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Original article:

Efficacy of Muscle Energy Technique on hamstring muscles flexibility in normal Indian collegiate males.

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Abstract

Purpose of Study: Success in sports depends on athlete's ability to develop and perfect a specific set of coordination and joint range of motion/flexibility. Purpose of the study to investigate the effectiveness of Muscle Energy Technique (MET) on hamstring flexibility in normal Indian collegiate males.

Material and Methods: 20 healthy collegiate male subjects with hamstring tightness were randomly allocated to two study groups. Groups-A (n=10) subjects were treated with Muscle energy technique where as other group-B (n=10) were kept as Control (No intervention). The treatment was given for 5 consecutive days and a follow-up measurement on 8th day was done. The outcome was measured in terms of popliteal angle (Active knee extension test).

Results: Independent-t test was used to compare the pre test-post test values between the groups. There was a significant difference between the subjects treated with Muscle energy technique and control group subjects, in terms of improvement in Active knee extension range of motion/Popliteal angle ($p<.001$) and significant decrease in ROM (Range of motion) in the follow up measurement .

Conclusion: Result indicates that MET is significantly improving the hamstring flexibility. (range of motion) in collegiate males.

Key Words: Muscle Energy Technique (MET), Popliteal angle, active knee extension (AKE), Hamstring flexibility.

Introduction

Most medical professionals, coaches and athletes consider aerobic conditioning, strength training and flexibility are integral components in any conditioning program [1]. Flexibility has been defined as the ability of a muscle to lengthen and allows one joint (or more than one joint in a series) to move through a range of motion [2, 3].

Flexibility is a physical fitness attribute and is often evaluated from the joint range of motion (ROM) [5], an essential element of normal biomechanical functioning in sports [6]. Muscle tissue length is thought to play an important role in efficiency and effectiveness of human movement [6, 7].

Hamstring muscle injuries are one of the most common musculotendinous injuries in the lower extremity [8]. They occur primarily during high speed or high intensity exercises and have a high rate of recurrence [9]. Worrel et al stated that a "lack of hamstring flexibility was the single most important characteristics of hamstring injuries in athletes" [8].

Muscle energy technique (MET) is an manual technique developed by osteopaths and is now used in many different manual therapy professions [9].One such approach which targets the soft tissues primarily (although it makes a major contribution towards joint mobilization) has been termed

as muscle energy technique and this is also known as active muscular relaxation technique [8, 9]. It is claimed to be effective for a variety of purposes including lengthening a shortened muscles, as a lymphatic or venous pump to aid the drainage of fluid or blood and increasing the range of motion [9, 10].

Methods

Sources of data

The source of data for this study was conducted at Majeedia Hospital, Hamdard University, New Delhi, India.

Study Design

Experimental study with a pretest-posttest design was conducted. The study design was approved by the research committee of Jamia Hamdard University.

Subjects

Twenty healthy normal Indian collegiate male volunteers were selected on the basis of the inclusion and exclusion criteria. A written informed consent was obtained from all those subjects who fulfilled the inclusion and exclusion criteria.

Inclusion criteria

a) Aged between 18- 25 year of age.
b) Gender- Male.
c) Tight hamstring (Inability to achieve greater than 160° of knee extension with hip at 90° of flexion).

Exclusion criteria

a) Acute or chronic low back pain.
b) Acute or chronic hamstring injury.
c) Inability to actively extend the knee fully in sitting position.
d) Visible acute swelling in the region of hamstring muscle.

Procedure

20 healthy collegiate male subjects with hamstring tightness were randomly allocated to two study groups. Subjects were assessed for hamstring tightness by measuring popliteal angle i.e. active knee extension test (Fig.1). Groups-A (n=10) subjects were treated with Muscle energy technique where as other group-B (n=10) were kept as Control (No intervention). The treatment was given for 5 consecutive days and a follow-up measurement on 8th day was done. The subjects were tested approximately at the same time of each day. The outcome was measured in terms of Popliteal angle (Active knee extension test).

Popliteal Angle/ Active Knee Extension Test

Pre-post and follow up measurement data on Popliteal angle were collected from both groups. Subjects were assessed for hamstring tightness using the Active Knee Extension test (Popliteal angle). The subject was in supine position with hips flexed 90° and knee flexed. A cross bar was used to maintain the proper position of hip and thigh. The testing was done on the right lower extremity and subsequently the left lower extremity and the pelvis were strapped down to the table for stabilization and control on accessory movements. Landmarks used to measure hip and knee range of motion were greater trochanter, lateral condyle of femur and the lateral malleolus which were marked by a skin permanent marker. The fulcrum of the

goniometer was centered over the lateral condyle of the femur with the proximal arm secured along the femur using greater trochanter as a reference. The distal arm was aligned with the lower leg using the lateral malleolus as a reference. The hip and knee of the extremity being tested were placed into 90° flexion with the anterior aspect of thigh in contact with the horizontal cross bar frame at all times to maintain hip in 90° flexion. The subject was then asked to extend the right lower extremity as far as possible until a mild stretch sensation was felt .A full circle goniometer was then used to measure the angle of knee flexion. Three repetitions were performed and an average of the three was taken as the final reading for Popliteal Angle [1].

