

Original Article

IMMEDIATE EFFECT OF ACTIVE RELEASE TECHNIQUE VERSUS MULLIGAN BENT LEG RAISE IN SUBJECTS WITH HAMSTRING TIGHTNESS: A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: To study and compare the effectiveness of active release technique and mulligan bent leg raise in subjects with hamstring tightness.

Methods: 40 normal healthy subjects (20 in each group) were recruited in the study under simple randomization method. Group A received single session of Active Release Technique and Group B received single session of Mulligan Bent Leg Raise technique for hamstring tightness. Popliteal angle and Sit and reach flexibility tests were measured pre intervention and post intervention. Data was analyzed using t-test.

Results: The group treated with Active release technique showed significant improvement in Popliteal angle ($P < 0.001$) and sit and reach flexibility test ($P < 0.001$) as compared to Mulligan bent leg raise technique. Results showed the significance difference within the groups post intervention.

Conclusion: A single session of Active release technique is better as compared to Mulligan bent leg raise technique to improve hamstring flexibility and range of motion.

KEYWORDS: Hamstring Tightness; Active release technique; Mulligan bent leg raise; flexibility.

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INTRODUCTION

Muscular flexibility is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person's level of function.¹

Muscular tightness is frequently postulated as an intrinsic risk factor for the development of a muscle injury. Lack of flexibility has been suggested as a predisposing factor to hamstring strains.²

Decreased hamstring flexibility is suggested to be one of the predisposing factors for hamstring strains and hamstring stretches are routinely used as part of a pre-exercise routine, usually after an aerobic warm-up.³

Worrell and Perrin (1992) proposed a theoretical model for hamstring strains, suggesting that

they result from a complex interaction of four etiologic factors: warm-up, strength, fatigue, and flexibility. Reasons for stretching relate to beliefs that stretching exercises will increase flexibility and decrease muscle stiffness. Maintaining normal muscle length requires regular stretching to prevent muscle stiffness, decreases risk of musculoskeletal injuries and enhance physical performance. Maintaining the flexibility of hamstring muscle is important for general and athletic population and of utmost importance for health care professionals, to achieve this goal one needs to know the most effective and efficient technique to gain hamstring flexibility.¹ According to Austin Sports Therapy, the active release technique, or ART, was developed by chiropractor Dr. P. Michael Leahy to work on a variety of muscle, tendon, ligament, fascia and nerve issues.

According to the Austin Sports Therapy, ART treatments involve tension or massage and guided movements. Active release technique therapy for the hamstrings is designed to alleviate pain and tightness and help the hamstring to return to its normal condition.⁽⁴⁾

Active release technique has three unique objectives: Restoring free and unimpeded movement of soft tissue, The release of entrapped nerves, vasculature and lymphatic, and to re-establish optimal texture, resilience and function of soft tissues.⁵

Study has been done demonstrating that single session of Active release technique treatment is effective in a group of healthy, active male participants in improving hamstring flexibility.⁶

According to B.Mulligan, bent leg raise is a painless technique and can be applied on any patient with low back pain who has limited or painful straight leg raising (SLR).It can be tried with patients who has a gross bilateral limitation of straight leg raise (SLR).If the bent leg raise (BLR) cannot be executed without pain then it is not to be used.⁷

ART and Mulligan bent leg has been proved separately to be effective in improving hamstring flexibility in previous studies. But there is limited study done comparing these two techniques i.e. ART and Mulligan bent leg raise for the hamstring muscle tightness. Hence, the aim of present work is to study and compare the effectiveness of Active release technique and Mulligan bent leg raise in normal healthy subjects with hamstring tightness.

METHODS

Under convenience sampling,40 Subjects were recruited from the KLE University Institute Of Physiotherapy,Belgaum.The subjects were randomly divided into two groups, Group A (Active release technique) and Group B (Mulligan bent leg raise). All subjects read and signed an informed consent form approved by the Institutional review board of the University.

Inclusion criteria:

- Age 17 – 25 years
- Minimum 20° restriction in SLR unilaterally
- Normal healthy Subjects

Exclusion criteria:

- Any history of lower extremity injury in past 3 months

- UMN and LMN
- Subjects involving in any sports and gymnasium activity
- Unwilling to participate and sign in the informed consent

Intervention:

Group A- Subject received single session of ART on dominant side. There are 3 steps to perform ART.

Step 1:Subject lies supine on the plinth and gentle tension was applied to the hamstring muscle along the entire length while stretching the leg in different positions to better work the muscle.

Step 2: Gentle tension was applied at the origin and insertion of the hamstring muscle.

Step 3: Gentle tension was applied around the adductors and gluteus muscle because hamstring connects to these muscles and that could be the source of hamstring tightness.⁶

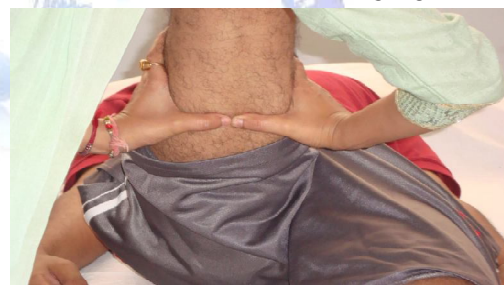


Fig : Active release technique.

