ijcrr
Vol 03 issue 09
Category: Research
Received on:14/06/11
Revised on:05/07/11
Accepted on:20/07/11

IMMEDIATE EFFECT OF MUSCLE ENERGY TECHNIQUE AND ECCENTRIC TRAINING ON HAMSTRING TIGHTNESS OF HEALTHY FEMALE VOLUNTEERS – A COMPARATIVE STUDY

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ABSTRACT

Background and Objective: The Hamstring muscles are found to be the most prevalent for the tightness in the body. Tightness of these muscles produces decrease range of motion and reduced flexibility of the pelvis, hip and knee joints. Muscle stiffness of the lower extremities and the consequential decrease in joint flexibility are considered to be major aetiological factors in musculoskeletal injuries. The purpose of this study is to compare the immediate effect of Muscle energy technique and Eccentric training on hamstring tightness of healthy female volunteers.

Methods: Sixty healthy female volunteers in the age group of 18 to 22 years with bilateral hamstring tightness without any previous musculo skeletal injuries were randomly divided in to Muscle energy technique group and Eccentric training group with 30 each. A total of 120 hamstrings were treated as pre the intervention plan in both groups. The outcome measure was active knee extension range of motion measured in supine lying with hip flexed to 90 degrees by using universal goniometer.

Results: The mean ± SD values in muscle energy technique group before intervention is 128.13±5.33 and after intervention is 138.07±5.51 with $p<0.001$ and in eccentric training group before intervention is 132.27±6.73 and after intervention is 137.33±6.63 with $p<0.001$ shows significant improvement in both groups. Intergroup comparison shows no significant difference between groups with $p>0.05$.

Conclusion: There is no difference between the immediate effect of Muscle energy technique and Eccentric training in lengthening the tight hamstring muscles of healthy females.

Keywords: Hamstring Tightness, Muscle energy technique, Eccentric training, Knee Extension

INTRODUCTION

Muscle stiffness of the lower extremities and the consequential decrease in joint flexibility are considered to be major aetiological factors in musculoskeletal injuries.[1] The Hamstring muscles are found to be the most prevalent for the tightness in the body. Tightness of these muscles produces decrease range of motion and reduced flexibility of the pelvis, hip and knee joints. Muscle tightness is a limiting factor for optimal physical performance including daily activities and an important intrinsic factor for sports injuries.[2]

Flexibility is the ability to move a single joint or series of joints smoothly and easily through an unrestricted pain free range of motion. Benefits

of increased flexibility include a decrease in injury rate and an increase in athletic performance. Flexibility exercises are designed to increase tissue elasticity, thereby increasing range of motion of specific joints. There are many successful ways[3-8] of treating Hamstring tightness like mechanical, thermal, ice, stretch and spray, ultrasound, soft tissue massage, short wave diathermy, myo fascial release therapy, and muscle energy technique.

Muscle energy technique (MET) is a manual technique developed by osteopaths that is now used in many different manual therapy professions. MET is direct active post facilitating technique (also called as post-isometric relaxation technique – PIRT) which follow different principles individually.[7] Muscle energy is used to lengthen a short or spastic muscle, to strengthen a physiologically weak muscle or group of muscles, to reduce localized oedema and relieve passive congestion and to mobilize an articulation with restricted mobility. Eccentric training refers to muscular action in which muscles lengthen in a controlled manner. It is also called as negative resistance training. The study is aimed to compare the flexibility of the tight hamstring muscle by improving the range of motion of the knee joint using Muscle energy technique and Eccentric training for individuals with hamstring tightness.

METHOD

An experimental study was done to compare the Muscle energy technique (MET) and Eccentric training in Hamstring flexibility of healthy female volunteers. The study was conducted in a physiotherapy college in Vadodara, India and ethical clearance was obtained from Institutional Review Board. Sixty healthy female volunteers after signing informed consent form within the age of 18 - 22 years having hamstring tightness bilaterally were included in the study. Subjects were screened for any previous neuro musculo skeletal injuries or disorders may produce hamstring tightness and not for their physical activity before inclusion. Subjects were randomly divided into 2 groups with closed envelopes method. Group A consist of 30 subjects who received Muscle energy technique[9-11] with six repetitions for five seconds bilaterally and group B consist of 30 subjects who received Eccentric training[12-14] exercise for 6 times, with no rest between repetitions, thereby providing a total of 30 seconds of stretching at the end range bilaterally. In both groups right side was treated first and then the left side irrespective of individual's dominancy, so a total of 120 hamstrings were treated with 60 in each group. Outcome measure used was Active knee extension test done before and after intervention with subject in supine lying with hip in 90 degrees of flexion using universal long arm goniometer.[15] The data were analysed by using SPSS 17 for windows for significant improvement and difference between groups. The paired t-test and independent t-test were used.

