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# Effectiveness of Mulligan's Bent Leg Raise and Two-Leg Rotation Technique on Hamstring Flexibility Among Hamstring Tightness Subjects

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**KEYWORDS**

Mulligan's Bent Leg Raise (BLR) and Two Leg Rotation Technique (TLR),

Active Knee Extension Test (AKE), hamstring flexibility, hamstring tightness

**ABSTRACT:**

**Introduction**: Having flexible muscles is important for good musculoskeletal health and for doing physical activities well. When the hamstrings become tight, it means parts of the muscle, including the tissues that aren't contractile, have shortened. Mulligan's Bent Leg Raise (BLR) and Two-Leg Rotation (TLR) techniques are believed to help by creating a type of "opening" effect on the nervous system. These techniques involve moving the joints, muscles, and connective tissues, which may help improve the flexibility of the hamstrings.

**Objectives**: To find out the effictiveness of Mulligan's Bent Leg Raise technique and Two Leg Rotation technique on hamstring flexibility among hamstring tightness subjects.

**Methods**: Fifty people between the ages of 18 and 22 with tight hamstrings and limited flexibility were chosen .Participants were given Mulligan's BLR and TLR technique. To check hamstring flexibility, an active knee extension test was performed before and after the treatment. The test was also carried out 10 days after the treatment to see how long the improvement lasted.

**Results**: Looking at the average results after the Mulligan technique and Two leg rotation technique , there was a noticeable increase in hamstring flexibility among the participants. A second test 10 days later was done to understand how long the benefits from the technique lasted for students.

**Conclusions**: A paired t test was used to analyze the results, showing a significant improvement in hamstring flexibility right after the treatment.This study shows that Mulligan's BLR and TLR technique is effective for improving hamstring flexibility quickly in people with tight hamstrings. A second test was also done after 10 days to check how long the improvement lasted among students

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## 1. Introduction;

When the contractile and non-contractile parts of the hamstring muscles become shortened, it is referred to as hamstring tightness. This condition usually results from a reduced ability of the muscle to stretch, leading to a smaller range of motion.[1] Tight hamstrings can cause problems such as difficulty in fully extending the knee when the hip is bent, and pain or discomfort A flexible muscle is important for good musculoskeletal function and physical performance.[4] Prolonged sitting, which is common in many jobs and educational settings, can reduce flexibility in soft tissues, especially in two-joint muscles like the hamstrings. Tight hamstrings can lead to repeated injuries, reduced performance, and soreness after exercise[2]. Hamstring flexibility is connected to the movement of the pelvis and lower back, the angle of bending forward, and the range of motion. It classical sit and reach test, the back saver sit and reach test, the V-sit and reach test (VSR), and the modified sit and reach test.

Active Knee Extension (AKE) is one of the recommended tests for measuring hamstring flexibility[6].

The Mulligan concept is commonly used in physical therapy to treat tightness in the hamstrings.

BLR is a gentle technique for people who have trouble with straight leg raising and experience pain. TLR is another technique that may provide long-lasting benefits and help open the spaces between the vertebrae while moving the nerves[7]. Studies suggest that these techniques, which involve movement of the joints,is also related to problems like low back pain, plantar fasciitis, patellar tendinopathy, and patellofemoral pain syndrome. Because of this, having flexible hamstrings is important for overall health and good physical fitness[5].

There are several tests used to assess hamstring extensibility, including Passive Knee Extension (PKE), Popliteal Angle (PA), Straight Leg Raise (SLR), Passive Straight Leg Raise (PSLR), fingerfloor distance, the muscles, and fascia, create an "opening action" around the nervous system and can influence its sensitivity Recommended treatment for sciatic nerve altered mechanosensitivity due to hamstring along the back of the thigh or knee. Being unable to extend the knee more than 20 degrees while the hip and knee are both bent at 90 degrees is a sign of hamstring tightness. [2]Hamstrings are muscles located at the back of the thigh and are important for many daily activities like walking, running, jumping, and controlling movements of the gluteal muscles[3].

strain includes resisting static contractions with hip extension and knee flexion against the therapist's body.

