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The immediate effect of muscle energy technique on pain and range of motion on hamstring strain in amateur badminton players

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Abstract
Badminton is a high agility sport which requires lunges, Jumping, rapid arm movement and quick change of direction from various positions during the racket swing. It requires players to cross the badminton court to both sides from mid-court to forward and backward to execute the shots. Badminton match requires high intensity intermittent actions within short resting period. Fatigue may affect the neuromuscular control of lower limb, which is susceptible to increase the risk of injuries.[3] Hamstring Strain are classified into Grade 1-3 strains depending on severity. Muscle Energy Technique (MET) is a form of a manual therapy which uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, and lengthen the muscle. MET is based on the concepts of autogenic Inhibition and Reciprocal Inhibition. Reciprocal inhibition (RI) is advocated for acute problems, especially where the muscle(s) requiring release are traumatized or painful, and cannot easily or safely be used in sustained contractions such as those in the notes on Post Isometric Relaxation (PIR). The aim of the study is find the immediate effect of MET on Pain and Range of Motion in amateur Badminton Players. After analyzing the data we concluded that there was decrease in pain on VAS and increase in hip extension and knee flexion measured on Goniometer.

Keywords: badminton, lunges, jumping, rapid arm movement, hamstring strain

Introduction
Badminton is a high agility sport which requires lunges, Jumping, rapid arm movement and quick change of direction from various positions during the racket swing. It requires players to cross the badminton court to both sides from mid-court to forward and backward to execute the shots [1, 2]. Badminton match requires high intensity intermittent actions within short resting period. Fatigue may affect the neuromuscular control of lower limb, which is susceptible to increase the risk of injuries. Thus, the physical demands of badminton lead to a high risk for upper and lower extremities injuries, which result in decreased ability in performance and work time, and increased medical costs [3].

The cause of a hamstring muscle strain is often obscure. In the second half of swing phase, the hamstrings are at their greatest length and at this moment, they generate maximum tension. In this phase, hamstrings contract eccentrically to decelerate flexion of the hip and extension of the lower leg. At this point, a peak is reached in the activity of the muscle spindles in the hamstrings. A strong contraction of the hamstring and relaxation of the quadriceps is needed. According to "Klafs and Arnheim", a breakdown in the coordination between these opposite muscles can be a cause for the hamstring to tear [1, 3].

Hamstring Strain is classified as Grade 1-3 strains depending on severity.

Grade1 (mild)
Overstretching without tear of muscle or tendon fiber, Symptoms may not present until activity is over, Increased tightness in the muscle during stretch or through a full ROM, a feeling of pain may be reported with sitting or while walking uphill or ascending stairs, Depending on the severity, weight bearing activities may or may not be possible, walking properly may be possible and there will be minimal swelling [3, 4, 7].

Muscle Energy Technique (MET) is a form of a manual therapy which uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, and lengthen the muscle. As compared to static stretching which is a passive technique in which therapist does all the work, MET is an active technique in which patient is also an active participant. MET is based on the concepts of autogenic Inhibition and Reciprocal Inhibition.

If a sub-maximal contraction of the muscle is followed by stretching of the same muscle it is known as autogenic Inhibition MET, and if a sub-maximal contraction of a muscle is followed by stretching of the opposite muscle than this is known as Reciprocal Inhibition MET. Reciprocal inhibition (RI), produces a very similar latency ('refractory') period to that produced by Post Isometric Inhibition (PIR). RI is advocated for acute problems, especially where the muscle(s) requiring release are traumatized or painful, and cannot easily or safely be used in sustained contractions such as those in the notes on Post Isometric Relaxation (PIR).

Need of Study
There are lots of techniques and programs that can be used for the treatment of hamstring strains injuries but they all lack the short term effectiveness of these techniques. While muscle energy techniques are widely used by osteopaths and other manual therapists, there is limited research supporting the immediate effects of MET. Muscle tightness and pain are a limiting factor for optimal physical performance including daily activities and an important intrinsic factor for sports

injuries. Therefore the present study aims to determine whether a single application of MET could produce an immediate significant change on pain and flexibility of hamstring muscle (i.e. Range of motion) in amateur Badminton players.

