ORIGINAL RESEARCH

Comparison of Muscle Energy Technique and Post Isometric Relaxation on Hamstring Flexibility in Healthy Young Individuals with Hamstring Tightness

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Background: Flexibility is a physical fitness and an essential element of normal biomechanical functioning in sports and daily life.

Objectives: To compare the effectiveness of Muscle energy technique (MET) and Post isometric relaxation (PIR) on hamstring flexibility in healthy young individuals with hamstring tightness.

Materials and Methods: 40 healthy individuals with hamstrings tightness were included and allocated into two groups group A and B. Group A was given MET to hamstrings muscle, and group B was given PIR for 5 consecutive days. Active knee extension (AKE) test was performed before and after the 5 days protocol. The outcome was measured in terms of Popliteal Angle (active knee extension test) using goniometer.

Results: Within group comparison demonstrated that the Popliteal angle in post test was significantly increased compared to pretest in both MET group and PIR group($p<0.05$). Between group comparison demonstrated that Popliteal angle increased significantly in the MET group compared to PIR group ($p<0.05$).

Conclusion: Muscle Energy technique is found to be more effective in decreasing hamstring tightness than post isometric relaxation in healthy young individuals.

Keywords: Muscle energy technique, Post isometric relaxation, Hamstrings flexibility

INTRODUCTION

Hamstring muscle is a two joint muscle. Hamstrings are the major knee flexors and also aid in hip extension. Physiologically full stretch occurs in this muscle only if the knee is fully extended and hip fully flexed[1]. Complete contraction occurs when the knee is fully flexed and hip is fully extended. Complete contraction and stretching rarely occurs in normal daily activity and hamstrings are therefore rarely put through their full physiological amplitude. Therefore chance of it going into tightness are more in individuals not participating in any daily stretching routine[2]. Hamstrings muscle tightness is a common condition even among young healthy individuals and recreational athletes. Hamstrings strain remains a primary concern for rehabilitation professionals as they result in a debilitating injury characterized by acute loss of functional performance, prolonged periods of recovery, and resultant increased incidence of recurrence.

Most medical professionals, coaches and athletes consider that aerobic conditioning, strength training and flexibility are the integral components in any conditioning program3. 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 ROM.[4,5] Flexibility is a physical fitness attribute and is often evaluated from the joint range of motion, and an essential element of normal biomechanical functioning in sports[6] .

Muscle energy technique (MET) is a manual technique that involves precise contraction of subject's muscle, and is claimed to increase muscle extensibility and joint motion[7] MET is claimed to address both the soft tissue and articular component of somatic dysfunction, and is commonly advocated by authors of manual therapy[7,8]. Post isometric relaxation (PIR) is another technique primarily used for trigger points and hyper tonicity due to interneuron dysfunction. It takes advantage of the principle which is relaxation of muscle following its isometric contraction, as well as facilitation and inhibition of muscles that accompanies breathing[8].

To our knowledge, study comparing effectiveness of Muscle energy technique (MET) and Post isometric relaxation (PIR) on hamstring flexibility has not been carried out previously. Hence the present study was conducted with the objective to compare the effectiveness of Muscle energy technique and Post isometric relaxation on hamstring flexibility in healthy young individuals with hamstring tightness.

MATERIALS AND METHODS

In this study, 40 female students aged between 20 to 25 years were recruited by convenience sampling. Informed written consent was obtained from all the Participants. Individuals having lack of Active knee extension more than 20 degrees were included and individuals with acute or chronic low back pain, acute or chronic hamstring injury and inability to extend the knee fully in sitting position were excluded. Approval was obtained from Institution Research Committee of SBB College of Physiotherapy.

Procedure

Outcome Measure

Active knee extension test was performed before and after the 5 days of Intervention. The subject was asked to lie supine and the experimental hip was flexed to 90 degrees and the thigh of opposite extremity was secured with a strap to minimise the rotation of pelvis. The subject was asked to extend the knee as much as possible and the measurement (Popliteal angle) was taken by universal goniometer. The intra tester reliability of this test ranges from 0.893 to 0.926.

Intervention

Subjects were either assigned to either Group A or Group B (20 in each group). Subjects in Group A were given MET to hamstring muscle, and group B was given post isometric relaxation. Both the techniques were given for 5 consecutive days.

