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## IMMEDIATE EFFECT OF MULLIGAN BENT LEG RAISE TECHNIQUE VERSUS SELF MYOFASCIAL RELEASE ON HAMSTRING TIGHTNESS IN YOUNG ADULTS-A RANDOMIZED CONTROL TRIAL

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### ABSTRACT

**Background:** 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. The objective of our study was to find out the effect of mulligan BLR on hamstring tightness, to find out the effect of self MFR on hamstring tightness & Comparison of Mulligan BLR & self MFR on hamstring. **Procedure:** 40 normal healthy subjects (20 in each group) fitting in inclusion criteria. They were divided in 2 groups by simple randomization method. Group A received single session of mulligan BLR Technique and Group B received single session of self MFR technique for hamstring tightness. Sit and reach flexibility tests were measured pre intervention and post intervention. Data was analyzed using paired and unpaired t-test. **Result:** Shows that hamstring flexibility in mulligan BLR (17.2850) and self MFR (11.0492) increased immediately post-intervention y within the group but there was no significant (0.5877) difference on comparison between two groups. **Conclusion:** The single intervention of Mulligan BLR and self MFR technique is equally effective in improving flexibility of hamstring.

**KEYWORDS:** Hamstring tightness; Mulligan Bent Leg Raise; Self Myofascial release

### 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<sup>1</sup>. 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<sup>2</sup>.

Decreased hamstring flexibility is suggested to be one of the predisposing factors for hamstring strains. Hamstring stretches are routinely used as part of a pre-exercise routine, usually after an aerobic warm-up<sup>3</sup>. 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. For maintaining normal muscle length requires regular stretching to prevent muscle stiffness, decreases risk of musculoskeletal injuries and enhance physical performance. The flexibility of hamstring muscle is important for general and athletic population and of almost importance for health care professionals, to achieve this goal one needs to know the most effective and efficient technique to gain hamstring flexibility<sup>1</sup>.

There are various treatment for the hamstring stretching like active release technique<sup>1</sup>, passive stretching, static stretching<sup>4</sup>, PNF Stretching Techniques<sup>5,6</sup>, eccentric stretching exercises<sup>7</sup> for improving hamstring flexibility.

The Mulligan concept is now an integral component of many manual physiotherapists' clinical practice<sup>8</sup>. Brian Mulligan pioneered the techniques of this concept in New Zealand in the 1970s. The concept has its foundation built on Kaltenborn's (1989) principles of restoring the accessory component of physiological joint movement. Mulligan proposed that injuries or sprains might result in a minor positional fault to a joint thus causing restrictions in physiological movement<sup>9</sup>.

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<sup>10</sup>.

Myofascial release is a collection of techniques used for the purpose of relieving soft tissue from an abnormal hold of a tight fascia<sup>11</sup>. The physiology behind this technique involves the golgi tendon organ<sup>12</sup>. The pressure associated with myofascial release causes the Golgi tendon organ to sense a change of tension in the muscle and responds to this high or prolonged tension by inducing relaxation of the muscle spindles<sup>12</sup>. The source of the pressure when using foam rollers is the individual's body weight<sup>12</sup>.

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Self myofascial release is a type of self-massage in which the practitioner utilizes their body weight and implements such as foam rollers to apply pressure and stretch to problematic areas of the body in an attempt to improve tissue quality. The theory behind this practice centers on the fascia, which is a normally gelatinous tissue that envelopes the musculature in the human body. When exposed to injury, inflammation, inactivity, or other forms of trauma, the fascia achieves a more solid state and forms adhesions with the underlying musculature<sup>13,14</sup>. These adhesions create tension and pain that resonates throughout the body thereby limiting range of motion (ROM) and facilitating dysfunctional movement patterns. It is proposed that the proper application of pressure and stretch can release these adhesions, eliminate pain, and restore a healthy ROM<sup>13,14</sup>.

Hence this study was undertaken to compare the immediate effect of mulligan Bent Leg Raise technique versus self Myofascial Release technique on hamstring tightness.

## MATERIAL AND METHOD

**Ethics Approval:** The Ethical clearance was obtained for the study from Institutional Ethical Committee of PDVVPF, COPT, Ahmednagar. Written informed consent was obtained from all the subject fitting in inclusion criteria i.e. both genders with age 18- 24 and willing to participate in the study.

In this randomized control trial, 40 subjects were divided in two groups i.e. Experimental Group n=20 (mulligan BLR) and Control Group n=20 (Self MFR) using lottery method of allocation.

