RESEARCH ARTICLE

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Effectiveness of Muscle Energy Technique Versus Self-Myofascial Release on Hamstring Flexibility

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Abstract

Background: The hamstring is the two-joint muscle, located on the posterior aspect of the thigh. The tightness of the hamstring muscle is more common than the other skeletal muscle. Lack of hamstring flexibility leads to postural changes and reduces muscle strength and length. To improve hamstring flexibility, muscle energy technique and self-myofascial release are effective. **Objectives:** To determine the effectiveness of muscle energy technique versus self-myofascial release by using a foam roller to improve hamstring flexibility in young individuals. **Methods:** 30 subjects were selected according to inclusive and exclusive criteria and they were divided into two groups, Group A treated with a self-myofascial release technique, and Group Was treated with a muscle energy technique. **Results:** To compare both groups, an unpaired t-test was used. The post-intervention value of flexibility in Group A is 8.4 and in Group B is 12.8. There is a significant difference between Group A and Group B for flexibility. According to the results, both techniques are effective but as a comparison, Group B *i.e.* muscle energy technique is more effective than Group A self-myofascial release. **Conclusion:** The muscle energy technique is more helpful in improving hamstring flexibility as per comparison to SMFR by using a foam roller.

Keywords: AKE Test, Hamstring Flexibility, Muscle Energy Technique, Self-Myofascial Release

1. Introduction

The hamstring is a large group of muscles located on the posterior aspect of the thigh, it includes four muscles *i.e.* semitendinosus, semimembranosus, long head of biceps femoris, and short head of biceps femoris. The hamstring muscle crosses the hip as well as the knee joint, the origin of muscle from the ischial tuberosity, and inserts into the upper end of the fibula and tibia it is considered as two joint muscles. It extends the thigh at the hip joint and flexes and rotates the leg at the knee joint. The hamstring muscle helps in maintaining body posture, holding the position of the pelvis, and performing trunk movements about the lower extremity. Lack of hamstring flexibility causes a decrease in range motion and sometimes it also causes pain while extending the knee[1]. The ability to elongate skeletal muscle and tendons is termed flexibility. Gleim explained two types of flexibility, Static flexibility is equal to the tolerance threshold toward stretches and holding the position which is measured via a Range of Motion (ROM), dynamic flexibility is the necessary resistance toward stretch and it involves moving rather than holding position which is measured via stiffness[2]. Hamstring tightness occurs due to inadequate stretching, maintaining the same position for a long period like prolonged sitting, standing, kneeling, *etc*. The Hamstring plays an important role in activities like walking, running, jumping, and changing speed. It also controls the movements of the trunk[3]. Development of patella tendinopathy occurs due to low hamstring flexibility[4].

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Less flexibility causes several biomechanical changes in posture and joint dysfunction. Deficiency of flexibility is due to the adaptive shortening of muscles, tendons, and other soft tissues[5]. Less flexible hamstrings have fewer muscle lengths[6]. Good flexibility results in lower muscle strains and generates greater efficiency in movement[5,6]. A tight hamstring causes decreasing lumbar lordosis and is associated with posterior pelvic tilt which leads to lower back pain[7].

A self-myofascial release independent technique, which is performed individually. Foam rollers are used in treating large groups and used to restrict the soft tissues[7]. It is an affordable and easily available technique that is used to release muscular and fascial pain and to improve muscle flexibility, for this technique, special tools are used such as foam rollers or massage balls to apply pressure on the muscle belly. Self-myofascial helps to reduce delayed onset muscle soreness and increases flexibility[8].

The muscle energy technique is soft tissue treatment, which is performed against resistance. For this article post isometric relaxation approach was used to improve flexibility. MET is much better than stretching, massage, cryotherapy, and other manual therapy techniques for hamstring shortening and lengthening. According to Mitchell, MET improves range of motion and muscle flexibility[9]. MET is a manual technique, beneficial for lengthening muscles, strengthening muscles, improving range of motion, and relieving hypertonic musculature[2,10].

2. Materials and Methods

This comparative study was carried out in Krishna College of Physiotherapy, deemed to be a university, in Karad.

Subject Criteria: For this study, 30 subjects were selected between the ages of 18-25 years. Inclusion criteria include subjects who have hamstring tightness, both males and females were selected. Exclusion criteria include a history of fracture and soft tissue injury in the last 6 months, systemic and localized infection, and acute and chronic back pain.

3. Outcome Measures

Active knee extension test: Participants were kept in the lying position with hip stabilization at 90 degrees. This test was measured with a goniometer. The greater trochanter, lateral condyle of the femur, and lateral malleolus are the landmarks used to measure a range of motion. The goniometer kept over the lateral epicondyle of the femur is considered a fulcrum with the stationary arm in line with the greater trochanter and midline of the femur and the moving arm with the lateral malleolus and midline of the fibula. The hip and knee should be kept in 90-degree flexion, then ask the subject to extend the knee. To confirm the final readings, at least three repetitions were taken.

4. Procedure

Ethical approval was taken from the institutional protocol and ethical committee of Krishna Vishwa Vidyapeeth deemed to be a university. Subjects were selected as per inclusive and exclusive criteria. Informed consent and demographic data were taken from each subject. 30 subjects were chosen by random sampling method and they were divided into two groups. First,15 subjects were treated with a self-myofascial release technique by using a foam roller *i.e.* Group A and the remaining 15 subjects were treated with a muscle energy technique *i.e.* Group B. To confirm the effectiveness of both treatments Active knee Extension test will be assessed by using a goniometer. The procedure of the study was explained to all participants in both groups.