The two-leg rotation technique is thought to carry over beneficial effects and open the lateral intervertebral foramen while moving neural structures. According to Mhatre (2013), these techniques, which involve movements of joints, muscles, and fascia, are believed to generate an 'opening action' around the nervous system and influence its mechanosensitivity.

**Objectives**

The objective of this study was to evaluate the effectiveness of Mulligan's Bent Leg Raise (BLR) and Two-Leg Rotation Technique (TLRT) in improving hamstring flexibility among individuals with hamstring tightness. The study also aimed to assess the immediate effects of these techniques as well as the retention of improvement after 10 days using the Active Knee Extension (AKE) test. Additionally, it sought to compare pre-intervention and post-intervention values and determine the statistical significance of changes in hamstring flexibility following the intervention..

**Methods**

The Review Board of RVS College of Physiotherapy in Coimbatore approved this descriptive study.

Written consent was obtained from the participants after they were given clear information about the procedure and its possible effects.

Study setting:

The study took place in the outpatient department of RVS College of Physiotherapy in Sulur, Coimbatore. A total of 50 subjects, aged between 18 and 22 years, with bilateral hamstring tightness were chosen based on certain inclusion and exclusion criteria. These subjects included both males and females who had a

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knee flexion angle of more than 20 degrees on the

Active Knee Extension (AKE) test and were willing to take part. People with back pain, spinal issues, lower limb fractures, avulsion injuries of the spine, femoral or inguinal hernias, or neurological problems were not included.

The study was designed as a pre-test and posttest experimental study that lasted three months.

The independent variables were the Mulligan's Bent Leg Raise (BLR) technique and the Two Leg Rotation Technique (TLRT). The dependent variable was hamstring flexibility, measured using the AKE test. Eligible participants were randomly assigned to groups. The interventions were given only once to those who had hamstring tightness The AKE test was conducted

before the intervention (pre-intervention) ,Immediately after the intervention (post-test I), and again after 10 days (post-test II).

During the AKE test, participants were placed in a supine position without a pillow under their head, with the testing hip flexed and held at 90 degrees. They were asked to actively extend their knee until they felt a stretch, And the angle of knee flexion was measured with a universal goniometer. This process was repeated for both legs.

**AKE test of the right lower limb TREATMENT PROCEDURE :**

**1) Mulligan's Bent Leg Raise technique (BLR)**

Patient position: Lying on their back

Therapist position: Standing or walking The patient was asked to lie flat on the plinth .Their knee was bent and placed on the therapist's shoulder. They were asked to press their leg against the therapist's shoulder using only muscle strength, called isometric contractions, for 5 seconds and then let go.. Next, the bent knee was pushed up as far as possible towards the same side shoulder .They were asked to hold this position for 30 seconds, then lower the leg back down to the bed. The bent knee being moved towards the shoulder.

This was repeated three times, each time with a greater bend in the hip, with a 30-second break between each repetition.

The bent knee pushed towards the shoulder

**2) The two-leg rotation technique (TLRT)** Patient position: Lying on their back This test was done by the patient themselves. While lying flat on the plinth, the patient was asked to hold the sides of the plinth with their hands.

Both legs were bent, with the feet off the plinth. Keeping their shoulders on the plinth, the patient was slowly asked to move their legs to the opposite side. They were asked to hold this position for 30 seconds. The legs were then slowly returned to the bent position and straightened

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This process was repeated three times, with a 30second pause between each repetition.

. **Two-leg rotation technique**

**Results**

50 subjects with bilateral hamstring tightness were selected by the Active knee extension test, and hamstring flexibility was measured before as Pretest values, and immediately after giving the intervention, and was measured as Post-test I. The hamstring flexibility was again measured after 10 days as Post test II. The data was collected and analyzed using a paired 't' test to check for a significant difference between the pre-test and post-test values.

The results demonstrated a significant improvement in hamstring flexibility following the application of Mulligan's Bent Leg Raise (BLR) and Two-Leg Rotation Technique (TLRT). The mean pre-test values for right and left hamstrings showed a reduction in knee flexion angle immediately after intervention, indicating improved flexibility. This improvement was statistically significant, as evidenced by high paired t-values exceeding the table value at the 0.005 level.