Initially the demographic data that is Name, Age, Gender, Height, Weight & BMI was assessed. Then the variable of the study that is back saver sit and reach test was assessed before and immediately after the intervention for each subject & score was noted down.

### BACK SAVER SIT TO REACH TEST

The back-saver sit and reach is very similar to the traditional sit and reach except that the measurement is performed on one side at a time. By testing one leg at a time a determination can be made of any asymmetry in hamstring flexibility, and hyperextension of both knees is avoided. The sit and reach measures predominantly the flexibility of the hamstring muscles. Normal hamstring flexibility allows rotation of the pelvis in forward bending movements and posterior tilting of the pelvis for proper sitting. The back-saver sit and reach has been shown to provide extremely consistent scores when administered under standardized

conditions. The back-saver sit and reach has also been shown to be a reasonably accurate measure of hamstring flexibility. This test involved sitting on the floor without shoes with legs stretched out straight ahead. The soles of the feet were placed flat against a custom made sit and reach box. Both knees were locked and pressed flat to the floor. With the palms facing downwards, and the hands on top of each other, the participant reached forward along the measuring line as far as possible ensuring that the hands remain at the same level, not one reaching further forward than the other. The participant reached out and held that position for one-two seconds while the distance was recorded. It was instructed and made sure that there are no jerky movements. The score was recorded to the nearest centimeter as the distance reached by the hand.



FIGURE 1: BACK SAVER SIT TO REACH TEST

### BENT LEG RAISE (BLR) TECHNIQUE

BLR technique consist of gentle isometrics stretching of hamstring in specific directions in progressively greater positions of hip flexion, the expecting results are increased flexibility of hamstring muscle with increased ROM of active knee extension. The procedure for performing BLR was as follows: Participant was in supine lying on a high couch with the investigator in walk stand position lateral to the leg, which was being stretched. Hip and Knee of the side to be stretched was bent at 90- 90°. Investigator placed participant's flexed knee over his shoulder, the popliteal fossa of the knee resting on his shoulder. A distraction (longitudinal traction force along the long axis of femur) was applied at the lower end of femur and the participant was asked to push the investigator's shoulder with his or her leg followed by voluntary relaxation. At this point of relaxation, the investigator pushed the bent knee up as far as possible in the direction of the shoulder on the same side in a pain free range. This stretch was sustained for 5-10 seconds and then relaxed. If the pain or restriction eased, the hip was taken further in to flexion. It was ensured that there was no pain during the procedure, if it was painful the direction of the leg raise was altered medially or laterally. The process was repeated till the knee of the participant was beyond the shoulder of

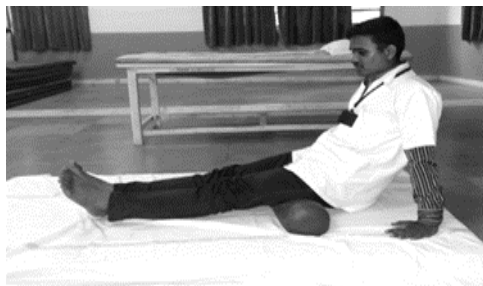
therapist. The contra lateral leg was kept relaxed and allowed to move as it goes. At the end of the range, the position was held for 10 seconds and limb brought back to the neutral position. The traction was maintained throughout the technique.



**FIGURE 2: MULLIGAN BENT LEG RAISE TECHNIQUE**

### SELF MYOFASCIAL RELEASE (MFR)

Myofascial Release Technique involves applying sustained pressure onto myofascial tissue restrictions. The sustained pressure diminishes associated pain, increases circulation and increases motion by rousing the stretch reflex of the muscles and overlying fascia. In Self MFR, subjects were asked to place hamstrings on the roll with hips unsupported. Legs are kept straight on and asked to Roll from knee toward posterior hip while keeping quadriceps tightened. Procedure is repeated for 1-2 min on each side. Subjects were asked to keep the abdominal muscles tight to provide stability.



**FIGURE 3: SELF MYOFASCIAL RELEASE TECHNIQUE**

### RESULT

**TABLE1: COMPARISON OF PRE AND POST SIT TO REACH TEST VALUES IN BLR GROUP**

Group	Mean± SD	T Value	P value
Pre Intervention	20.12 ±3.67	17.2850	<0.0001
Post Intervention	22.5±3.500		

Table no 1 shows that on Comparison of Pre and Post Sit to reach test values in BLR group using paired t test t value is 17.2850 and p value <0.0001 it indicated statistically significant.

