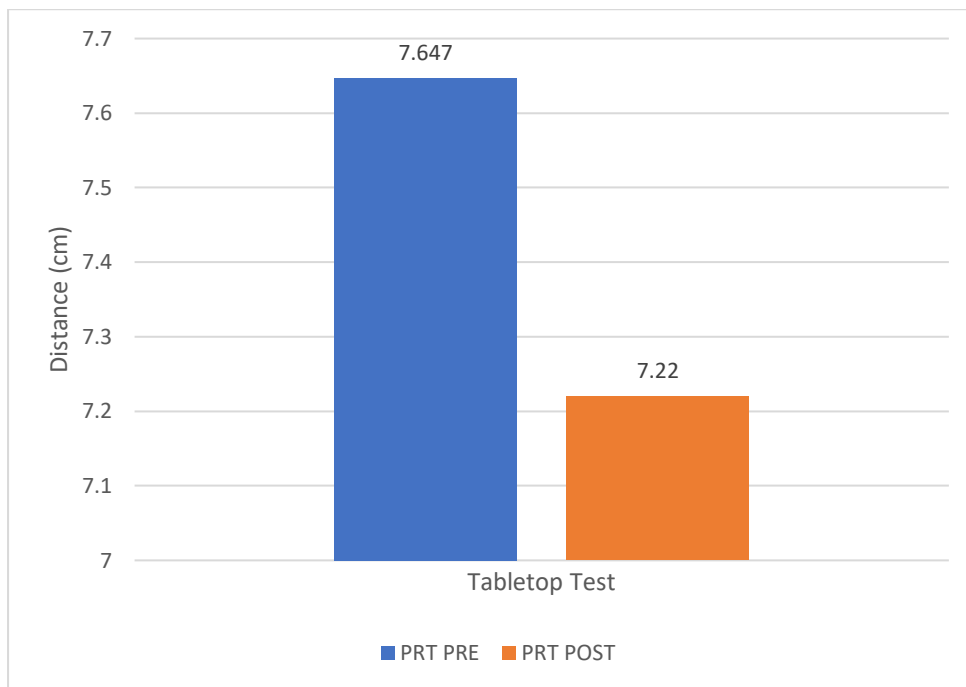


GRAPH NO. 2: MEAN OF PRE AND POST TREATMENT VALUES OF GROUP A (MET).

- For Tabletop Test, the mean for Group B (Positional Release Therapy) was 7.647 pre-treatment, and it was 7.220 post-treatment. The Standard Deviation for pre-treatment for Group B (PRT) was ± 1.517 , and that for post-treatment was ± 1.434 . The two tailed p value for paired t-test for Group B (PRT) was <0.0001 , i.e., extremely statistically significant. The t value for paired t-test for Group B was 13.5811 (Table No. 3 and Graph No. 3).

GROUP A (PRT)	MEAN \pm SD		P VALUE	T VALUE
	PRE - TREATMENT	POST TREATMENT		
TABLETOP TEST	7.647 \pm 1.517	7.220 \pm 1.434	<0.0001	13.5811

TABLE NO. 3: MEAN OF PRE AND POST TREATMENT VALUES OF GROUP B (PRT).

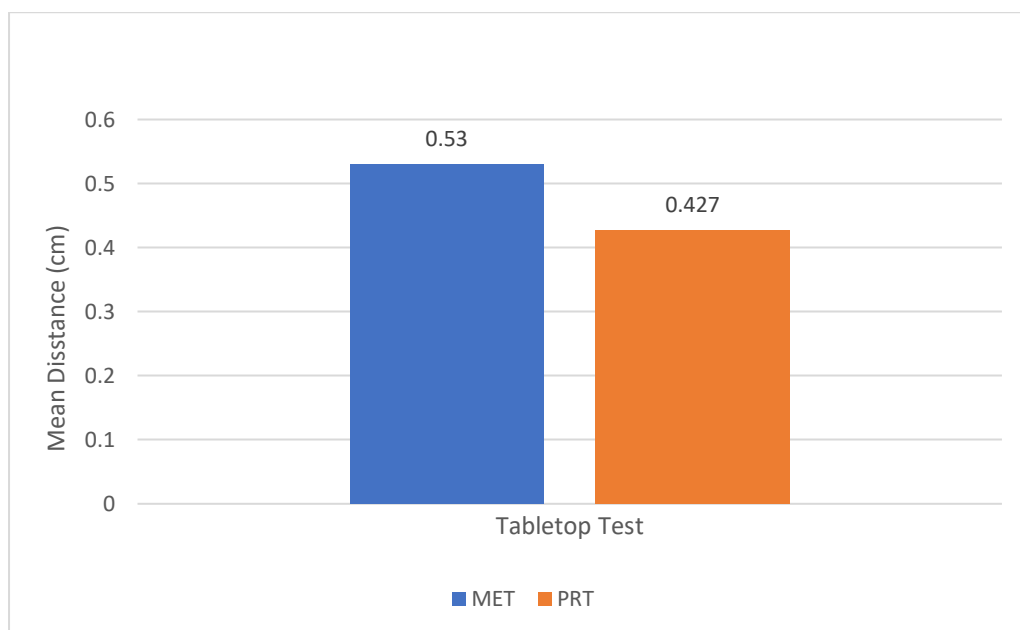


GRAPH NO. 3: MEAN OF PRE AND POST TREATMENT VALUES OF GROUP B (PRT).

