Research Article

Randomized Control Trial on Hamstring Tightness and Muscle Energy Technique

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Abstract

Background: Tightness in the hamstring muscles is a frequent issue in physically active people, which may impact flexibility, range of motion, and performance in sprinting athletes who are male. Muscle Energy Technique (MET) and static stretching are commonly used physiotherapy interventions to enhance muscle flexibility.
Objective: To compare the effect of Muscle Energy Technique and static stretching on hamstring flexibility in male sprint athletes.
Methodology: Thirty male sprint athletes, aged 20–30 years, with hamstring tightness were compared. The participants were randomly allocated to two groups of 15. Group A was given static stretching and Group B was given Muscle Energy Technique for 10 days. Hamstring flexibility was measured by the Active Knee Extension (AKE) test and a universal goniometer. Measurements were taken pre- and post-treatment and at follow-up.
Fifteen participants were randomly assigned to groups. Group A received static stretching and Group B received Muscle Energy Technique for 10 days. The Active Knee Extension (AKE) test and a universal goniometer were used to assess hamstring flexibility. Measurements were made pre and post treatment and at follow up.
Results: The mean values for Group A were 10.27 ± 1.16 for the left leg and 10.47 ± 0.83 for the right leg. The mean values for group B were 13.08 ± 1.08 for the left leg and 14.07 ± 1.53 for the right leg. The reported respective t-values were 4.34 and 3.39 indicating statistically significant difference between the groups .
Conclusion: Both interventions were related to improvements in hamstring flexibility. However, the reported findings support the use of Muscle Energy Technique over static stretching to improve hamstring range of motion.

Keywords: Muscle Energy Technique, Static Stretching, Hamstring Flexibility, Active Knee Extension, Range of Motion.

1. Introduction

Physical fitness involves a lot of flexibility. It is important in normal movement mechanics and in athletic performance [4, 5]. Tight hamstrings, in particular, are likely to restrict the range of motion of the lower limb and increase the risk of muscle strain [5, 6]. This problem may be particularly prevalent in sprinters, as repetitive high speed running during sprinting may result in a gradual decrease in hamstring flexibility [4, 5].
Flexibility is often improved by static stretching or Muscle Energy Technique (MET) [1-3, 6, 7]. Static stretching is a method of slowly elongating a muscle and maintaining it in the elongated position [1, 2, 6]. MET adds a step. The person contracts the muscle against resistance, relaxes it, and then stretches it out further [3, 7].
Flexibility is important to physical fitness. It affects the body's movement and the performance of athletes [4, 5]. Limited flexibility of the hamstrings frequently restricts the range of motion of the lower limb and may increase the risk of a muscle strain [5, 6]. Sprinters may be affected too, as repeated high-speed running in sprinting may lead to a reduction in hamstring flexibility over time [4, 5].
Static stretching and Muscle Energy Technique are popular methods for improving muscle flexibility [1–3, 6, 7]. Static stretching involves gradually lengthening a muscle and holding it in the lengthened position [1, 2, 6], while MET involves a voluntary contraction of a muscle against a resistance followed by a relaxation and further stretching [3, 7].
MET is believed to improve flexibility through neuromuscular and mechanical mechanisms [3, 7]. Therefore, this study compares the effectiveness of MET and static stretching in improving hamstring flexibility among sprinting athlete males.

2. Aim And Objectives

Aim: To compare the effects of Muscle Energy Technique and static stretching on hamstring flexibility in sprinting athlete males.
Objectives:
To evaluate the effect of static stretching on hamstring flexibility in sprinting athlete males.

To assess the effect of MET on hamstring flexibility in sprinting athlete males.
To compare the effectiveness of both techniques in improving knee extension range of motion.

3. MATERIALS AND METHODS

Study Design: Comparative experimental study.
Study Setting: Nehru stadium, O.P.D., Dasmesh college of physiotherapy.
Sample Size: 30 sprinting athlete males.
Age Group: 20–30 years.
Sampling: Simple random sampling, as reported in the original study.

INCLUSION CRITERIA

Aged 20–30 years.
Gender – Male.
Subjects having sprinting sport with hamstring tightness [1, 2, 6].
Subjects run for 20 min. without incline at 8.5 km/hr of speed.
Inability to achieve greater than 150° of knee extension with the hip maintained at 90° flexion [1, 2, 6].

EXCLUSION CRITERIA

Patients with Acute or chronic low back pain.
Patients with Previous or current hamstring injury.
Patients with Acute swelling in the hamstring region.
Patients with Lower-limb fractures.
Patients with History of arthritis.
Patients with Joint hypermobility.
Patients with Traumatic soft-tissue injuries.

OUTCOME MEASURES AND EQUIPMENT

Universal goniometer [8].
Active Knee Extension test (popliteal angle measurement) [8].

GROUP ALLOCATION AND INTERVENTION

Participants were divided into two groups:
Group A – Static Stretching (n = 15): Participants received static stretching for 10 days [1, 2]. The hamstring was stretched until
moderate discomfort was reported. The position was maintained with a moderate isometric contraction for 10 seconds, followed by 5 seconds of relaxation [7]. The procedure was repeated five times [1, 2].
Group B – Muscle Energy Technique (n = 15): Participants received Muscle Energy Technique for 10 days. The technique involved isometric contraction of the hamstring muscle followed by relaxation and further movement into the available range [3, 7].

