Research Article

Comparative effect of graston technique and muscle energy technique on the flexibility of hamstring muscle

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ABSTRACT

Background: Flexibility is the most important aspect of physical fitness. The capacity to move a joint easily across its whole range of motion is referred to as flexibility (ROM). One of the frequently observed symptoms in people who lead sedentary lifestyles is hamstring tightness. Hamstring tightness can result in increased risk for injury. Our main objective is to evaluate which treatment is more effective in improving flexibility of hamstring muscle.

Aim: To compare the impact of the Graston technique and Muscle Energy Technique on the flexibility of the hamstring muscle

Materials and Methods: It is an experimental study conducted at Isra Institute of Rehabilitation Sciences Karachi Campus. A sample size of 30 individual having hamstring tightness were equally divided into two groups. Patients in group A were treated with the Graston Technique, whereas those in group B were given the Muscle Energy Technique. IBM-SPSS version 23.0 was used to analyse the data. Hamstring flexibility at days 1 and 12 was measured using the mean and standard deviation. Within-group analysis was performed using the paired sample t-test. To compare the post-treatment scores, a one-way analysis of variance was also performed.

Results: With a mean difference of 12.86 units, Graston was found to be very effective, whereas Muscle Energy increases flexibility by 11.40 units. The average hamstring muscle flexibility was 65.47 ± 6.25 for the Graston group and 64.13 ± 6.91 for the Muscle Energy group.

Conclusion: Graston technique was found to be more effective than muscle energy technique in improving hamstring flexibility.

Keywords: Graston technique, muscle energy technique, flexibility

Introduction

The hamstring muscle group is made up of the semitendinosus, semimembranosus, and biceps femoris muscles. The bulk of the hamstring complex's muscles cross the femoroacetabular and tibiofemoral joints as they extend posteriorly from the pelvis along the length of the femur. As an exception to this rule, the short head of the biceps femoris arises from the lateral lip of the femoral Linea aspera, which is located distal to the femoroacetabular joint. Some contend that the short head of the biceps femoris is not a true hamstring muscle because of this. All other hamstring muscles arise from the ischial tuberosity, not the short head of the biceps femoris. The hamstring muscle group is crucial for knee flexion and hip extension (the posterior movement of the femur) (posterior movement of the tibia and fibula). In terms of the gait cycle, the hamstrings begin to contract at the final 25% of the swing phase, causing the hip to extend and preventing the knee from extending. The hamstring muscles are crucial for stabilising the knee joint dynamically [1,2].

Flexibility is the most important aspect of physical fitness. The capacity to move a joint

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easily across its whole range of motion is referred to as flexibility (ROM). Numerous elements, such as the bone alignment and the structures surrounding the joint, can affect a joint's flexibility. As an example, because to the differing joint types, the biomechanics of the elbow and shoulder joints varies significantly. A hinge joint cannot move in the same manner as a ball and socket joint. Age, exercise level, gender, health state, and characteristics of the surrounding soft tissues, including muscles, tendons, etc., are other factors that may affect joint flexibility and mobility. The joints of women are often more flexible, though there may be some outliers. However, aging process can lead to reduce flexibility [3].

Hamstring tightness is more common in college students. Additional students had AKE angles between 30° and 45° that harmed them. The age group of 18 years to 25 years-old college students has an extraordinarily high prevalence of hamstring tightness [4].

One of the main problems preventing performance in regular activities and athletic endeavours is hamstring tightness. In cross-sectional investigations, it has been hypothesised that decreased hamstring flexibility is connected to the prevalence of back pain in adolescents and adults [5,6]. Moreover, it has been suggested that a decrease in hamstring flexibility increases the risk of system injury [7,8]. Therefore, hamstring flexibility is essential for overall health and condition [9].

One of the popular soft tissue mobilisation methods is the Graston Technique, which is referred to as an instrument-assisted soft tissue mobilisation (IASTM). It treats a variety of soggy tissue ailments, including sprains, strains, and soggy tissue pathologies in general [10]. By misusing this technique, some medical professionals have discovered that the Graston Technique can effectively treat soft tissue problems and injuries [11].

In order to improve fixed storage after these injuries and return to physical activity after injuries, rehabilitation and treatment are required. One important aspect of physical activity, sports, and recreation is variety of motion. The range of motion will be described in terms of how much a joint move. Active vary of motion (AROM) and passive vary of motion are two types of fixed storage (PROM). An individual's active range of motion is the extent to which they will move a limb independently. The amount that a practitioner will move a patient's limb in a passive range of motion. Active range of motion is frequently used to track therapeutic improvement [12].