- The mean of difference between the pre and post treatment values of Group A (MET) was 0.530. The mean of difference between the pre and post treatment values of Group B (PRT) was 0.427. The Standard Deviation for Group A (MET) was ± 0.229 , and that for Group B (PRT) was ± 0.172 . The two tailed p value for unpaired t-test was $=0.0462$, which is statistically significant. The t value for unpaired t-test was 2.0371. (Table No. 4 and Graph No. 4).

	MEAN \pm SD		P VALUE	T VALUE
	MET	PRT		
TABLETOP TEST	0.533 \pm 0.229	0.427 \pm 0.172	$=0.0462$	2.0371

TABLE NO. 4: MEAN OF DIFFERENCE OF PRE AND POST TREATMENT VALUES OF GROUP A (MET) AND GROUP B (PRT)



GRAPH NO. 4: MEAN OF DIFFERENCE OF PRE AND POST TREATMENT VALUES OF GROUP A (MET) AND GROUP B (PRT).

- As the mean of Group A (MET) was more than Group B (PRT), it indicates that Muscle Energy Technique (MET) was more effective than Positional Release Therapy (PRT) in reducing Pectoralis Minor Tightness in healthy collegiate individuals.

DISCUSSION

The purpose of this study was to compare the effectiveness of Muscle Energy Technique (MET) and Positional Release Therapy (PRT) on Pectoralis Minor tightness in healthy collegiate individuals.

Postural and muscle imbalance theory suggests that a short pectoralis minor is associated with a number of syndromes affecting the shoulder and upper quadrant.²⁵ Shortening of pectoralis minor has been associated with forward head posture.²⁶

The pectoralis minor length test is one method that has been recommended to determine if this muscle is of normal length or is short and the 2.6 cm distance has been proposed as the length that separates a muscle of normal length to one that is short and may be associated with symptoms.³

According to the statistical analysis, Muscle Energy Technique (MET) is more effective than Positional Release Therapy (PRT) in reducing Pectoralis Minor tightness in healthy collegiate individuals, however, both the techniques are effective in reducing the Pectoralis Minor tightness.

Muscle Energy Technique (MET) is a manual therapy technique, in which the patient actively uses his or her muscles from a controlled position and in a specific direction against a distinct counterforce.¹⁸ It is an active technique in which isometric contraction with 30% of the patient's effort is utilized to treat the patient's pain.¹⁶ In Isometric Contraction using post isometric relaxation, the affected muscle (agonist) is used in the isometric contraction, therefore the shortened muscle subsequently relaxes via post isometric relaxation, allowing an

easier stretch to be performed.¹¹ Post Isometric Relaxation refers to the subsequent reduction in the tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors called Golgi Tendon Organs (GTOs) that are located in the tendon of the agonist muscle.³ MET has been proposed to produce muscle relaxation and muscle lengthening by decreasing muscle tone that happens due to Golgi Tendon Organs which react to excessive stretching of the muscles by counteracting longer muscle contractions. This has a lengthening effect due to the immediate relaxation of the whole muscle under tension.¹¹ According to Webster G., a strong muscle contraction against equal counterforce triggers the Golgi Tendon Organ (GTO) during Post Isometric Relaxation (PIR). The afferent nerve impulse from the GTO enters the dorsal root of the spinal cord and meets with an inhibitory motor neuron. This stops the discharge of the efferent motor neuron's impulse and therefore prevents further contraction. Thus, the muscle tone decreases, which in turn results in the agonist relaxing and lengthening.²⁷ MET is said to inhibit motor activity via GTOs or muscle spindles. The latency period of approximately 7-10 sec is present after the isometric phase. During this period, the movement toward the new position of a joint or muscle can be easier (due to reduction in tone).¹³

Muscle Energy Technique (MET) is effective for a variety of purposes, including, reducing pain, lengthening a shortened muscle or muscle contracture, 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.^{10,13}