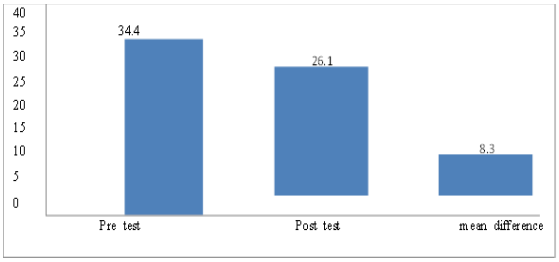
Furthermore, the improvement in hamstring flexibility was sustained at the 10-day follow-up assessment. Although there was a slight reduction in the magnitude of improvement compared to immediate post-test values, the results remained statistically significant for both right and left hamstrings.

Overall, the findings indicate that Mulligan's BLR and TLRT techniques produce both immediate and short-term improvements in hamstring flexibility among individus with hamstring tightness.

**TABLE 1** shows the Mean value, mean difference, standard deviation, and paired 't' value between pre-test and post-test I scores of right hamstring flexibility immediately after intervention**.**

| Measurement | Mean | Mean difference | Standard deviation | Paired Value |
|---|---|---|---|---|
| pre test | 34.4 | 8.3 | 2.590 | 21.78 |
| post test | 26.1 | | | |

The calculated paired 't' value is 21.78, and the 't' table value is 2.576 at the 0.005 level. Since the calculated 't' value is more than the 't' table value, there is a significant difference in right hamstring flexibility immediately following Mulligan's Bent leg raise (BLR) and Two leg rotation technique (TLRT) among hamstring tightness subjects.




**Graphical representation of pre- and post-test I values of left hamstring flexibility**

**TABLE 2** shows the Mean value, mean difference, standard deviation, and paired 't' value between pretest and post-test I scores of left hamstring flexibility immediately after intervention.

| Measurement | Mean | Mean difference | Standard deviation | Paired 't' value |
|---|---|---|---|---|
| pre test | 34.9 | 8.1 | 3.62 | 15.31 |

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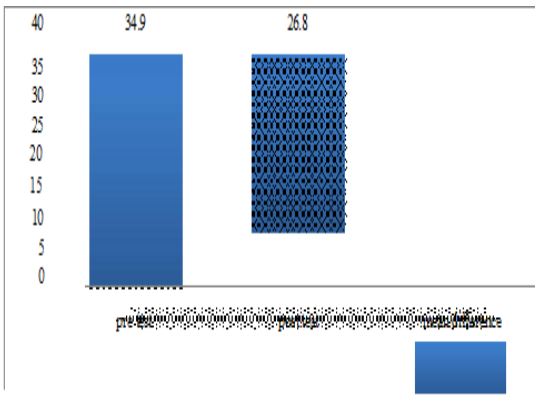
| | | | | |
|---|---|---|---|---|
| **post test** | **26.8** | | | |

The calculated paired ‘ t’ value is 15.31, and the ‘t’ table value is 2.576 at the 0.005 level. Since the calculated ‘ t’ value is more than the ‘t’ table value, there is a significant difference in left

hamstring flexibility immediately following Mulligan’s Bent leg raise (BLR) and Two leg rotation technique (TLRT) among hamstring tightness subjects.

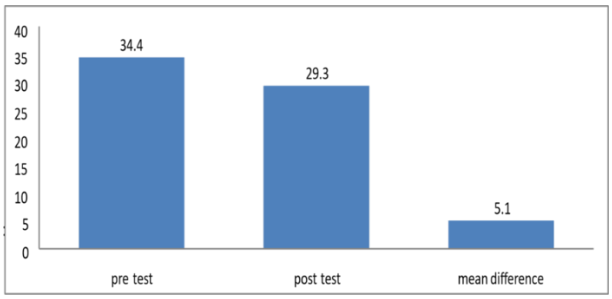



**Graphical representation of pre- and post-test I values of left hamstring flexibility**

**TABLE 3 shows the** Mean value, mean difference, standard deviation, and paired ‘t’ value between pretest and post-test II scores of right hamstring flexibility after 10 days.

