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Research Article

Impact of Muscle Energy Technique on Hamstring Muscle Flexibility in Recreational Athletes

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Abstract

Background: The Hamstring muscle is the most common to endure any sports injury. Extended rehabilitation and occasional recurrence are encountered due to its rapid shortening tendency. Improved muscular flexibility and enhanced increasing range of motion through stretching, prevents from sports injuries accelerating athletic performance.

Aim: To analyze the efficacy of muscle energy technique [MET] on the flexibility of hamstring among recreational athletes.

Methodology: 30 healthy recreational athletes, received MET for 4 weeks, 5 sessions/ week. The Modified Back Saver's sit and Reach Test (BSSR test) was the outcome measure.

Statistical tool: Student "t" test was used.

Conclusion: Significant difference in hamstring flexibility was seen due to muscle energy technique.

Keywords: Hamstring; Flexibility; Modified Back Saver's Sit and Reach Test; Muscle Energy Technique

Introduction

A simple mechanism of altered flexibility is extensibility [1]. Flexibility is the potential of the muscle to elongate and favor the continuity of joint movement [2]. The hamstrings become tight and this is identified when the knee extension ranges from 20° to 0° with 90° hip flexion are not attained [3]. Reduced ROM of knee causes postural deviations and also affects gait pattern of the individual as flexibility varies, as a leading factor for muscle strain injury [4]. Even among young, healthy individuals and in recreational athletes, hamstrings has the tendency to undergo tightness, making them prone for muscle tear [5,6].

MET is the technique applied by manual means and is effectively proved for lengthening of a tightened muscle or contracture, improving joint range, facilitating the drainage of lymphatic fluid or blood by muscle stretch [7]. The explorations supporting and authenticating the utility of MET is restricted and the evidences that help the assumptions to clarify its effects are also limited.

Adel Rashad Ahmed., *et al.* investigated to compare the effects of MET and dynamic extending on hamstrings adaptability in adults and confirmed that better improvement was seen in muscle energy technique as compared to dynamic stretching. These techniques are simple and easy to administer on subjects who lack muscle flexibility [8].

Muscular tightness is the major cause for reduced joint ROM. Hence the need arises to find out an effective technique that reduces hamstrings tightness, increasing its flexibility and combats the propotion of injury to muscle. Analyzing the effects of MET on hamstring adaptability among recreational competitors remains the fundamental idea of this examination.

Method

The study was pretest and posttest experimental study conducted in a private Physiotherapy college in Chennai. 30 members were sorted out for this investigation and consent form was obtained. 17 male and 13 female recreational athletes, with normal BMI scores having bilateral hamstring tightness [lack of ability to reach knee extension of 20° to 0° with hip flexion of 90° [9], with the age group ranging from 18- 27 years, were taken for the study. Subjects having musculoskeletal injury as history, recent fracture, pelvic pathology, hip and knee, lower limb surgeries, any injury to hamstring muscle in last 6 months were set aside. Baseline measures to analyze the hamstring muscle tightness was obtained using active knee extension test. Modified Back saver's stretch test was used to analyze the outcome post the administration of muscle energy technique.

Ethical Clearance was obtained from Spectrum Physio Pvt Ltd. on 05th November 2021- PT/3612.

Materials

Goniometer, weighing machine, measuring tape, scale, fitness gram analysis guide, Lafayette elasticity analyzer (SR box), recording sheet, informed consent form are the materials used in this research.

Study schema

30 participants based on inclusion criteria were sorted into a single group, following the ethical clearance

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Consent form was obtained

↓

Baseline values were taken, Pre intervention assessment was carried out

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Warm up for 10 minutes, Muscle Energy Technique for 20 minutes and Cool down for 10 minutes were administered

↓

Post intervention assessment was carried after 4 weeks and statistical analysis done

Procedure

Baseline value

Active knee extension test was used to obtain the baseline line measure by making the subjects positioned in supine lying, with extension of his/her knee actively till a firm resistance was felt. Goniometer was positioned on the femur at the point of lateral epicondyle. The measurements of both the legs were recorded.

Muscle energy technique

Prior to the administration, a warm up session of 10 minutes was initiated. MET mechanism involved using post isometric relaxation. The subjects were positioned in supine lying and the hips were flexed passively to reach out legs. This was done till a pressure was felt by the therapist and a stretch reported by the subject. An isometric contraction of knee flexor muscles was performed by the subject by squeezing the lower extremity against the highest point of the therapist's shoulder. The intensity of this contraction should be approximately 50% of the maximal contraction. This contraction was maintained for 7-10 seconds. Following this, 2-3 seconds of relaxation was given following which the lower limb was stretched by the therapist passively to a limit of palpable hindrance or a resistance to further extension establishing for 30 seconds, completed by bringing the lower limb down and relaxed for approximately 10 seconds. This procedure was repeated twice and the intensity slowly increased depending upon the subject's tolerance [10]. The ideology of post isometric relaxation, efficiated sustained maintenance of the MET impact. As the basic principle behind muscle energy involved voluntary contraction of the target muscle in a precise direction at varying levels of intensity to improve the flexibility, the technique was applied for five sessions per week for four weeks for both the lower limbs [14]. Cool down session of 10 minutes was followed.

