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Research Article

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A Comparative study on the effectiveness of muscle energy technique and self-myofascial release on hamstring flexibility among young adults

Surya Prakash.D[1], Dr.B.Kannabiran M.P.T.,Ph.D[2], Dr.M.K.Franklin Shaju M.P.T.,Ph.D[3]

[1]*Intern, RVS College of Physiotherapy, The Tamil Nadu Dr.MGR Medical University,*

[2]*Professor, RVS College of Physiotherapy, The Tamil Nadu Dr.MGR Medical University,*

[3]*Professor and Principal, RVS College of Physiotherapy, The Tamil Nadu Dr.MGR Medical University,*

Corresponding Author: Surya Prakash. D, Intern, RVS College of Physiotherapy, The Tamil Nadu Dr.MGR Medical University,

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Abstract

Background: Reduced hamstring flexibility may increase the risk of musculoskeletal overuse injuries and limit functional ability. This study aimed to compare the effects of muscle energy technique and self-myofascial release on hamstring flexibility among young adults.

Methodology: The study was conducted at RVS College of Physiotherapy with ethical approval and informed consent. Forty eligible participants were randomly assigned into two equal groups: Group A received muscle energy technique, while Group B underwent self-myofascial release. Interventions were administered five days per week for six weeks, and hamstring flexibility was assessed using the active knee extension test.

Results: The calculated unpaired t values for right and left leg range of motion were 8.6 and 9.82, respectively, which exceeded the table value (2.712) at the 0.005 significance level. Therefore, there is a significant difference between muscle energy technique and self-myofascial release in improving hamstring flexibility among young adults.

Conclusion: This study found that muscle energy technique is more effective than self-myofascial release for improving hamstring flexibility among young adults.

Keywords: Hamstring flexibility, muscle energy technique, self-myofascial release

Introduction

Hamstrings are a group of three muscles located on the posterior aspect of the thigh—biceps femoris, semitendinosus, and semimembranosus—which originate from the ischial tuberosity of the pelvis and insert distally around the knee joint. Functionally, these muscles act to extend the hip and flex the knee, playing a central role in walking, running, and maintaining postural stability. The biceps femoris sits laterally, while the semitendinosus and semimembranosus lie medially, working together to stabilise the pelvis and contribute to lower limb power and movement control.[1]

Hamstrings act as the primary knee flexors and significant hip extensors, contributing to propulsion during walking and running. During high-speed activities, hamstrings play a crucial role in eccentric control, decelerating the swinging limb and preventing the knee from excessive extension. They also support pelvic stabilisation, particularly by limiting anterior pelvic tilt and assist in tibial rotation during knee flexion, which enhances dynamic postural control. These combined functions make the hamstrings vital for locomotion efficiency and injury prevention.[2]

Muscle flexibility refers to the ability of a muscle-tendon unit to lengthen and allow joints to move smoothly through their full range of motion. It plays an essential role in functional movement, posture, and injury prevention, as adequate flexibility reduces stress on muscles and connective tissues during daily and athletic activities. Flexibility can be influenced by factors such as age, physical activity level, muscle stiffness, and neuromuscular control.[3]

Hamstring flexibility refers to the capacity of the hamstring muscle group to elongate sufficiently to permit optimal hip and knee movement without restriction. It is an important component of lower-limb mobility and functional performance, as limited hamstring flexibility has been associated with altered biomechanics, increased risk of musculoskeletal injury, and reduced efficiency in tasks such as walking, running, and bending.[4]

Limited hamstring flexibility has been linked to reduced stride length, impaired shock absorption, and increased mechanical load on the lumbar spine during activities such as running, bending, and lifting. These restrictions can contribute to compensatory patterns in the pelvis and spine, elevating the risk of both acute muscle strain and chronic low-back pain. Athletes with poor hamstring extensibility demonstrate a higher incidence of muscle strain injuries due to reduced capacity to tolerate eccentric loading during high-speed movements.[5]

Muscle energy technique (MET)

Muscle energy Technique (MET) is a manual therapy intervention used to improve muscle flexibility, increase joint mobility, and reduce pain through controlled voluntary muscle contractions against therapist resistance. Based on principles such as post-isometric relaxation and reciprocal inhibition, MET helps decrease muscle tightness, improve stretch response, and enhance movement. As an active treatment approach, it encourages patient participation and supports better muscle function and mobility in musculoskeletal conditions.Reciprocal inhibition is defined as a neuromuscular process in which the contraction of one muscle causes automatic relaxation of its opposing muscle, allowing increased range of motion and reduced resistance to stretch.[6]

Self-myofascial release (SMFR)

Self-myofascial release (SMFR) is a therapeutic technique widely used in physiotherapy, sports rehabilitation, and fitness training to relieve soft-tissue restrictions and improve flexibility by applying sustained pressure to the fascia and underlying muscles using tools such as foam rollers, massage balls, or roller sticks. SMFR is believed to enhance tissue mobility, reduce muscle stiffness, and promote neuromuscular relaxation by influencing mechanoreceptors and improving local circulation. It is commonly incorporated into warm-up or recovery programs for its ability to increase range of motion without adversely affecting muscle performance.[7]