Fig.1: Popliteal Angle (Active Knee Extension test)

Group-A (Muscle Energy Technique)

The muscle energy technique was applied to the experimental group B. The subject's knee was extended to the position where the subject first reported of any hamstring discomfort and moderate isometric contraction (approx 75% of maximal) of the hamstring muscle was then elicited for a period of five second. After a period of three seconds of relaxation, the technique was repeated three times (for a total of four contractions) [9].

Group-B (Control)

The control group subjects performed no stretching or any strengthening exercise for 8 days.

Results

The data were statistically analyzed using the Statistical Package for Social Science (SPSS)/15.0. (Copyright © SPSS Inc.) . The results from three sessions of both the groups i.e. MET and Control groups on day 1st, 5th and day 8th are represented in Table-1. Between-group and within-group comparisons were analyzed using independent-t-test and repeated measure ANOVA test for within group comparison.

Table 1. Post training mean values of Popliteal angle for both the groups on day 1, 5th and day 8.

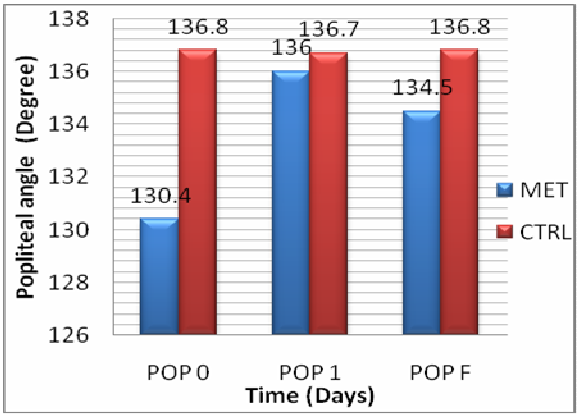
	Mean ± S.D.	
Variable	**Group-A**	**Group-B**
POP 0	130.4 ± 3.8	136.8 ± 7.0
POP 1	136 ± 4	136.7 ± 6.8
POP F	134.5 ± 3.3	136.8 ± 7.0
Pre/Post	.001**	1.00N.S.
Pre/FU	.001**	1.00N.S.
Post/FU	.020*	1.00N.S.

NS: Non significant, * significant p< 0.05, significant p<0.001. Group-A: Muscle energy technique, Group-B: Control group, FU: Follow-UP.**

MET group showed significant improvement in popliteal angle i.e. hamstring flexibility. But there were no changes in popliteal angle in the control group subjects. Pre-post difference in MET group was (p<.001),

whereas in control group it was non significant (p>.05). On day 8th (carryover effect) also maintained by MET group but not maintained as respect to post test value. (Fig. 2)

Figure.2: Between-group comparison of mean Popliteal angle/AKE on day 1st, 5th and 8th .



POP.0: Pre test value of Popliteal Angle (Active Knee Extension).
POP.1: Post test value of Popliteal Angle (Active Knee Extension).
POP. F: Follow up value of Popliteal Angle (Active Knee Extension).
MET: The group that received Muscle Energy Technique intervention.
CTRL: Control Group (NO intervention).

Discussion

The review of existing literature regarding the role of different techniques in improving flexibility reveals a confusing picture. Therefore the current study was undertaken to investigate the efficacy of Muscle energy technique. For the purpose of this comparison a pre–post test, follow up (experimental study) was carried out. Hamstring was the muscles of choice since it is the muscle that is most prone to injuries during sporting activities, and if the flexibility of hamstrings is adequate then incidence of hamstrings strains can be decreased and performance can be enhanced as well. Also there are well documented, reliable and valid methods of testing flexibility of hamstring muscles, such as the measure of popliteal angle/Active Knee Extension.

A comparison of the pre-test and the post test values of the Popliteal angle for the groups showed that there was a significant improvement in the group-A. Whereas non significant improvement in group-B. Thus it may be said that this technique is effective individually in improving flexibility of hamstrings.

In earlier researches Bandy et al identified 30 seconds as the optimal duration for an effective stretch [10]; MET, which can maintain muscle elongation for this duration, may produce increase in muscle length by a combination of creep and plastic change in the connective tissue [12], an increase in flexibility after muscle energy technique (MET) occurred due to biomechanical or neuro-physiological changes or due to an increase in tolerance to stretching [10, 11].

At the time of follow-up the values of Popliteal angle was higher than the pre-test values but showed a decrease from the post-test values. Thus an analysis of the muscle flexibility after 72 hours of the end of training did not reveal a significant maintenance of flexibility. The deterioration from the post-test values at the time of follow-up can be attributed to the fact that there was no maintenance program that was being followed during that period, and the subjects were not undergoing any active or passive stretching regime during those 72 hours.

Conclusion

On the basis of present study, it can be concluded that all the subjects belonging to MET group were able to increase the popliteal angle i.e. improvement in the hamstring flexibility. However we can clearly say that Muscle energy technique is efficient technique in improving muscle flexibility. This study can further be extended on to athletic and on female populations also. This technique is very simple and can be easily used voluntarily on those who are experiencing lack of muscle flexibility.

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