Muscle Energy Technique

Subjects were taken in supine lying position. Therapist knelt on the mat and placed the subject's heel against her shoulder; the opposite extremity was stabilized in extension by therapist's knee. The subject's knee was extended to the position up to barrier point and moderate (approximately 75% of maximal) isometric contraction of the hamstring muscle was elicited for a period of 5 to 8 seconds. After

a period of three seconds of relaxation, the technique was repeated three times (for a total of four contractions) for 5 consecutive days.

Post Isometric Relaxation

Subjects were asked to lie on their back, hip was flexed to 90 degrees and then knee was extended until the point where resistance started taking out the slack and then the patient was asked to push away from that point against the matched resistance of approximately 10% of maximum effort to create isometric contraction. The subject was asked to breathe in and hold for 5 to 8 seconds and then release both breath and effort so that slack was taken up and tissue was eased to new barrier point and process was repeated three times for 5 consecutive days.

Statistical Analysis

Statistical analysis was done using SPSS 16.0 version software for windows. The descriptive analysis was performed for the demographic data. Non parametric Wilcoxon test was applied for within group comparison and Mann-Whitney test was applied for comparison between the groups. P value less than 0.05 was considered as significant for all measurements.

RESULTS

The demographic data for both groups are presented in **Table 1**. Pretest and post test popliteal angle for both groups and within group comparisons are presented in **Table 2**. Within group comparison demonstrated that the Popliteal angle in post test was significantly increased compared to pretest in both MET group and PIR group ($p<0.05$). The between group comparisons are presented in **Table 3**. Between group comparison demonstrated that Popliteal angle increased significantly in the MET group compared to PIR group ($p<0.05$).

Table 1 Demographic Data

Characteristics	Group A (n = 20)	Group B (n = 20)
Age (Years)*	22.2 ± 0.42	22.7 ± 1.83
Height (cm)*	162.45 ± 5.57	162.3 ± 5.6
Weight (kg)*	55.35 ± 4.97	56.1 ± 4.8

*- Values are Mean ± SD

Table 2 Within Group Comparison

Group	Pretest[¥]	Posttest[¥]	p-value[€]
A (MET)	133.25 ± 10.04	149.75±9.63	0.001*
B (PIR)	134.25±10.04	148.35±9.57	0.001*

[¥]- Values are Mean ± SD of Popliteal angle in degrees, [€] - Wilcoxon test, * - Significant $p < 0.05$.

Table 3 Between Group Comparison

Group	Pretest[¥]	Posttest[¥]	p-value[€]
A (MET)	133.25 ± 10.04	149.75±9.63	0.001*
B (PIR)	134.25±10.04	148.35±9.57	

[¥]- Values are Mean ± SD of Popliteal angle in degrees, [€] - Mannwhitney test, * - Significant $p < 0.05$.

DISCUSSION

The present study shows that both MET and PIR are effective in increasing popliteal angle and decreasing hamstring tightness in young healthy individuals. The study also shows that MET is better than PIR for improving hamstring flexibility.

Muscle tightness is one of the limiting factors for restricted ROM and reduced flexibility of joint. Hamstring muscles are more prone for tightness which causes musculoskeletal problems. This study was focused on checking effects of MET and PIR in increasing ROM and flexibility of healthy subjects with hamstring tightness.

Waseem M et al concluded that MET significantly improves hamstring flexibility in collegiate males. MET increased muscle length by a combination of creep and plastic changes in connective tissue. It occurred due to biomechanical or neuro-physiological changes or due to an increase in tolerance to stretching. Neuro-physiological and biomechanical mechanism may underlie changes to both ROM and muscle stiffness following the application of MET[9]. The neuro-physiological component is explained by inhibition of motor activity of muscle exposed to stretch, the object of stretching is therefore to minimise muscle activity to reduce resistance to stretching.

Meena K et al concluded that PIR improves hamstring flexibility. PIR helps in lengthening of tight hamstring by its contraction and relaxation method. PIR causes reduction in tone experienced by muscle or a group of muscles, after brief periods during which an isometric contraction has been performed[10].

The result of this study proved that MET may have an influence on tight muscle at a faster rate and more number of subjects achieved increase in ROM and flexibility of hamstring than PIR. Limitations of the study were that only healthy young females were included in this study.

CONCLUSION

Muscle energy technique is better than Post isometric relaxation in young healthy individuals with Hamstring tightness in improving popliteal angle. This study can be further extended on athletic population or geriatric population. Future research recommendations are that the effect can be studied in geriatric population on range of motion as well as on pain can be seen. Clinical application is MET can be used in young adults with tight hamstrings to prevent injuries before performing exercises.

CONFLICTS OF INTEREST

None declared

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