Group A: Self-Myofascial Release Technique



Figure 1. The subject performed the SMFR technique by using a foam roller.

Place the foam roller under the ischial tuberosity and instruct them to keep their ankles relaxed with their hands on the floor. Then actively moving the foam roller from the ischial tuberosity to the popliteal fossa and inversely. Instruct the participants to roll the foam roller from the origin to the insertion of the muscle. This is performed

for 4-5 min, in which 30sec roll over the muscle belly then 30sec rest were taken.

Group B: Muscle Energy Technique



Figure 2. Muscle energy technique performed by therapist.

The subject was in the supine position, the therapist passively flexed the hip and knee at 90 degrees. From this position, the subject's lower leg was placed on the therapist's shoulder then the knee passively extended the knee. Ask the subject to resist the shoulder for 10 sec followed by a 10 sec rest period was taken. Repeat the same technique at least three times.

5. Results

Graph 1. Gender-wise distribution

Age	Male	Female
18-25	18	12

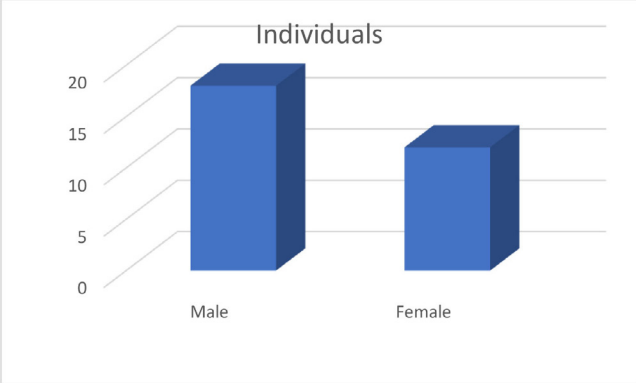


Figure 3. The graph shows that 18 males and 12 females between the 18-25 age group were assessed for this study.

Graph 2. Techniques to improve hamstring flexibility.

Techniques	Mean difference
Muscle energy technique [Group B]	12.6
Self-myofascial release technique [Group A]	8.4

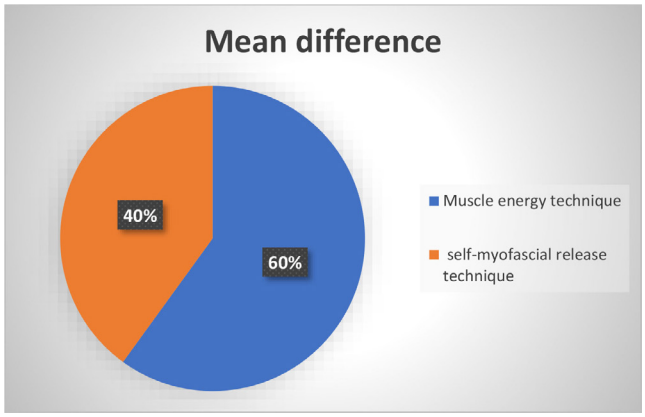


Figure 4. This pie chart shows that the muscle energy technique is more effective in improving hamstring flexibility.

6. Discussion

This study aimed to find out the effectiveness of muscle energy techniques compared to self-myofascial release to improve the flexibility of the hamstring muscle. For this study, 30 individuals were taken and they were divided into two groups, Group A [SMFR] and Group B [MET]. AKE test was used to assess the hamstring tightness According to the study, both techniques are effective in improving hamstring flexibility. While comparing between two techniques individuals who were treated with the muscle energy technique showed more improvement in hamstring flexibility than the self-myofascial release technique.

The Self-myofascial technique depends on the individual's skill. while doing foam rolling, how much pressure will be applied to the muscles and this pressure will maintain entire the treatment session[3]. SMFR is also used before and after physical activity[6]. Umiya. I. Pathan concludes that PIR and RI are equally effective in improving flexibility. It is applied after post-immobilization and used to lengthen and strengthen muscles[10]. Vibhuti Gaur, Datta Meghe Institute of Medical Sciences This study reveals that MET and ART stretching

techniques are equally effective in improving hamstring flexibility[11]. Mohd. Waseem, shibili nuhmani, conducted a study on normal collegiate males according to this study, the MET group was able to increase the popliteal angle. This study clearly said that the muscle energy technique improves hamstring flexibility[12].

MET works on active muscle relation and it facilitates the voluntary contraction of muscles[13]. According to, Ricardo M. Ferreira, foam rollers are reasonable in size and they are easier to use for lower limb muscles. They give a similar result as dynamic stretching but are not superior to static stretching[14]. It is also used to improve joint range of motion and to improve muscle function[15]. Kathleen M Sullivan concludes foam roller is not that effective for muscle strength; it increases ROM only when used for a longer duration. Upper limb strength is important to move the foam roller over the muscle[16]. Scott W. Cheatham suggests that foam roller is effective for pre- and post-exercise muscle performance and also enhancing joint ROM[17]. Previous studies concluded that both techniques are equally effective in improving hamstring flexibility in a single session[18].

According to my study, MET is more effective in improving hamstring flexibility than SMFR because it depends on the individual's body weight, upper limb muscle strength, and how much pressure is applied to the hamstring by individuals.

7. Conclusion

Based on the result, we have concluded that both techniques are effective. However, the muscle energy technique is more effective in improving hamstring flexibility than the self-myofascial release (foam roller).

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