Aim and Objectives

Aim of the study is to find the immediate effect of MET on Pain and Range of Motion in amateur Badminton Players.

Objective

To find out immediate effect of MET on Pain in amateur Badminton Players.

To find out immediate effect of MET on Range of Motion in amateur Badminton Players.

Methodology

Study design: - Experimental study.

Study setting: - PDMBA and sports club in and around Pune.

Sampling technique: - Purposive Sampling.

Study sample: - 30 subjects.

Inclusion Criteria

Age group: 12 – 25 years of age.

Subjects with unilateral Hamstring Strain Grade 1.

Both Genders were included.

Exclusion Criteria

Subjects with musculoskeletal and/or neurological conditions.

Subjects with previous strains or hip, knee injuries.

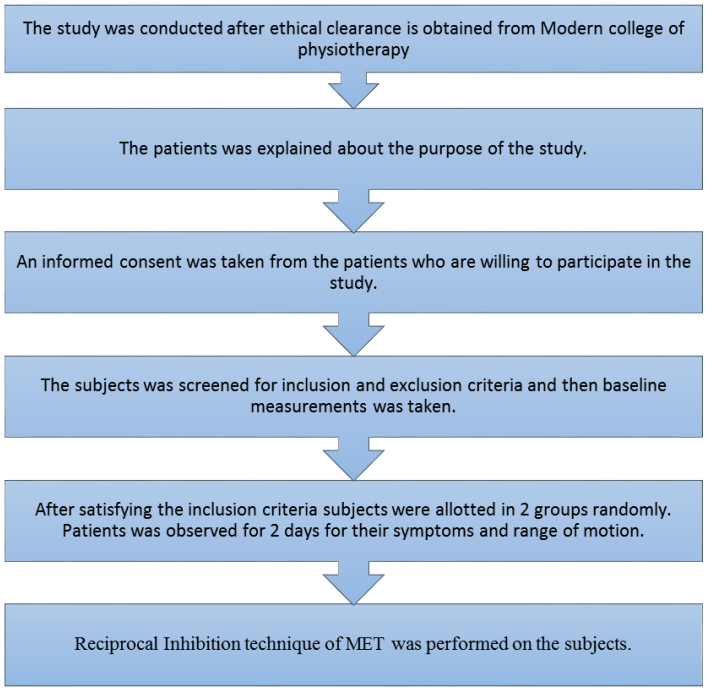
Subjects with contraindicated for MET such as Joint instability, healing fractures, open wounds, recent surgeries, etc.

Outcome Measures

Visual Analog Scale VAS

Goniometer

Procedure



Data Analysis

Table 1: showing distribution of subjects according to genders.

Total no. of subjects	Female	Male
30	12	18

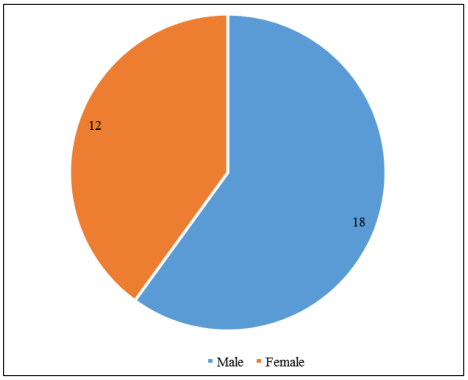


Fig 1: showing gender distribution

Table 2: showing age distribution

Age	12- 18	19-24
	13	17

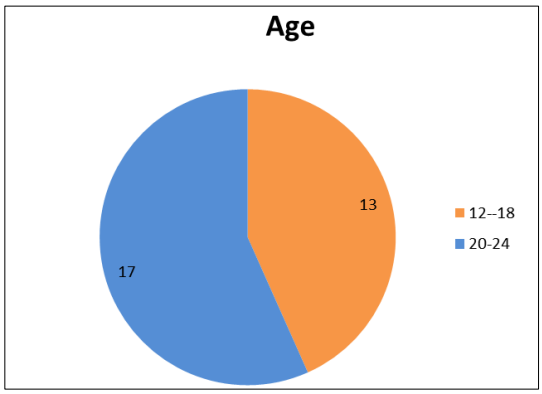


Fig 2: showing age distribution

Table 3: showing pre and post scores of pain on VAS.