Methodology

Review board of RVS College of Physiotherapy, Coimbatore, has approved this two group pre and post-test experimental study and written consent was obtained from all the participants after giving clear instructions regarding treatment procedure and its implications. The study was conducted in RVS College of Physiotherapy, Coimbatore, Tamil Nadu, India. 40 subjects aged between 18-25 years were selected for the study and randomly assigned into two equal groups. Group A-20 subjects, received muscle energy technique for five days per week for six weeks and group B-20 subjects, received self-myofascial release for five days per week for six weeks. Hamstring flexibility was measured before and after 6 weeks of intervention by active knee extension test. Normal individuals with tight hamstrings of age group 18-25 years with no history of major musculoskeletal and neurological dysfunctions were included for the study and all the confound variables were clearly identified and controlled.

Measurement Procedure:

Active knee extension test:

The subject was positioned supine with the hip flexed to 90⁰. The examiner stabilised the thigh in this position and instructed the subject to actively extend the knee as far as possible without pelvic movement. The terminal knee angle was measured using a goniometer with the fulcrum at the lateral femoral epicondyle, the stationary arm aligned with the fibula. The knee flexion angle obtained was recorded as the test outcome.

Figure 1: Active knee extension test.

Treatment Procedure:

Group A: Muscle energy technique – Reciprocal inhibition

The subject was positioned in supine lying while the therapist stood beside the affected leg facing the head of the table. The subject was in supine lying position with flexion of the hip on the affected side and the flexed knee was extended by the therapist to the point of resistance and placed on therapist's shoulder. The therapist held the treated leg thigh using one hand to maintain stability and to palpate for bind when the barrier was being assessed and the other hand stabilised the subject's unaffected leg against the table. The subject was asked to extend the knee by utilising the antagonists to the hamstring which employ 20% of the strength in the quadriceps and is resisted by the therapist for 7-10 seconds. The leg was then extended at the knee to its new hamstring limit and after relaxation, the procedure was repeated. The technique was performed for 3 repetitions per session, once daily, 5 sessions per week for 6 weeks.

Figure 2: Muscle energy technique- Reciprocal inhibition.

Group B: Self-myofascial release – Foam rolling

The subject was positioned in long sitting with a foam roller placed between the ischial tuberosity and the subject's legs were maintained in an extended position, keeping their ankles relaxed. Subjects were then instructed to support their body weight with their arms extended on the ground and raise the upper body and to allow as much pressure between the hamstring muscle group and the foam roller. The intervention consisted of three 1-minute repetitions with 30-second rest intervals between repetitions and was administered once daily, 5 sessions per week for 6 weeks.

Figure 3: Self-myofascial release – Foam rolling

Data Analysis and Results

The study was conducted to find out the effectiveness of muscle energy technique and self-myofascial release on hamstring flexibility among young adults.

Table 1: Mean value, mean difference, standard deviation and paired 't' value of range of motion of the right leg among group A &B

Variable	Group	Pre-test mean	Post-test mean	Mean difference	Standard deviation	Paired 't' value
Hamstring flexibility	A	40.3	27.9	12.4	0.94	59.2
	B	38.5	28.6	9.9	0.85	52.5

***0.005 level significance**

The calculated paired 't' values of range of motion for group A and B are 59.2 and 52.5 respectively and the 't' table value is 2.861 at a 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, there is a significant difference in the range of motion of the right leg following muscle energy technique and self-myofascial release for respective groups on the hamstring muscles among young adults.

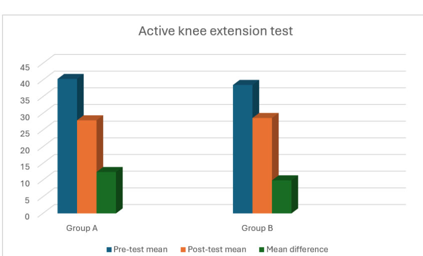

Table 2: Mean value, mean difference, standard deviation and unpaired 't' value of range of motion of the right leg among group A & B

Group	Mean	Mean difference	Standard deviation	Unpaired 't' value
A	12.4	2.5	0.9	8.6
B	9.9			

*0.005 level of significance.

In between group analysis, , the calculated unpaired 't' value for range of motion is 8.6 and the 't' table value is 2.712 at a 0.005 level of significance. Since the calculated 't' value is more than the 't' table value, there is a significant difference in the range of motion of the right leg between muscle energy technique and self-myofascial release on the hamstring muscles among young adults.

Table 3: Mean value, mean difference, standard deviation and paired 't' value of range of motion of the left leg among group A &B

Variable	Group	Pre-test mean	Post-test mean	Mean difference	Standard deviation	Paired 't' value
Hamstring flexibility	A	44.8	32.3	12.5	0.88	63.4
	B	45.05	35.2	9.85	0.81	55.02

***0.005 level significance**

The calculated paired 't' values of range of motion for group A and B are 63.4 and 55.02 respectively and the 't' table value is 2.861 at a 0.005 level of significance. Since the calculated 't' values are more than the 't' table value, there is a significant difference in the range of motion data of left leg following muscle energy technique and self-myofascial release for respective groups on the hamstring muscles among young adults.