Modified back saver sit and reach test

Previous studies conducted by Baltaci G., *et al.* in 2003, Looney., *et al.* in 2012 and Hui SS., *et al.* in 2000, reveal that the modified back saver sit and reach test produced more accurate and specific results when compared to other sit and reach test and flexibility analyzers/protocols; with a positive reliability value of 0.99, sensitivity rate of 0.67 and a significant validity measure at $p < 0.001$ [18-20]. Fitness gram analysis guide was involved. The trail was controlled utilizing Lafayette elasticity analyzer (SR box). The member sat at the Sit and Reach box and completely expanded single leg to complete the goal. The subject by then bowed another leg with the objective that the base of the pad was level on the ground

and 7 to 10 cm laterally away from the straight leg. With the primary leg as baseline as could be expected under the circumstances, hands on one another rand palms falling down, the subject gradually came to advance gliding the fist along the case range very long. The therapist recorded the average of the trails of three on two legs [8].

Figure 1: Post-test measurement using Modified back savers sit and reach test.

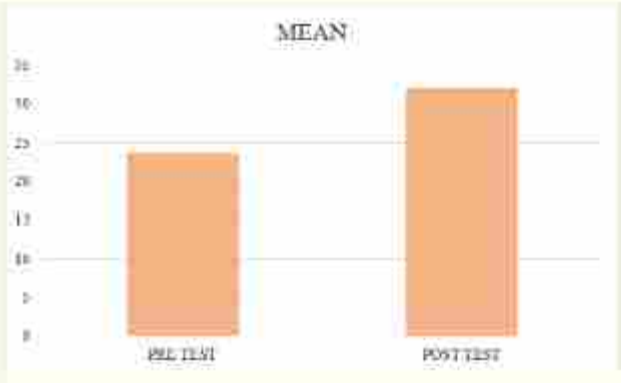

Figure 2: Comparison of BSSRT Values for pretest and posttest.

Results

Student "t" test was used to analyze the impact of MET on the subjects. The mean values on BSSRT with huge increments reflected in posttest. MET had the extreme mean (32.13) confirming positively the alternate hypothesis.

The mean values of Pretest and Posttest on BSSRT indicated profoundly a note worth distinction at $p \leq 0.001$.

Discussion

This research was instituted to analyze the impact of MET in terms of physical dynamics and physiological variations towards improving hamstring muscle flexibility in recreational athletes. Fryer G., *et al.* in 2009: put forward that the concepts

Test	BSSRT following met		t- Test	
	MEAN	S. D		df
Pre Test	23.73	6.35	.501	28
Post Test	32.13	7.01	1.97	28

Table 1: Comparison of BSSRT values for pretest and posttest. Analysis revealed that the mean value was found to be significantly higher in the posttest.

of muscle energy and its applications to improve muscle energy concepts and practice myofascial tissue extensibility may potentially produce viscoelastic and structural change. that mediated Mechan transduction as the therapeutic effect of MET [15].

According to the table-1 posttest mean values are significant. There is a major difference (*** $p \leq 0.001$). The flexibility of hamstring muscle much improved by muscle energy technique.

According to the study done by Fryer G., *et al.* in 2011; it was observed that MET technique is most useful technique that integrated variations in terms of number of repetitions. strength of contraction, duration of stretch phase; leading to an increase in the extensibility of muscles and spinal range of motion [16]. Previous studies by Lee Herrington., *et al.* 2013 had proved the efficiency of analysing hamstring muscle flexibility using 90º - 90° [17].

This research aimed at establishing an explorative foundation of utilizing the modified back savers sit and reach test as an ideal tool to measure the improvement in hamstring muscle flexibility following MET.

MET has been emphasized as a technique effective in improving flexibility of muscles especially in hamstrings. There are evidences which propose that MET shows better results in enhancing muscle flexibility when compared with passive stretching. Mohd. Waseem., *et al.* in 2015. suggested that improve in muscle elasticity following MET is result in the connective tissue by the way of mix of creep and plastic changes. Due to the biomechanical and neurophysiological changes in the muscle, the tolerance to stretching increases.[2] The present study compared the MET to improve the elasticity of hamstring muscles and MET is has more efficient in improving the hamstring muscle flexibility.

Conclusion

This analysis focussed on the fact non-ballistic active knee ex-

tension inclusive of stretch technique yields significant reduction of hamstring tightness and improve the flexibility of the subjects with bilateral hamstring tightness. The investigation uncovers that there is a significant difference in non-ballistic active knee extension having muscle energy technique as the prima facie, helps in the management of subjects with bilateral hamstring tightness.