Positional Release Therapy (PRT) is also effective in reducing Pectoralis Minor tightness in healthy collegiate individuals. PRT is a type of manual therapy technique that may be used effectively in treating chronic and sub-acute muscle spasm and the pain and disability that is often associated with it.¹⁵ Positional Release Therapy is a technique in which muscles are placed in a position of greatest comfort and this causes normalization of muscle hypertonicity & fascial tension, a reduction in joint hypomobility, increased circulation & reduced swelling, decreased pain and increased muscular strength.^{17,28} Positional release technique is thought to achieve its benefits by means of an automatic resetting of muscle spindles which would help to dictate the length and tone of the affected tissues. Passively shortening the dysfunctional agonist muscle long enough allows normal muscle spindle activity to return. Once agonist muscle spindle activity is reset, the antagonist muscle activity can also return to resting state, relieving aberrant neuromuscular activity and restoring normal function.¹⁷ PRT acts on the muscle spindle mechanism and its associated reflex mechanism (which controls spasm) to promote a more normal firing of the spindle and a more normal level of tension in the muscle, which results in a more normal relationship within the various soft tissues surrounding the area. It works to reduce the hyperactivity of the myotatic reflex arc and to reduce the overwhelming afferent nerve impulses within the arc that may lead to an overflow of neurotransmitters into the associated dermatome, resulting in referred pain (known as facilitated segment). Reduction in localised spasm increases range of motion, decreases pain, allows more normal circulation, and improves lymphatic drainage and increases the potential for normal biomechanics.¹⁵ PRT involves the identification of active tender points, followed by application of ischaemic compression to reproduce the nociceptive response. The limb is then positioned to reduce the tension in the affected muscle and subsequently the painful trigger points are deactivated. One proposed mechanism for the benefit of ischaemic compression was explained by Hou et al., who suggested that pain and muscle spasm relief from

direct digital pressure may result from the reactive hyperaemia produced in the area or from the spinal reflex mechanism. PRT affects proprioceptive activity and helps to normalize tone and set the normal length-tension relationship in the muscle. Thus, there is elongation of the involved muscle fibre to its normal state.²⁹

CONCLUSION

The consequences of the present study show that Muscle Energy Technique (MET) is more effective than Positional Release Therapy (PRT) in reducing Pectoralis Minor tightness in healthy collegiate individuals.

LIMITATIONS

- Subjects of 18-25 years of age were considered for study, thus results cannot be generalized to all age groups.
- Only immediate effect was studied.
- Unequal ratio of male and female in study population.
- Only college students were recruited.

FURTHER SCOPE OF THE STUDY

- The study can be done on population above 25 years of age.
- Population other than college going students can be selected for the study.
- A larger sample size can be used for the study.
- The study can be done on subjects with shoulder pain.
- Short term and long-term effects of MET and PRT can be studied to find the maintenance of the improved outcome measure.

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APPENDIX-I

Consent Form

I _____ agree to take part in the research study conducted by Anushka Chidambar Deshpande and Sharayu Bhaurao Shinde students, (INTERN BPTH), MVP'S COLLEGE OF PHYSIOTHERAPY, NASHIK on

“A COMPARATIVE STUDY OF IMMEDIATE EFFECT OF MUSCLE ENERGY TECHNIQUE (MET) AND POSITIONAL RELEASE THERAPY (PRT) ON PECTORALIS MINOR TIGHTNESS IN HEALTHY COLLEGIATE INDIVIDUALS.”

I acknowledge that the research study has been explained to me and I understand that agreeing to participate in the research means that I'm willing to

- Every effort will be made to maintain the confidentiality of my study records. The data from the study may be published; however, I will not be identified by the name. My identity will remain confidential unless disclosure is required by law.
- Funds are not available to cover the costs of any ongoing medical care and I will remain responsible for the cost of non-related care. Tests, procedures or other costs incurred solely for the purpose of the research will not be my financial responsibility.
- I have been told I will not receive payment for participation in this study.
- I understand that my participation is voluntary and I may refuse to participate, or may discontinue participation at any time, without penalty or loss of benefits to which I am otherwise entitled. I also understand that the investigator has the right to withdraw me from the study at any time. I understand that my withdrawal from the study may be reasons related solely to me (e.g.: not following study related directions from the investigator; a serious adverse reaction) or because the entire study has been terminated.
- Nothing in this consent form waives any legal rights I may have nor does it release the investigator, the sponsor, the institution, or its agents from liability for negligence.

I have read the information provided above. I voluntarily agree to participate in this study.

After I sign, I will receive a copy of this consent form.

Name & Sign of the Participant

Signature of the Researcher

APPENDIX- II**Assessment Form**

NAME:

AGE/SEX:

ADDRESS:

PAST MEDICAL HISTORY:

OCCUPATION:

PATIENT'S CONTACT NUMBER:

OUTCOMES:

	TABLE TOP TEST		
Outcomes and Total score	Pre intervention	Post intervention	Difference
Group A			
Group B			