ASSESSMENT PROCEDURE

Hamstring flexibility was assessed using the Active Knee Extension test [8]. Participants were positioned supine with the hip flexed to 90°. The knee was extended until a mild stretching sensation was experienced. A universal goniometer was used to measure knee range of motion [8]. Three readings were taken, and their average was recorded.
Pre-treatment, post-treatment, and follow-up measurements were collected.

4. RESULTS

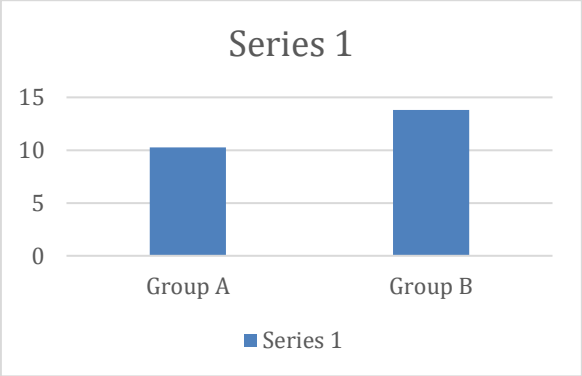
The results demonstrated greater mean improvement in the MET group compared with the static stretching group.

COMPARISON OF LEFT LEG

Parameter	Group A (Static Stretching)	Group B (MET)
Mean	10.27	13.08
Standard Deviation	1.16	1.08
t-value	4.34	
p-value	0.05	

Parameter	Group A (Static Stretching)	Group B (MET)
Mean	10.47	14.07
Standard Deviation	0.83	1.53
t-value	3.39	
p-value	0.05	

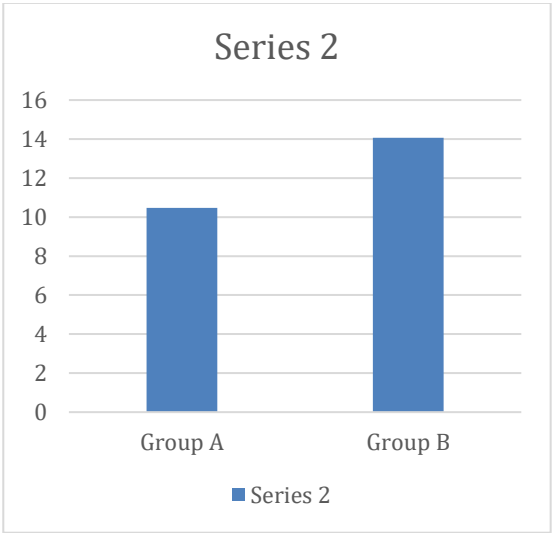
Table reveals that the mean and standard deviation of group A (left leg) are 10.27 and 1.16. Mean and standard deviation of group B (left leg) are 13.08 and 1.08. The calculated t-value is 4.34 which is significant at 0.05 level of significance. This proves treatment given in group B is effective in increasing the ROM.



Graph – showing comparison of the ROM between two groups (left leg)

COMPARISON OF RIGHT LEG

Table reveals that the mean and standard deviation of group A (right leg) are 10.47 and 0.83. Mean and standard deviation of group B (right leg) are 14.07 and 1.53. The calculated t-value is 3.39 which is significant at 0.05 level of significance. This proves treatment given in group B is effective in increasing the ROM.



Graph – showing comparison of the ROM between two groups (right leg)

RESULT:

The findings indicate greater reported improvements in knee extension range of motion in Group B than in Group A.

5. DISCUSSION

The findings suggest that Muscle Energy Technique was more effective than static stretching in improving hamstring flexibility.

The improvement following MET may be associated with neuromuscular mechanisms, including changes in muscle activation and stretch tolerance [3, 7]. Isometric contraction followed by relaxation may allow further movement into the available range of motion [3, 7].

Static stretching also contributes to flexibility improvement by gradually increasing tolerance to muscle elongation [1, 2, 6].

The results are consistent with earlier research suggesting that contract-relax techniques can improve hamstring flexibility [3, 7]. However, the exact physiological mechanisms responsible for these improvements remain debated [3, 6, 7].

The follow-up findings indicated that flexibility decreased from post-treatment values after 72 hours, suggesting that regular stretching or maintenance exercises may be necessary to retain improvements [2, 6].

6. LIMITATIONS OF THE STUDY

Small sample size of only 30 participants.

Study restricted to male sprinting athlete, aged 20–30 years.

Only hamstring flexibility was investigated.

Long-term effects of the interventions were not evaluated.

Follow-up duration was limited.

A maintenance exercise programme was not included.

7. CONCLUSION

The study concludes that both Muscle Energy Technique and static stretching can be used to improve hamstring flexibility. However, the reported results indicate that Muscle Energy Technique produced greater improvements in knee extension range of motion compared with static stretching.

Therefore, MET may be considered a useful physiotherapy intervention for improving hamstring flexibility in sprinting athlete males.

8. RECOMMENDATIONS FOR FUTURE RESEARCH

Conduct studies with larger sample sizes.

Include both male and female participants.

Investigate different age groups and athletic populations.

Examine the long-term effects of MET and static stretching.

Compare different MET protocols and stretching durations [1–3, 7].

Include a maintenance programme to evaluate the retention of flexibility gains [2].

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