Limitations

Small sample size was low and duration of the study was short. Study was performed uniquely for age 18-27 years. Follow up was not ensured.

Recommendations

The current study can be done on professional competitors as well as competitors from various games with huge sample size.

Contributions

Mr. Dinesh and Dr. Gladies; worked on the background, identification and purpose of this research. Mr. Dinesh and Dr. Vijay Selvan; conceptualized the methodology and procedure. Mr. Dinesh, Dr. Gladies and Ms. Monica; executed this idea on the subjects. Dr. Gladies and Dr. Vijay Selvan; analyzed, contributed to the statistical findings, results, discussion and the conclusion of this work.

Conflict of Interest

Nil.

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Bibliography

1. Lim KI., *et al.* "Effects on hamstring muscle extensibility, muscle activity, and balance of different stretching techniques". *The Journal of Physical Therapy Science* 26.2 (2014): 209-213.

2. Magalhães FE., *et al.* "Comparison of the effects of hamstring stretching using proprioceptive neuromuscular facilitation with prior application of cryotherapy or ultrasound therapy". *The Journal of Physical Therapy Science* 27.5 (2015): 1549-1553.

3. Shikha Tiwari and Gurpreet Kaur. "To Compare the Efficacy of Muscle Energy Technique and Maitland Technique on Functional Performance in Adhesive Capsulitis". *Indian Journal of Physiotherapy and Occupational Therapy* 11.3 (2017): 7-11.

4. Puentedura EJ., *et al.* "Immediate effects of quantified hamstring stretching: hold-relax proprioceptive neuromuscular facilitation versus static stretching". *Physical Therapy in Sport* 12.3 (2011): 122-126.

5. Hamid MS., *et al.* "Interrater and Intrarater Reliability of the Active Knee Extension (AKE) Test among Healthy Adults". *Journal of Physical Therapy Science* 25.8 (2013): 957-961.

6. Gary Fryer. "Muscle energy technique: An evidence-informed approach". *International Journal of Osteopathic Medicine?* 14.1 (2011): 3-9.

7. Ahmed A. "A comparative study of muscle energy technique and dynamic stretching on hamstring flexibility in healthy adults". *Bulletin of Faculty of Physical Therapy* 16.1 (2011).

8. Shepherd E., *et al.* "Comparing Hamstring Muscle Length Measurements of the Traditional Active Knee Extension Test and a Functional Hamstring Flexibility Test". *Journal of Physiotherapy and Physical Rehabilitation* 2.1 (2017): 1000125.

9. Pratiksha Gadpal and Asgaonkar Bharati. "Comparison Of Immediate Effect on Hamstring Flexibility Using Non-Ballistic Active Knee Extension In Neural Slump Position And Static Stretch Technique". *International Journal of Physiotherapy and Research* 5 (2017): 2425-2431.

10. Ishanka., *et al.* "The Prevalence of Hamstring Tightness among the Male Athletes of University of Peradeniya in 2010 Sri Lanka". *International Journal of Physical Medicine and Rehabilitation* (2013).

11. Rose Sumi and Thakur Dipesh. "A Study to Find Out the Correlation Between the Right And Left Hamstring Length In Both Genders To Determine The Prevalence Of Hamstring Tightness Among College Students". *Nitte University Journal of Health Science* (2016).

12. Manchanda and Babina. "A Comparison between Two Active Stretching Techniques on Hamstrings Flexibility in Asymptomatic Individuals". *IOSR Journal of Dental and Medical Sciences* 14 (2015): 12-16.

13. Farahnazzarghami and Jafar barghi. "Effect of PNF exercises on the hip flexion motion of nonathlete women". *European Journal of Experimental Biology* 2.4 (2012): 1235-1239.

14. Greenman P. "Prindicine. 3rd edition" (2003).

15. Gary Fryer., *et al.* "Edition VOD Research informed Muscle Energy and Practice". University of Health Sciences, Kirksville, Missouri. USA (2009).

16. Fryer G., *et al.* "Muscle energy technique: An evidence informed approach". *International Journal of Osteopathic Medicine* 14.1 (2011): 3-9.

17. Lee Herrington., *et al.* "The Effect of Pelvic Position on Popliteal Angle Achieved During 90:90 Hamstring Length Test". *Journal of Sport Rehabilitation* 22.4 (2013): 254-256.

18. Baltaci G., *et al.* "Comparison of three different sit and reach tests for measurement of hamstring flexibility in female university students". *British Journal of Sports Medicine* 37 (2003): 59-61.

19. Looney Marilyn and Gilbert Jennie. "Validity of Alternative Cut - Off Score for the Back-Saver Sit and Reach Test". *Measurement in Physical Education and Exercise Science* 16 (2012): 268-283.

20. Hui SS and Yuen PY. "Validity of the modified back-saver sit-and-reach test: a comparison with other protocols". *Medicine and Science in Sports and Exercise* 32.9 (2000): 1655-1659.