Numerous alternative manual medical care professions today use the Muscle Energy Technique (MET), a manual technique created by osteopaths. It is asserted to be effective for a variety of purposes, including protraction of shortened or contracted muscles, strengthening of the muscles, use as a humour or blood vessel pump to aid in the voidance of fluid or blood, and expansion of a limited joint's range of motion (ROM) [13].

Although osteopaths and other manual therapists frequently use muscular energy techniques, there is little research to back up this practise or to substantiate the ideas put up to explain the outcomes of MET. The effect of contract-relax techniques (similar to MET) on hamstring flexibility has been studied by a large number of researchers, who found that these techniques increased muscle flexibility [14-17].

Compared to the MET's therapeutic action mechanisms, the mechanical component of muscular flexibility during static stretch is better understood. The myofibrils in skeletal muscles are primarily responsible for maintaining tension during rest, and since the muscle stretches, the connective tissues' visco-elastic components are thought to be responsible for setting the limit of motion [18]. Visco-elasticity, a characteristic of both elastic and viscous elements, describes how a tissue reacts to a load. The tissue's capacity to revert to its original form after deformation is the elastic component. The fluid portion of the muscle that sways in reaction to external stimuli is referred to as the viscous element. The fabric's strain or force gradually decreases after viscoelastic structures are operated at constant stretch. Indisputable visco-elastic modification in rabbit forelimb muscles was found by Taylor et al [19].

In addition to the current, the skin and hypodermic animal tissue may also have a significant impact on how much mobility a joint is able to move. Johns and Wright have demonstrated that the joint capsule (47%), sinew (10%), muscle (41%), and skin (2%), all contribute to the passive torsion required to move a joint [20-22]. Flexibility is often measured by the range of motion of the joint and is a favourable condition trait (ROM) [23]. The potency and effectiveness of human movement are thought to be significantly influenced by the length of the muscle tissue [24,25].

The objective of the study was to find out whether Graston Technique and the Muscle Energy Technique are equally effective or not at increasing hamstring muscle flexibility.

Numerous research has examined the specific effects of the Graston Technique and the Muscle Energy Technique on the hamstring muscle. However, there are relatively few research that have compared the impact of various approaches on hamstring muscle flexibility.

Figure 1: Graston Technique (G1 Instrument)

Figure 2: Muscle Energy Technique (Isometric Contraction)

Methodology

The research was done by Isra University in Karachi using a randomization and control procedure. Following ethical approval, information was gathered from a few chosen subjects. Chit technique was employed for randomization, and basic random sampling was used to acquire the sample. The study had a total of 30 students who gave their informed permission. Male and female students between the ages of 18 and 25 who met the inclusion criteria had to have a limited range of hip flexibility (between 30 and 45 degrees for the hamstrings). (90-90 test of straight leg lift).

Those who had undergone surgery on their lower extremities within the previous six months, had a lumbar disc herniation, or who had any skin infections were prohibited from participating. (Test with leg raise) Data were gathered using the Graston Instrument and the Universal Goniometer (Baseline HiResTM 12-1000HR) (GT-1).

Short hamstring individuals (30 subjects' total) were randomly divided into two groups of 15 each. The Goniometer was used to measure the shortening of the hamstrings in both groups. The therapist filled out an assessment Performa and took measurements (pre-test results) on the first day before beginning treatment. Patients in group A were treated with the Graston Technique shown in (Figure 1), whereas those in group B were given the Muscle Energy Technique shown in (Figure 2). There were two sessions every week for six weeks of treatment.

Each participant in group A had hamstring soft tissue mobilisation with the Graston instrument and GT number 1. (GT-1). The participant was initially prone and had their knees bent between 30° and 60°. Each patient received 30 Graston strokes from the gluteal line to the popliteal fossa after applying coconut oil to the hamstring muscle. Six weeks of treatment, two sessions per week [26].

Each member of group B was placed comfortably in a supine posture on a plinth with the hip locked at 90 degrees of flexion and the knee stretched to the first sign of hamstring pain. For a total of 5 seconds, hamstring muscles were forced into a mild isometric contraction (about 75% of their maximum), which was followed by 3 seconds of relaxation. Six weeks of treatment, two sessions per week [27].

IBM SPSS version 23.0 was used to store and analyse the data. For the initial characteristics of the examined samples, counts and percentages were provided. At day 0 and day 12, the hamstring muscle's flexibility was measured using a mean and standard deviation. The effectiveness of the treatments was evaluated using a paired sample t-test. To compare the post-treatment scores between the two treatment groups, a one-way analysis of variance was also conducted. P-values of 0.05 or less were regarded as significant. Another graphical depiction of data is the bar chart.