VAS	Pre	Post	p value	t value
Mean ±SD	7.01 ± 0.85	5.62 ± 0.92	0.0001	17.27

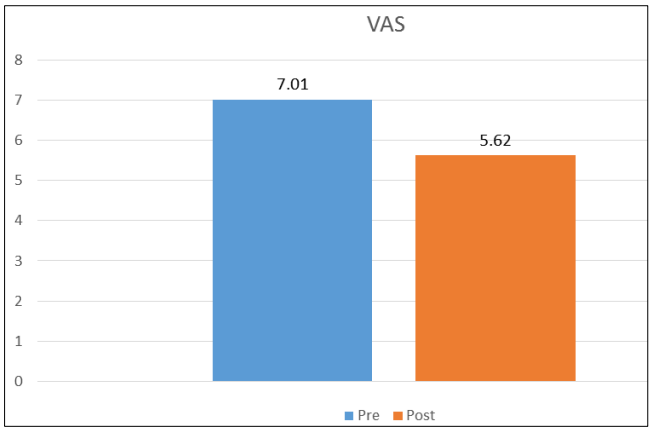


Fig 3: showing pre and post score of pain on VAS

Table 4: Showing pre and post ranges of knee flexion.

ROM	Pre	Post	p value	t value
Mean ± SD	34.66 ± 6.22	45.4± 5.8	0.001	14.10

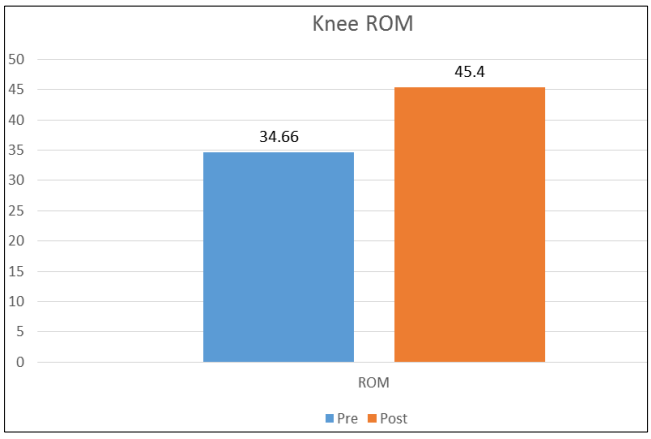


Fig 4: showing pre and post ranges of knee flexion

Table 5: Showing Pre and Post of Hip Extension

ROM	Pre	Post	p value	t value
Mean ± SD	18 ± 3.06	20.6±3.23	0.001	5.48

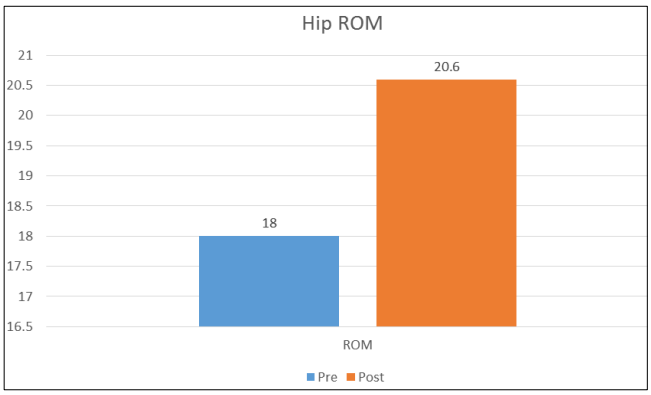


Fig 5: showing pre post ranges of hip Extension

Result

The Present study was conducted to know the immediate effect of Muscle Energy Technique on Pain and hip, knee Range of Motion on Hamstring Strain in amateur Badminton Players. The Statistical Analysis was done using Instat Software using Mean and Standard Deviation.