RESULTS

The table-1 shows age distribution of the subjects participated in the study and Table-2 shows the values of comparison of before and after intervention in Muscle Energy Technique Group by paired t-test. The mean ± SD before intervention is 128.13 ± 5.33 and after intervention is 138.07 ± 5.51 with p value less than 0.001 proves that there is significant improvement in the hamstring muscle flexibility measured by active knee extension after muscle energy technique.

Table-3 shows the values of comparison of before and after intervention in Eccentric Training Group by paired t-test. The mean ± SD before intervention is 132.27 ± 6.73 and after intervention is 137.33 ± 6.63 with p value less than 0.001 proves that there is significant

improvement in the hamstring muscle flexibility measured by active knee extension after eccentric training.

Table-4, shows inter group comparison of Muscle Energy Technique and Eccentric Training groups by independent t-test before and after intervention. The p value of independent t-test at baseline is 0.173 which is more than 0.05 proves homogeneity of groups at baseline. The p value after intervention is more than 0.05 shows that there is no statistically significant difference between both groups in improving hamstrings flexibility.

DISCUSSION

This study compared the immediate effects of Muscle energy technique (MET) and Eccentric training in increasing knee ROM of subjects with bilateral hamstring tightness and the results shows that there is significant improvement in hamstring length followed by both techniques and no significant difference between two techniques. The results of this study are in line with some previous studies. The major limitations of this study are dominant side was not differentiated and physical activity of the subjects were not considered. Long term and follow up effects were not studied.

Waseem and Nuhmani, in their study "comparative study of the impact of muscle energy technique and eccentric training on popliteal angle: hamstring flexibility in Indian collegiate male" indicated more significant hamstring flexibility in MET than ECC but the improvement level decreased in the follow-up measurement.[6]

"A comparison of two muscle energy techniques for increasing flexibility of the hamstring muscle group" by Smith and Fryer concluded that both techniques appeared to be equally effective in increasing hamstring extensibility, and there appeared to be sustained improvement 1 week following the initial treatment.[16] Ballantyne and Fryer concluded that the Muscle energy technique produced an immediate increase in passive knee extension.[9]

Nelson and Bandy, in their study" Eccentric Training and Static Stretching Improve Hamstring Flexibility of High School Males" study reveal that one session of eccentrically training through a full range of motion improved hamstring flexibility better than the gains made by a static stretch group or a control group.[12]

Brockett, C. L., D. L. Morgan, And U. Proske, in Their Study "Human hamstring muscles adapt to eccentric exercise by changing optimum length" showed that a sustained shift in the optimum angle of human muscle occurred as a protective strategy against injury from eccentric exercise.[13]

CONCLUSION

This study concludes that Muscle energy technique and Eccentric training are effective in lengthening the tight hamstring muscles of healthy females and there is no difference between the immediate effects of both techniques.

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Table-1, showing age distribution of participants.

Age in years	MET Group	Eccentric Group
18	8	8
19	8	6
20	6	7
21	5	4
22	3	5
Total	30	30

Table-2, Comparison of before and after intervention values in Muscle Energy Technique Group by paired t-test.

Intervention	Mean	SD	SEM	t	p
Before	128.13	5.33	1.38	15.095	.000
After	138.07	5.51	1.42		

Table-3, Comparison of before and after intervention values in Eccentric Training Group by paired t-test.

Intervention	Mean	SD	SEM	t	p
Before	132.27	6.73	1.74	10.717	.000
After	137.33	6.63	1.71		

Table-4, inter group comparison of Muscle Energy Technique (MET) and Eccentric Training (ET) groups by independent t-test before and after intervention.

Intervention	Group	Mean	SD	t	p
Before	MET	128.13	5.33	1.866	.173
	ET	132.27	6.73		
After	MET	138.07	5.51	.329	.744
	ET	137.33	6.63		