Group B- Subject received single session of Mulligan BLR on dominant side. subject was in supine lying, therapist stood at the side of limited SLR.Therapist placed subject's flexed knee over her shoulder and subject was asked to push therapist away with his/her leg and then relax. At this point therapist pushed subject's bent knee up as far as in the direction of shoulder on the same side provided there is no pain. This stretch was sustained for several seconds and then lowered the leg to the bed. With the bent knee over the therapist's shoulder therapist included a traction component with this technique.¹



Fig : Active release technique.

Outcome measures: Popliteal angle and sit and reach flexibility tests were measured pre and post intervention.

Popliteal angle : With the subject supine on plinth, with the help of goniometer angle is measured between thigh and calf.

Sit and reach flexibility test-This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor. With the palm facing downward, and the hands on top of each other, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at one-two seconds while distance is recorded.

Statistical Analysis: The statistical analysis was done using t-test to compare between the groups and within the group and level of significance was set up at $p < 0.001$.

RESULTS AND TABLES

The Study included 40 subjects. Table 1 shows the baseline characteristics of the subjects.

Table 1: Showing distribution of age and gender in Group A and Group B.

Variable	Group A	Group B
Sex	M- 6 F- 14	M- 8 F-12
Average Age (in Years)	21.6 ± 2.5	22 ± 2

Table 2: Descriptive statistics for popliteal angle and sit and reach flexibility test.

Measures/Group		Pre-intervention	Post-intervention	Difference within the groups	p value
Popliteal angle	Group A	53.7 ± 8.4	70.2 ± 9.10	16.5 ± 7.27	<0.001
	Group B	48 ± 8.79	57 ± 8.88	9 ± 3.59	<0.001
Sit and Reach	Group A	19.3 ± 5.32	23.9 ± 5.32	4.6 ± 1.32	<0.001
	Group B	19.9 ± 5.20	22.6 ± 5.73	2.7 ± 1.44	<0.001

Table 3: Inter-group difference.

Groups	Popliteal angle (paired t-test)	p value	Sit and reach flexibility (paired t-test)	p value
Group A	10	<0.001	15.49	<0.001
Group B	9	<0.001	8.34	<0.001

The group treated with Active release technique showed significant improvement in Popliteal angle ($p < 0.001$) and sit and reach flexibility test

($p < 0.001$) as compared to Mulligan bent leg raise technique.

Result also showed a significant difference within the groups post-intervention.

DISCUSSION

The result of the present study demonstrated that ART and Mulligan BLR increases immediate post-intervention hamstring flexibility and range of motion.

Both the groups showed improvement in Popliteal angle and sit and reach flexibility measurements.

As per our knowledge this study was the first which compared the Active release technique and Mulligan bent leg raise in healthy subjects with hamstring tightness with the single intervention.

If the hamstring muscle is not stretched regularly then there is a great chance of getting it tighter and shorter which leads to muscle "knots". Active release technique and Mulligan bent leg raise technique releases the scar tissue adhesions to allow full lengthening of the muscle and to regain flexibility for functional use. ⁴

Reproducibility and criteria related validity of the sit and reach test has coefficient of variation(CV) 8.74% and intraclass correlation coefficient(ICC) 0.92.This has been proved in a study conducted by Ayala et al in recreationally active young adults for estimating the hamstring flexibility. ⁸

Study conducted by D.Scott Davis on concurrent validity of four clinical tests found Active knee extension/ Popliteal angle test as the gold standard for the measurement of hamstring flexibility with intratester reliability (ICC) of 0.94.⁹

A study conducted by Waseem et al comparing static stretching versus eccentric stretching on popliteal angle in normal healthy participants. Pre-test and the post test values of the Popliteal angle for the groups showed that there is a significant improvement in both groups but static stretching showed better improvement. Static stretching resulted in an increased flexibility due to changes in viscoelastic properties. They related the resultant increase in muscle length to viscoelastic behavior i.e. this type of stretching may adjust the positional sensitivity of the Golgi tendon organs by affecting the series elastic component of the

muscle. Thus it may be said that these techniques are effective individually in improving flexibility of hamstrings.¹⁰

Study conducted by James W. George et al (2006) showed increased flexibility and ROM of hamstring muscle immediately after the ART treatment. Our study showed the same result with improved flexibility and ROM.⁶

Active Release Technique (ART), developed by Dr. Michael Leahy, proposed a mechanism to explain increased tissue stiffness or tension called the cumulative injury cycle. In this cycle, repetitive micro-injury in tight muscles leads to an increase in the friction and tension within the myofascial structures.⁶

On the other hand, in Mulligan bent leg raise there was significant difference in Popliteal angle and Sit and reach flexibility pre and post-intervention.

Study conducted by hall(2006) concluded that hamstrings in hip flexion provides peripheral somatic input by the way of contracting muscle and the cutaneous contact of the therapist.⁷

CONCLUSION

On the basis of statistical analysis, we conclude that single intervention of ART and Mulligan BLR technique is effective in improving Popliteal angle and Sit and reach flexibility measurements but ART has shown better improvement in hamstring flexibility and ROM than Mulligan BLR. In this study immediate effects are analyzed, in further studies maintenance of the flexibility of Hamstring muscle can be assessed. Small number of subjects are recruited in this study so in future studies number of subjects should be increased These techniques can be recommended for the patient population with Hamstring tightness since these have given better results in normal subjects.

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Conflicts of interest: None

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