The Mean and Standard Deviation of the Pre scores of VAS scale was 7.01 ± 0.85, whereas the post VAS score was 5.62 ± 0.92, with the p value < 0.001 considering it extremely significant and t value = 17.27.

The Mean and Standard Deviation for Pre and Post degree of Range of Motion of knee flexion was 34.66 ± 6.22 and 38 ± 6.26, respectively, with the p value < 0.001 and t value = 14.10.

And the Mean and Standard Deviation for Pre and Post degree of Range of Motion of hip extension was 18 ± 3.60 and 20 ± 3.23, respectively, with the p value < 0.001 and t value = 5.48.

Hence, after analyzing the data we can conclude that there was significant difference in the Pre and Post scores of VAS as well as ROM of knee flexion and hip extension.

Discussion

- In the given study conducted for the immediate effect of Muscle Energy Technique using Reciprocal Inhibition, which shows a significant change in reduction of pain in Hamstring strain Grade 1 in amateur Badminton players. The results of this study are in line with previous studies [1, 3, 4, 6].
- The significant decrease in pain is due to the activation of other peripheral fiber, that is, those fibers that carry information about harmless stimuli or mild irritation, here touching the skin. These are the large-diameter fibers called Aβ fibers which tends to close the pain gate, inhibiting the perception of pain when noxious stimulation exists.
- NoelleM. Selkow, *et al*. in their study " Short-Term Effect of Muscle Energy Technique on Pain in Individuals with Non-Specific Lumbopelvic Pain: A Pilot Study" indicated there was small decrease in worst pain over the past 24 hours due to a decrease in neurophysiological pain, thus decreasing the level of pain perceived by the patient [1].
- The present study also shows a significant increase in the range of motion of knee flexion as well as hip extension, with single application of Reciprocal Inhibition method of Muscle Energy Technique [12, 13, 16, 17].
- Cheraladhan E. Sambandham, Jagatheesan Alagesan, et. al in their study "Immediate effect of muscle energy

technique and eccentric training on hamstring tightness of healthy female volunteers – a comparative study" indicated more significant improvement in hamstring flexibility using MET [6].

- Waseem and Nuhmani, in their study ―comparative study of the impact of muscle energy technique and eccentric training on popliteal angle: hamstring flexibility in Indian collegiate male indicated more significant hamstring flexibility in MET than ECC [3].
- "A significant increase in joint angle was observed following the MET, a change in tissue property could be the only logical explanation" was quoted by Allen (2011) who studied the effectiveness of MET in improving hamstring extensibility and considered MET a statistically significant intervention in improving hamstring extensibility in patients with hamstring injuries [25] Thus supporting the present intervention.
- While improvements have been reported using MET on the cervical, thoracic, and lumbar spine [6, 7, 8, 9] following a single application of MET. Ballantyne *et al.* observed a significant increase in passive knee extension, Smith and Fryer reported significant increases in hamstring flexibility following 2 applications of MET performed over a 2-week period, but none on Hamstring Strain in Badminton Players.

Conclusion

This study found that a single application of Muscle energy Technique produce decrease in the pain on Visual Analog Scale, but a very slight difference (increase) in the hip and knee Range of Motion after a single application of Muscle Energy Technique for hamstring Grade 1 muscle strain.

Limitations and future scope of study

- The sample size was small. Future studies with a larger sample size are recommended.
- This study focused only on the immediate effects. Future studies with a long term focus are recommended.
- The population was restricted to sports persons. Similar studies with other groups with pain and disability in different group of muscle can be carried out.
- The absence of a control group led to ineffectiveness of the interventions. Further, future studies must include a control group to enable effectiveness of the interventions.
- This study was restricted to only two outcome measures. Several other outcome measures can be measured using various other tools.

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