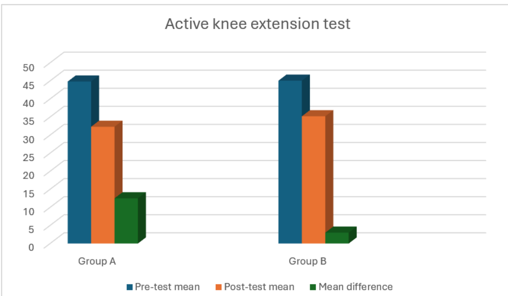

Table 4: Mean value, mean difference, standard deviation and unpaired 't' value of range of motion of the left leg among group A & B

Group	Mean	Mean difference	Standard deviation	Unpaired 't' value
A	12.5	2.65	0.85	9.82
B	9.85			

***0.005 level of significance.**

In between group analysis, , the calculated unpaired 't' value for range of motion is 9.82 and the 't' table value is 2.712 at a 0.005 level of significance. Since the calculated 't' value is more than the 't' table value, there is a significant difference in the range of motion data of right leg is between muscle energy technique and self-myofascial release on the hamstring muscles among young adults.

Discussion

The study aimed to compare the effectiveness of muscle energy technique and self-myofascial release on hamstring flexibility among young adults. Before and after the interventions, range of motion was assessed by active knee extension test. The results of this study showed that muscle energy technique is more effective than self-myofascial release in improving hamstring flexibility among young adults.

Reciprocal inhibition occurs when the quadriceps (agonist) contract during active knee extension, causing reflex relaxation of the hamstrings (antagonist). Muscle spindle activation sends Ia afferent impulses to the spinal cord, exciting quadriceps alpha motor neurons while inhibitory interneurons reduce hamstring motor activity. This decreases hamstring resistance, promotes effective muscle lengthening, and improves smooth, precise movement.[8]

Self-myofascialreleaseusingfoamrollingimproveshamstringflexibility by applying sustained pressure that stimulates mechanoreceptors in the fascia and muscle, leading to reduced alpha motor neuron activity and decreased muscle tone through autogenic inhibition. It also modulates pain perception and increases stretch tolerance, resulting in temporary muscle relaxation, improved myofascial viscoelasticity, and increased range of motion without reducing muscle strength.[9]

Conclusion

A pre and post-experimental study was conducted to compare the effectiveness of muscle energy technique (MET) and self-myofascial release (SMFR) on hamstring flexibility among young adults. Forty subjects meeting the inclusion and exclusion criteria were randomly selected and divided equally into Group A (MET) and Group B (SMFR). Both groups received treatment for six weeks, with five sessions per week, and hamstring flexibility was assessed before and after intervention using active knee extension test. There was a statistically significant improvement in hamstring extensibility in Group A treated with muscle energy technique compared to Group B treated with self-myofascial release. Therefore, muscle energy technique can be considered an effective physiotherapeutic intervention for improving hamstring flexibility among young adults.

References

1. Standring Susan, Gray Henry, Anand Neel, Tunstall Richard (2021). Gray's anatomy: the anatomical basis of clinical practice. Elsevier; 1588 p.
2. Morin JB GPEPMJ (2021). Acceleration, deceleration, and muscle injury risk in sport. *Sports Med*. 51(10):1935–50.
3. Behm DG, Chaouachi A (2011). A review of the acute effects of static and dynamic stretching on performance. *Eur J Appl Physiol*. Nov 4;111(11):2633–51.
4. López-Miñarro PA, Rodríguez-García PL (2010). Hamstring Muscle Extensibility Influences the Criterion-Related Validity of Sit-and-Reach and Toe-Touch Tests. *J Strength Cond Res*. 24(4):1013–8.
5. Witvrouw E, Danneels L, Asselman P, D'Have T, Cambier D (2003). Muscle Flexibility as a Risk Factor for Developing Muscle Injuries in Male Professional Soccer Players. *Am J Sports Med*. Jan 1;31(1):41–6.
6. Chaitow L (2013). Muscle energy techniques.4th ed. Edinburgh: Churchill Livingstone; .;2–52.
7. Cheatham SW KMCMLM (2015). The effects of self-myofascial release using foam rolling on performance and recovery: a systematic review. *Int J Sports Phys Ther*. 0(6):827–38.

8. Gopikrishnan CG, & PGS (2017). “Comparative study between Muscle Energy Technique and eccentric training in improving hamstring muscle flexibility and performance in male college athletes.” *International Journal of Medical and Exercise Science*. 3(3):340–53.

9. Junker DH, & STL (2015). “The foam roll as a tool to improve hamstring flexibility”. *J Strength Cond Res*. 29(12):3480–5.