

# Immediate Effects of Bowen Technique Versus Mulligan Bent Leg Raise on Hamstring Tightness in Dominant Leg of College Going Students: A Comparative Study

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**Abstract:** ***Introduction:** Hamstring muscles, crucial for knee flexion and hip extension, are located at the back of the thigh. Tight hamstrings can lead to discomfort, movement impairments, and lower back pain. This study investigates the immediate effectiveness of Mulligan Bent Leg Raise (MBLR) and Bowen Technique in improving hamstring flexibility in college students aged 17-25 years. **Methodology:** A comparative study was conducted with 24 eligible participants from a physiotherapy department. Participants were randomly divided into two groups: Group-MBLR (n=12) and Group-Bowen Technique (n=12). The MBLR technique involved isometric contractions of the hamstring muscles at various knee flexion angles, while the Bowen Technique used gentle myofascial release movements. Baseline and post-intervention assessments were conducted using the Active Knee Extension (AKE) test. **Results:** Both techniques effectively increased hamstring flexibility, with no adverse effects reported. SPSS software version 21 was used for all tests and calculations. Baseline demographic details and outcome scores were heterogeneous, with a p-value < 0.05. Pre- and post-intervention comparisons using the paired t-test revealed significant differences within both groups for AKE scores (p < 0.05). However, the independent t-test showed no significant difference in AKE scores between the two groups (p < 0.05). **Conclusion:** The study concludes that both Mulligan Bent Leg Raise (MBLR) and Bowen Technique are effective for improving hamstring muscle flexibility in college students.*

**Keywords:** Hamstring tightness, Mulligan Bent Leg Raise, Bowen Technique, Active Knee Extension, Sit & Reach Test

## 1. Introduction

The hamstring group consists of three primary muscles—the biceps femoris, semitendinosus, and semimembranosus—that play a critical role in hip extension and knee flexion, contributing to movement and stability (1). These muscles are active during the walking cycle, particularly in hip extension and knee stabilization (2,3). Hamstring tightness is a common issue affecting mobility and comfort, prevalent in 40.17% of college students, with a higher occurrence in males (4). Limited flexibility can contribute to lower back pain and an increased risk of injuries, affecting knee mechanics and leading to patellofemoral pain syndrome (5).

The Bowen technique, introduced by Thomas Bowen in 1916, is a non-invasive myofascial release method involving gentle manipulations over muscles and connective tissues to enhance circulation and healing (6,7,8). It reduces pain, relieves tension, and aids in restoring normal movement without discomfort.

The Mulligan Bent Leg Raise (MBLR) method improves hamstring flexibility and enhances mobility by using isometric contractions at different knee angles. It is effective for individuals with lower back pain or hamstring tightness

and should be applied within pain-free ranges to avoid discomfort (9).

The Sit and Reach (SR) test, developed in 1952 by Wells and Dillon, assesses hamstring and lower back flexibility. It is widely used to evaluate movement efficiency and prevent musculoskeletal issues such as posture-related discomfort and walking difficulties (10,11).

The Active Knee Extension (AKE) test provides a reliable measure of hamstring flexibility. Participants lie on their backs, maintaining hip stability while extending the knee until a stretch is felt. Studies validate this method as an effective tool for assessing hamstring flexibility (12,13).

## 2. Need and Significant of Study

Various physiotherapy techniques are used to address hamstring tightness, include the bowen technique (a soft tissue manipulation method) and the MBLR Mulligan bent leg raise technique (a mobilization technique that enhance ROM and neuromuscular function).

However, there is limited comparative evidence regarding their immediate effect on hamstring flexibility in dominant

leg. Student involved in sports can benefits from a quick and effective technique to reduce hamstring muscle tightness and improve performance. This study aims to fill this gap by evaluating which technique provide better short-term relief.

### Objective

- 1) To find out immediate effectiveness of the BOWEN technique in improving hamstring flexibility.
- 2) To find out immediate effectiveness of the MBLR technique on hamstring tightness.
- 3) To compare the efficacy of the MBLR technique and Bowen technique in reducing hamstring tightness.

