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Effect of mulligan bent leg raise technique in subject with hamstring trigger point.

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Abstract: *The aim of the study was to analyse the effect of mulligan bent leg raise technique on hamstring trigger point. 40 subjects who were diagnosed by hamstring trigger point randomly recruited in the study All subjects received Mulligan bent leg raise technique (BLR), To determine the effect of intervention the patient were assessed on the measures of Active knee extension test (AKE) and visual analogue scale(VAS) on pre and post of the study. t-test indicated significant improvement in Visual analogue scale and Active knee extension test in subject with hamstring trigger point. The study suggests that BLR is effective in decreasing pain and improving range of motion in subjects with hamstring trigger point.*

Keywords: *Hamstring trigger point, Mulligan Bent Leg Raise technique, Active knee extension test, Visual analogue scale.*

I. Introduction

The term myofascial pain was first introduced by Travell, who described it as “the complex of sensory, motor, and autonomic symptoms caused by myofascial trigger points.”[1]

A myofascial trigger point has been described as an area of hyperirritability located in a taut band of muscle, variously described as resembling a small pea or as a rope-like nodular or crepitant (crackling, grating) area within the muscle that is painful upon palpation and refers pain, tenderness, and an autonomic (functionally independent) response to a remote area. When pressure is applied to a trigger point, a “jump sign” or “jump response” is elicited whereby the patient reacts with facial grimacing, by a verbal response, or by jumping away from the examiner. Muscle without trigger points, or normal muscle, is not tender upon palpation and does not produce a “jump sign.”[2] Several possible mechanisms can lead to the development of MTrPs, including low-level muscle contractions, uneven intramuscular pressure distribution, direct trauma, unaccustomed eccentric contractions, eccentric contractions in unconditioned muscle, and maximal or submaximal concentric contractions.[3]

The hamstrings comprise three large muscles, namely semitendinosus, semimembranosus and biceps femoris which originate from the ischial tuberosity. They are located in the posterior compartment of the thigh and span the hip and knee joints. Hence, they are extensors of the hip and flexors of the knee.[4] The peculiar characteristics of the hamstring muscles—biathrodial, made predominantly of type II fibres, and containing less titin protein—may put the muscle group at higher risk of strains.[5] The biceps femoris longhead is injured most frequently, accounting for approximately 80% of all hamstrings injuries.[6]

Referred pain from the myofascial trigger points (TrPs) in the semitendinosus and semimembranosus muscles concentrates in the lower buttock and adjacent thigh. From there, pain may extend down the posteromedial aspect of the thigh and knee to the upper half of the calf medially. Pain referred from TrPs in the lower half of the biceps femoris (long or short head) focuses on the back of the knee and may extend up the posterolateral area of the thigh as far as the crease of the buttock. Symptoms due to TrPs in the hamstring muscles include pain that is increased by sitting and walking and that often disturbs sleep. Part or all of the pain patterns referred by hamstring TrPs can be caused by TrPs in eight other muscles. The patient with TrPs in the hamstring muscles usually experiences pain on walking; he or she may even limp, because loading this group of muscles is so painful and the muscle inhibition compromises hip stability. When sitting, patients with these TrPs are likely to experience pain posteriorly in the buttock, upper thigh, and back of the knee that is reproduced by pressure on the TrPs.[7] Many researchers agree that acute trauma or repetitive microtrauma may lead to the development of a trigger point. Lack of exercise, prolonged poor posture, vitamin deficiencies, sleep disturbances, and joint problems may all predispose to the development of microtrauma. Occupational or recreational activities that produce repetitive stress on a specific muscle or muscle group commonly cause chronic stress in muscle fibers, leading to trigger points. [8] Myofascial trigger points causing pain and dysfunction are commonly treated by injection or dry needling, which are considered by many to be equally effective. In 1979, Lewit emphasized the needle effect as distinct from that of the injected substance. A variety of non invasive methods are also used, ranging from physical therapies, such as heat and massage, to mud baths or magnetic fields.[9]

There are many treatments approach are available in physical therapy to deactivate the MTrPs such as Ischaemic compression technique, spry and stretch technique, Strain -Counter strain technique, Trigger point pressure release technique, Ultrasound deep heat therapy, Thermo Therapy, Laser Therapy, Needling Therapies, Transverse Friction massage, Post isometric relaxation (MET), Electrical muscle stimulator, Stretching etc.[10,69] The Mulligan bent leg raise (BLR) technique has been described as a means of improving range of straight leg raise (SLR) in subjects with LBP and/or referred thigh pain (Mulligan, 1999). The intention of this technique is to restore normal mobility and reduce LBP and physical impairment.[11] But till date there are no study or literature available that shows the effect of Mulligan Bent Leg Raise Technique in subject with Hamstring trigger point.