**TABLE NO 2: COMPARISON OF PRE AND POST SIT TO REACH TEST VALUES IN SELF MFR GROUP**

Group	Mean ±SD	t value	P value
Pre Intervention	20.575±3.764	11.0492	< 0.0001 Extremely statistically significant.
Post Intervention	21.842±3.815		

Table no 2 shows that on Comparison of Pre and Post Sit to reach test values in self MFR group using paired t test t value is 11.0492 and p value <0.0001 it indicated statistically significant

**TABLE NO 3: COMPARISON OF POST VALUE OF SIT AND REACH TEST AFTER THE MULLIGAN BLR AND SELF MFR**

Group	Mean ±SD	t value	p value
Post intervention (mulligan BLR)	22.475 ±3.408	0.5469	0.5877 Statistically not significant
Post intervention (self MFR)	21.842 ±3.815		

Table no 3 shows that on comparison of post value of sit and reach test after the mulligan BLR and self MFR using unpaired t test t value is 0.5469 and p value is 0.5877 it indicated not statistically significant.

### DISCUSSION

The result of the present study demonstrated that mulligan BLR and self MFR increases immediate post-intervention hamstring flexibility within the group but there was no significant difference on comparison between two groups.

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

The present study compared the effectiveness of mulligan BLR & self MFR on hamstring tightness, Even though BLR produced a change of 2 to 3 centimeters difference in pre and posttest measures when observed within groups, a comparison between groups failed to produce significant differences which shows that BLR does not have any clinical advantage than self MFR in improving hamstring flexibility. Result of our study are supported by Oves Patni et al which concluded that the BLR produced a change of 3.7 and 4 centimeters difference in pre and posttest measures when observed within groups, a comparison between groups failed to produce significant differences which shows that BLR does not have any clinical advantage than

passive stretching in improving hamstring flexibility<sup>15</sup>.

Toby Hall et al concluded that after a single intervention of Mulligan's BLR technique, immediate improvement were not observed but the technique was effective in improving the range of SLR after 24 hours. They also added that BLR technique was no better than placebo<sup>10</sup>.

Improvement of SLR range, by the BLR technique, might be due to mobilization of the painful, sensitized, nerve tissues, similar to the "slider" effects<sup>16,17</sup>. However, it is unlikely that this is the main treatment benefit; in a comparable LBP sample with SLR limitation, only one third of the subjects had signs of sensitized neural tissue<sup>18</sup>. Another beneficial effect of the BLR technique might be a change in stretch tolerance of the hamstrings. Goeken and Hof 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<sup>19</sup>. Since studies on BLR are scarce and highly variable, the results of our study can be of significance in setting a baseline for further future studies.

From our study we conclude that the self MFR produced a change of 1 and 1.5 centimeters difference in pre and post sit and reach test measures when observed within groups, a comparison between groups failed to produce significant differences which shows that self MFR does not have any clinical advantage than BLR in improving hamstring flexibility. Previous studies by Graham MacDonald et al concluded that there was a significant increase in knee joint ROM at 2 min post- (12.7%) , Foam rolling for two minutes increased knee joint ROM by approximately 11° and 9° at 2 and 10 minutes, respectively<sup>20</sup>.

One potential theory to explain the increase in ROM following foam rolling is a change in the thixotropic property (fluid like form) of the fascia encasing the muscle<sup>21</sup>. Fascia is made of colloidal substances and when it is disturbed, via heat and/or mechanical stress, it softens and takes on a more gel-like state, but when left undisturbed it thickens and becomes more viscous, taking on a more solid state<sup>22</sup>. Repeated stress placed on the soft-tissue of the body due to overuse or inactivity may cause abnormal cross-links and scar tissue to form in the fascia. Subsequently, these abnormal cross-links and scar tissue may inhibit proper biomechanics and reduce joint ROM. SMR may mechanically shear out these cross-links and breakdown scar tissue, remobilizing the fascia back to its gel-like state<sup>23</sup>. Once the fascia is in a more gel-like state, soft-tissue compliance increases allowing for greater range of motion<sup>24</sup>. The reference literature on MFR, and assert that foam rolling causes

neuro-myofascial inhibition, which decreases the stiffness of the muscle and increases its compliance<sup>25</sup>. That is of concern because multiple advocates suggest foam rolling prior to exercise, which may negatively affect performance by causing latency in neuromuscular responses to exercise or physical activity<sup>26-29</sup>.

## CONCLUSION

We conclude that single intervention of Mulligan BLR and self MFR techniques are equally effective in improving hamstring flexibility.

## CONFLICT OF INTEREST

None

## FUNDING

None

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