### 3. Materials and Methodology

- 1) **Research Design:** Comparative study
- 2) **Sample Design:** Randomized Sampling
- 3) **Study Population:** College Going Students (Adults)
- 4) **Study Size:** 110 Student (Group A-12, Group B-12)
- 5) **Study Setting:** Vidhyadeep Institute of Physiotherapy
- 6) **Study Duration:** 3 months, December (2024)-February (2025)
- 7) **Treatment Duration:** Immediate
- 8) **Selection Criteria**

#### a) Inclusion Criteria

- Both Gender
- Age group 18 to 25 years
- College Going Students
- Healthy Students

#### b) Exclusion Criteria

- Hypersensitive Skin
- Diagnosed with malignancy
- Diagnosed with Traumatic injury

#### 9) Tools and Parameters:

- Universal Goniometer
- Measure Tape
- Plinth
- Physioball
- Pen and Paper
- Consent Form

### Outcome Measures: Active Knee Extension (AKE)

The AKE test dependably surveys hamstring adaptability in light of muscle connection focuses. Members lay on their backs with the left leg got at 0° hip flexion and the right thigh twisted at 90°. They expanded the right knee until the principal stretch sensation, with the foot in plantar flexion. This endpoint strategy, upheld by review from Turl, George, Cameron, and Bohannon, affirms the test's unwavering quality.

### Data Collection Procedure

All the participants were diagnosed clinically with hamstring tightness and had affected lower extremity. They were selected for the study through randomized sampling technique. The procedure was clearly explained to all the participants and the consent has been obtained from the

participants. Participants with hamstring tightness who fulfilled the selection criteria were divided into 2 groups through odd/even assignment (Group A- MBLR, Group B- Bowen Technique). Prior to study all the subjects were examined and pre-treatment measurement of Active Knee Extension assessment was taken and post treatment measurement of Active Knee Extension Immediately After Treatment. Results were compared and analyzed statistically. P value < 0.05 was considered as statistically significant.



Figure 1: Active Knee Extension Test

### 4. Result and Analysis

For the statistical analysis, data were obtained before the treatment and after Immediate Effect of treatment from both groups.

AKE was taken for hamstring muscles.

We are doing Kolmogorov-Smirnov Test which is not significant for our data so, we are doing statistical analysis by Non-Parametric Test.

- Wilcoxon Signed Rank Test- was used for the comparison between the pre and post value of outcome measure within the groups.
- Mann Whitney U Test- was used for the comparison between the pre and post value of outcome measure between the groups.

The significance level adopted for the statistical tests was <0.05 and CI was kept at 95%

### 5. Tabular Presentation

Table 1: Normality Test

Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PREBOWEN	.196	12	0.200*	.865	12	0.057
PREMBLR	.183	12	0.200*	.882	12	0.093
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

All statistical tests were performed using SPSS Version 21 software.