II. Methodology

2.1 Sample Size & Source: 40 subjects with hamstring muscle trigger point and Santosh College of Physiotherapy.

2.2 Population: 150 students of age group between 18 to 30 years studying in Santosh College of Physiotherapy.

2.3 Selection Criteria:

Inclusion criteria :Age from 18-30 years, each subject with hamstring trigger point, Simons et al. (1999) and Gerwin et al. (1997) recommend that the minimum acceptable criteria for the presence of an active trigger point diagnosis involves the combination of the presence of a palpable taut band, an exquisite tender spot in the taut band, patient's recognition of pain as 'familiar', pain on stretching the tissues, Subject with unilateral greater than 30° limitation of Active Knee Extension. Exclusion Criteria : Fracture that may have affected the lower extremity within the past six months. History of hamstring tear, upper motor neuron disease, lower motor neuron disease, the extremity to be tested had history of impairment to the knee, thigh, hip or low back for one year, Subject with ankle pathology causing limitation of movement, History of spinal surgery in the previous six months, Participants with systemic disease were excluded from the study, History of P.I.V.D. and Low back ache, the subject involved in any exercise activity.

2.3 Procedure :

Active knee extension test[13]: Each subject was positioned supine on the couch and the hip of the lower limb being assessed was flexed to 90°. The distal part of the anterior surface of the thigh was placed in contact with the cross-line of a specially constructed metal frame. With his ankle in relaxed position, and ensuring that his thigh maintained contact with the cross line cross bar frame , the subject was instructed to actively extend the knee to the point where he started feeling a stretch. The knee extension deficiency (KED) was measured using the Goniometer. Zero degree was considered to be full extension of the knee. Reliability of the AKE test to be high using a metal rig to assist in measurement and straps to limit pelvic and leg motion (Gajdosik and Lusin, 1983). Visual analogue scale[15]: The VAS is presented as a 10 cm horizontal line, anchored by verbal descriptors labeled with "no pain" at point zero (0 cm) and "worst imaginable pain" at point ten (10 cm). The patient marks the line at the point corresponding to the intensity of the pain currently experienced. Using a 1 cm-per-point scale to measure the patient's score, the VAS provides ten levels of pain intensity.

Mulligan Bent Leg Raising Technique[(11)]**:** Subject place his flexed right knee over the shoulder therapist. Now ask him to push therapist away with his leg and then relax .At this point therapist push his bent knee up as a far as therapist can in the direction of his shoulder on the same side provided there is no pain. Three repetitions of pain free 5s, isometric contraction of the hamstring performed in five progressively greater position of hip flexion. With the bent knee over the therapist shoulder therapist include a traction component with this technique.

III. Data Analysis

The independent variable in the study was Mulligan BLR. The dependent variable were VAS and AKE test. All analyses were performed on STATISTICA (version 6.0) software. The values are reported as mean ± standard deviation. Paired t-test was used to calculate the differences between two paired samples. Level of significance of $P<0.05$ was set for the present study.

IV. Result

Table.1 shows the mean age and standard deviation of patients.

Characteristics	Statistics
Age (yrs)	22.83 ± 3.25

Table 1.2 shows mean and standard deviation value of Active knee extension(AKE) at pre and post intervention. It also shows the t value and p value of AKE, The pre-treatment AKE levels of all hamstring patients ranged from 110-145 degree with mean (± SD) 134.59 ± 7.07 degree while at post it ranged from 129-162 degree with mean (± SD) 148.45 ± 7.84 degree. Comparing the pre and post AKE levels, t test revealed significant mean increase (improvement) of 13.86 ± 3.75 degree (9.3%) at post as compared to pre (134.59 ± 7.07 vs. 148.45 ± 7.84, t=23.35; p<0.001)

Pre treatment	Post treatment	t value (DF=39)	P value
134.59 ± 7.07	148.45 ± 7.84	23.35	p<0.001

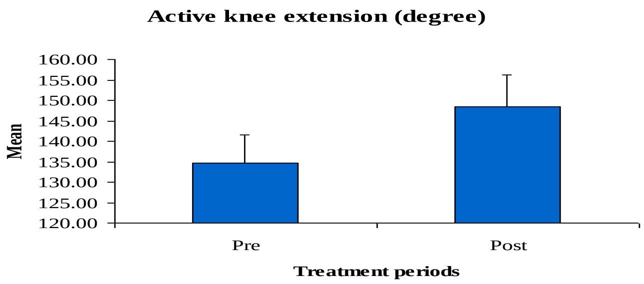
Table 1.2: Pre and post treatment AKE levels (Mean ± SD) of hamstring trigger point patients

Table 1.3 shows mean and standard deviation value of VAS at pre and post intervention, it also shows t value and p value of VAS, The pre treatment VAS scores of all hamstring patients ranged 5.33 ± 1.75 while at post it ranged from 2.50 ± 1.93. Comparing the pre and post VAS levels, t test revealed significant mean decrease (improvement) of 2.83 ± 1.43 (53.1%) at post as compared to pre (5.33 ± 1.75 vs. 2.50 ± 1.93, t=12.49; p<0.001).