The data was kept confidential and followed by serial numbering and coding. Informed consent form was signed by the participants.

Result

The baseline characteristics of the examined samples are reported in (Table 1). There were thirty samples in the current investigation, split into two treatment groups. There are 15 samples total in each treatment group, of which 46.7% were men and 53.3% were women.

Table 2 compares the mean hamstring muscle flexibilityo f participants on day 1 of treatment and on day 12 of treatment. Results demonstrated a 12.86-unit significant increase in hamstring muscle flexibility at day-12 with a p-value less than 0.01. In the Graston group, the mean flexibility at day-01 was 52.60 ± 9.14 and at day-12 it was 65.47 ± 9.41.

The results showed 11.40 units of significantly enhanced flexibility in the hamstring muscle at day-12 with a p-value less than 0.01 was found in the Muscle Energy group, where the mean flexibility at day-01 was 52.73 ± 6.42 and at day-12 it was 64.13 ± 6.91.

The mean hamstring muscle flexibility in the two treatment groups is shown in (Table 3) following the treatment. It was 64.13 ± 6.91 in the Muscle Energy group and 65.47 ± 6.25 in the Graston group, with a P-value of 0.182 based on a one-way analysis. ANOVA indicated that both treatment groups generally obtained similar results.

With the biggest mean difference of 12.86 units greater in hamstring muscle flexibility, Graston was proven to be quite effective.

Discussion

The study's objective was to evaluate the impact of a Graston technique and a muscular energy technique on the hamstring muscle's flexibility. One of the common findings in those who lead sedentary lifestyles is the occurrence of hamstring tightness. It is identified through physical examination and treated using a variety of physical therapy techniques.

The current study's results showed that patients who received the Graston technique demonstrated improvement in their hamstring muscles' flexibility on the first day of therapy and on the twelfth day of treatment. The mean flexibility in the Graston group was 52.609.14 on day 1 and 65.479.41 on day 12. The results revealed 12.86 units. At day 12, there was a significant increase in hamstring muscle flexibility with a p-value of less than 0.01.

MTrPs evaluation and treatment is a difficult condition for both sports physical therapists and athletes, according to a 2016 study by Fousekis K et al. Techniques such as ischemia pressure,

Table 1: Baseline Characteristics of Samples (N=45)

Gender	Treatment			
	Graston (n=15)		Muscle Energy (n=15)	
	n	%	n	%
Male	7	46.7%	7	46.7%
Female	8	53.3%	8	53.3%

Table 2: Mean Comparison of Flexibility of Hamstring Muscle

Treatment		Mean	SD	Mean Difference	p-value
Graston	Day-01	52.60	9.41	-12.86	<0.01*
	Day-12	65.47	6.25		
Muscle Energy	Day-01	52.73	6.42	-11.40	<0.01*
	Day-12	64.13	6.91		

***p<0.05 was considered significant using Paired Sample t-test**

Table 3: Mean Comparison of Post Flexibility of Hamstring Muscle Among Treatments

Treatments	N	Mean	Std. Deviation	p-value
Graston	15	65.47	6.25	0.182
Muscle Energy	15	64.13	6.91	

***P-value obtained using one way ANOVA**

cupping, and Ergon-IASTM are successful but not comparable in relieving myofascial trigger point tenderness (MTrPs). As its application led to a significant statistical reduction in pain symptoms, the Ergon IASTM approach appears to have much better results than either of the other two techniques in minimising the harmful effects of MTrPs [28].

The results of the current study showed that patients who received the muscular energy approach improved their hamstring muscle's flexibility, with mean flexibility at day 1 being 52.736.42 and day 12 being 64.136.91. Results showed 11.40 units. At day 12, there was a significant increase in hamstring muscle flexibility with a p-value of less than 0.01.

Arun B. et al. conducted a study in 2018 and came to the conclusion that the Muscle Energy Technique (METs) is the best technique for increasing muscle length and joint range of motion. It also causes a combination of changes in the connective tissue (creep and plastic change), which would increase flexibility. This occurs as a result of biomechanical, neurophysiological, or possibly an increase in stretching tolerance. This method aids in calming the hyperactive muscle and the connective tissue that it is connected to, both of which contribute to the muscle's elongation [29].

Conclusion

It has been concluded from the study that both techniques Graston technique and Muscle Energy Technique were found to be effective in the treatment of the flexibility of hamstring muscle but Graston technique was found to be more effective as compared to Muscle Energy Technique in the patients with hamstring muscle tightness.

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