**Table 2: Mean of Age**

	Mean	Minimum	Maximum	SD
MBLR	18.583	18	21	0.996
BOWEN	19.166	17	26	2.329

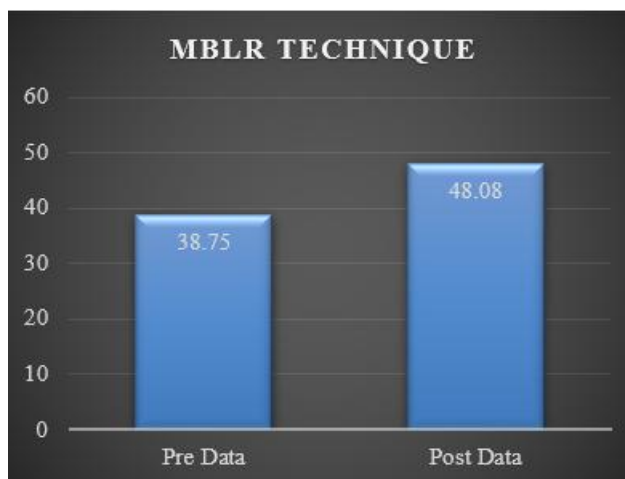
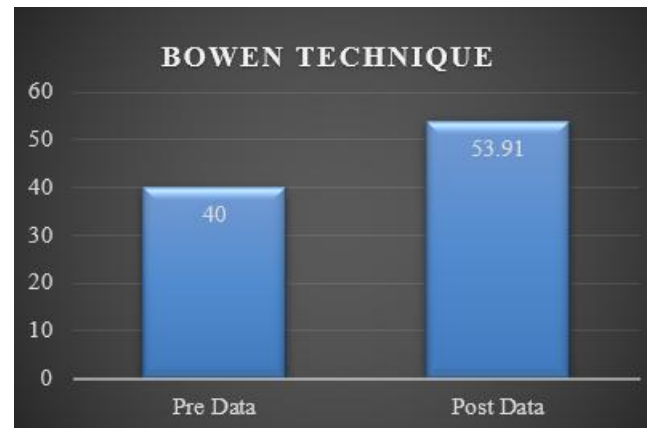
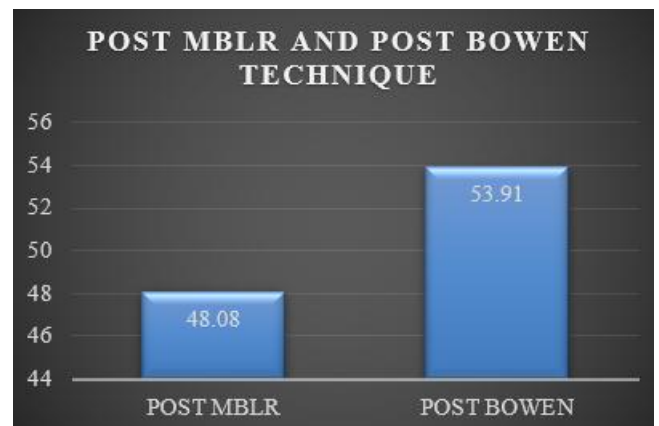
**Table 3: Intragroup & Intergroup Comparison with Statistical Analysis**

Group	Pre		Post		Intra Group	
	Mean	SD	Mean	SD	T Value	P Value
Bowen Group	40	±4.5	53.25	±5.5	3.068	0.002
MBLR Group	38.75	±6.04	48.08	±6.06	3.093	0.002
INTER GROUP					-2.260	0.024

## 6. Interpretation of Result

**Inter-group Analysis:** The above table shows the inter-group comparison of post treatment scores of flexibility measured through AKE for Hamstring Muscles Flexibility assessment of Group A and B. The analysis was carried out by Mann Whitney U Test. At baseline, the p value is  $> 0.05$ . Hence it shows the groups are homogenous. The p value comparing at post treatment scores for Group A and B for right side is 0.024 which is suggestive of significant improvement between groups.

**Intra Group Analysis:** The above table shows the intra-group comparison of AKE value for hamstring tightness assessment in Group A and B. The comparison was done through Mann Whitney test. The p value of Group A and B comparing pre and post treatment value is 0.002 and 0.002 resp. The p value is  $< 0.05$  which shows that both groups are significant in improving Immediate Muscle flexibility. So, the null hypothesis  $H_{01}$ ,  $H_{02}$ ,  $H_{03}$  is rejected and alternate hypothesis  $H_{11}$ ,  $H_{12}$ ,  $H_{13}$  is accepted.

**Graph 1:** Comparing Pre-Post Mean Values of Flexibility in MBLR Group.**Graph 2:** Comparing Pre-Post Mean Values of Flexibility in Bowen Technique Group**Graph 3:** Comparisons of Mean Values of Post Flexibility Measure between MBLR & Bowen Technique

## 7. Discussion

This study examined the immediate effectiveness of the Mulligan Bent Leg Raise (MBLR) and Bowen Technique in improving hamstring flexibility among students aged 17–25 years. Both interventions significantly enhanced flexibility without adverse effects. MBLR uses isometric contractions at various knee flexion angles, whereas the Bowen Technique employs gentle myofascial release. Post-intervention, participants showed notable improvements in Active Knee Extension (AKE) scores ( $p < 0.05$ ). However, independent t-tests found no significant difference between methods ( $p > 0.05$ ), indicating both were equally effective (9).