Pre treatment	Post treatment	t value (DF=39)	P value
5.33± 1.75 (2-9)	2.50 ± 1.93 (0-6)	12.49	p<0.001

Table 1.3: Pre and post treatment VAS levels (Mean ± SD) of hamstring trigger point patients

Fig. 1.1: Pre and post treatment mean AKE levels of hamstring trigger point patients.



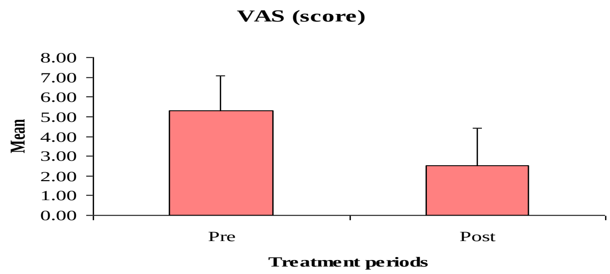


Fig. 1.2: Pre and post treatment mean VAS scores of hamstring trigger point patients.

V. Discussion

The increased range of motion immediately following passive stretching can be explained by the viscoelastic behavior of muscle and short-term changes in muscle extensibility[36]. Stretching of the muscle pulls out the sarcomeres to a length where there is too little overlap of myofilaments for maximum tension to be developed. Adding on sarcomeres could result in sarcomere length being restored to the optimum.[37] An increase in muscle length appears to relate more to the physical application of tension than to thermal or chemical responses of the tissue to exercise.[43] Another beneficial effect of the Mulligan BLR technique might be a change in stretch tolerance of the hamstrings. Goeken and Hof (1994) demonstrated that the increased range of SLR, following stretching, is mediated via an increase in hip flexion and hamstring length, and not related to increased hamstring viscoelastic properties.[11]

Taylor states that the acute effects of stretching are a change in the mechanical properties of the muscle. Human models have shown that a chronic regimen of stretching may increase joint range of motion (Sady, Wortman & Blanke, Gajdosik, Bandy & Irion). According to Hutton, the suggested mechanism for this augmented joint range of motion is a change in the tissue properties of the muscle. The aim of stretching is to inhibit the reflex activity, which reduces resistance and thereby improves joint range of motion.[71]

According to proponents of proprioceptive neuromuscular facilitation, the application of passive stretch can alter the muscle spindle (Ia and II afferents) and perhaps the Golgi tendon organ (Ib afferents) output to the central nervous system.[36]

According to Toby hall et al Golgi tendon organs around the knee, hip and spine probably initiate various segmental reflex pathways during traction of the limb. Likewise, Golgi tendon organs are activated during large amplitude stretching movements such as straight leg raise. This processing of information in the nervous system may inhibit the activity of the muscles being lengthened during straight leg raise by dampening the afferent activity of type II muscle spindles or by decreasing motor neuron excitability via 1-b fibers. Hence, improvement in range of straight leg raise may be directly related to inhibition of the hamstring muscles rather than to changes to stretch tolerance.[50]

Traction may also reduce pain by stimulating the large afferent fibers of muscles and joints that presynaptically inhibit pain fiber transmission at the spinal cord level.[23]. It is proposed that passive stretching during cervical traction may relieve painful muscular contractions.[25]

According to Lewit and Simons the post-isometric relaxation technique to be effective in reducing Trigger point sensitivity and pain intensity. The technique involved stretching the muscle containing the Trigger point, followed by an isometric contraction against minimal resistance. After the contraction, the muscle was first allowed to relax, and then it was stretched.[2] Postisometric relaxation is claimed to be an effective method for acute tension in soft tissue problems, reduces muscle spasm, reduces pain and lengthen the tightened neck muscles.[55]

According to Schnek, and MacDiarmid, 1997 Repetitive light muscle contractions increase venous, lymphatic drainage and relieve paraspinal congestion.[55] Fryer and Fossum have hypothesized that the sequence of muscle and joint mechanoreceptor activation evokes firing of local somatic efferents. This in turn leads to sympatho excitation and activation of the periaqueductal gray matter, which plays a role in the descending modulation of pain.[63] Further study with a larger sample size is required and an increase in the time duration and with larger sample size can be conducted in future studies.

VI. Conclusion

The study concludes by stating that null hypothesis is rejected as result of the study suggests that BLR is effective in decreasing pain and improving range of motion in subjects with hamstring trigger point.

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