| **Measurement** | **Mean** | **Mean difference** | **Standard deviation** | **Paired ‘t’ value** |
|---|---|---|---|---|
| **pre test** | **34.4** | **5.1** | **1.74** | **20.2** |
| **post test** | **29.3** | | | |

The calculated paired ‘t’ value is 20.2 and ‘t’ table value is 2.576 at 0.005 level. Since the calculated ‘t’ value is more than the ‘t’ table value, there is a significance difference in right hamstring flexibilityfollowing Mulligan’s Bent leg raise (BLR) and Two leg rotation technique (TLRT) after 10 days among hamstring tightness subjects




**Graphical representation of pre- and post test II values of right hamstring flexibility after 10** days

**TABLE 4** shows the Mean value, mean difference, standard deviation, and paired ‘t’ value between pre-test and post test II scores of left hamstring flexibility after 10 days **.**

| **Measurement** | **Mean** | **Mean difference** | **Standard deviation** | **Paired ‘t’ value** |
|---|---|---|---|---|
| **pre test** | **34.9** | **4.1** | **1.34** | **22.6** |
| **post test** | **30.8** | | | |

The calculated paired ‘t’ value is 1.34 and ‘t’ table value is 2.576 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table there is significant difference in left hamstring flexibility following

Mulligan’s Bent leg raise (BLR) and Two leg rotation technique (TLRT)after 10 days among hamstring tightness subje

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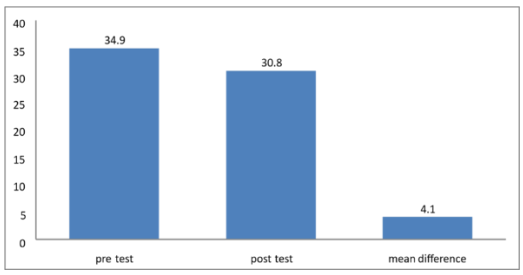


**Graphical representation of pre and post test II values of left hamstring flexibility after 10** days

**Discussion**

The study wanted to find out how effective Mulligan's Bent Leg Raise (BLR) technique and Two Leg Rotation technique (TLRT) are in improving hamstring

flexibility.

Fifty people with tight hamstrings on both sides were chosen using the active knee extension test. These participants were given Mulligan's Bent Leg Raise (BLR) technique and Two Leg Rotation technique (TLRT).

The results of this study show that both Mulligan's Bent Leg Raise (BLR) technique and Two Leg Rotation technique (TLRT) made a significant improvement in hamstring flexibility right after the treatment was done.

This study is supported by Tejashree Bhoir et al., (2016)[8], who found that BLR caused a 3.7 to 4 cm difference in the pre-test and post-test measurements.

He said BLR is a type of Mulligan stretching method that is a new approach for dealing with tight hamstrings. The improvement in straight leg raise range, due to BLR, could be because of the movement of sensitive nerve tissues,

similar to the slider effect. Another benefit of

BLR might be that it changes how the hamstrings react to stretching. Ylinen et al., (2020), in a systematic review, emphasized that stretching exercises, especially for hamstrings, are important for preventing and managing low back pain.

This is because stretching improves lumbopelvic rhythm and lowers neural mechanosensitivity. This aligns with the findings of the present study, suggesting that Mulligan's techniques not only improve hamstring flexibility but may also have wider clinical applications in musculoskeletal rehabilitation. García-Manso et al., (2021), looked into hamstring muscle injuries and found that limited flexibility is a key risk factor for sports-related injuries.

They concluded that flexibility training reduces injury risk by making muscles more compliant and reducing eccentric overload. This adds more clinical importance to the findings of this study, as improving hamstring flexibility through Mulligan's techniques could serve both therapeutic and preventive roles in sports rehabilitation.

An experimental study was carried out to check hamstring flexibility in 50 people with tight hamstrings immediately after the treatment (post test I) and after 10 days (post test II).

From the results, it was concluded that there was an immediate improvement in hamstring flexibility following the intervention.

Post-test II was conducted to understand how long the benefits of Mulligan's technique last in improving hamstring flexibility among college students.

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