The Bowen Technique stimulates mechanoreceptors, influencing neuromuscular responses, improving joint proprioception, muscle coordination, posture, and mobility without forceful manipulation (13). Studies comparing Bowen Therapy to the muscle energy technique demonstrated superior flexibility improvements using Bowen Therapy (14). AKE testing is highly reliable for measuring hamstring flexibility, with an intraclass correlation coefficient (ICC) of 0.94 (Davis et al.). It is strongly associated with the Straight Leg Raise (SLR) test, widely used in neuromuscular assessments (2008 study). Research on hamstring tightness indicates both proprioceptive neuromuscular facilitation (PNF) and active release techniques (ART) significantly improve flexibility and pain reduction in chronic lower back pain patients, with PNF being more effective (2015 study).



The clinical findings from these trials provide valuable insights into the effectiveness of Bowen Therapy and Mulligan Bent Leg Raise (MBLR) in addressing hamstring tightness across different populations. Both techniques demonstrated significant improvements, though differences exist between studies on asymptomatic individuals and those assessing lumbar spine and hamstring flexibility in students. Previous research evaluated the long-term effects of remote myofascial release and MBLR, while current studies focus on their immediate impacts within a single session on individuals without musculoskeletal conditions. Despite variations in demographics and intervention methods, both studies employed similar assessment frameworks to determine the efficacy of manual therapy approaches.

Earlier studies included lumbar spine flexibility as a key metric, whereas the present research highlights the role of Bowen Therapy and MBLR in reducing hamstring tightness in asymptomatic individuals. These findings reinforce their utility in enhancing flexibility, but further studies are needed to assess their broader implications across diverse populations.

A randomized controlled trial assessed the long-term effects of MBLR vs. myofascial release on hamstring tightness, showing MBLR had greater improvements in flexibility and muscle relaxation over time (15). Another study evaluated the impact of MBLR immediately after a session and found a 7° improvement in flexibility within 24 hours compared to a placebo intervention (2006 RCT).

Future research should explore the long-term efficacy of these techniques, ideally with larger sample sizes across diverse populations. Current results indicate both Bowen Therapy and MBLR effectively enhance hamstring flexibility, making them valuable methods for physiotherapy and rehabilitation.

## 8. Limitation

- 1) Small Sample Size: The study included only 24 participants, which limits the generalizability of the findings to a larger population
- 2) Short study duration
- 3) To find immediate effect: The study evaluated the immediate effects of the techniques, without assessing long-term outcomes.
- 4) No Blinding: Participants and therapists were aware of the treatment being administered, which could introduce bias in the result.

## 9. Suggestion & Recommendation

- 1) Increase Sample Size
- 2) To find long term duration effect
- 3) Double-blind procedures to reduce potential biases.
- 4) Include participants with varying levels of hamstring tightness and physical activity levels for broader applicability.
- 5) Conduct additional studies comparing these techniques with other physiotherapy approaches
- 6) Educate sports and physiotherapy practitioners about the immediate benefits of these techniques to promote their use.

- 7) Publish the findings in relevant journals to contribute to the body of knowledge in physiotherapy and sports science

## 10. Conclusion

The study concludes that both Mulligan Bent Leg Raise (MBLR) and Bowen Technique are effective in improving hamstring muscle flexibility in college students aged 17-25 years. However, the Bowen Technique was found to be more effective than the Mulligan Bent Leg Raise, as it significantly increased Active Knee Extension (AKE) scores without causing adverse effects. These findings suggest that the Bowen Technique can be a preferred option for enhancing hamstring flexibility, offering valuable options for physiotherapists and healthcare professionals working with young adults experiencing hamstring tightness.

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