

**Research Article****To compare effectiveness of mulligan bent leg raise versus myofacial release in physiotherapy students with hamstring tightness**

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ABSTRACT

Various stretching technique have been used to improve muscle flexibility in rehabilitation and sports. Mechanisms involving the efficacy of a stretching technique were studied and certain conclusions indicate one technique better than the other. The aim of the present study was to measure hamstring flexibility after giving Myofacial Release Technique (MFR) and Mulligan Bent Leg Raise (BLR) and comparing the effects between the two techniques. A study was conducted among 30 asymptomatic physiotherapy students ranging from 18 – 25 year of age with bilateral hamstring tightness and were randomized to one of the two groups- Myofacial Release Technique (n=15) and Bent Leg Raise Technique (n=15). Hamstring Flexibility was measured using Sit And Reach Test before the treatment after a week of treatment and follow up at the end of 2nd week. Analysis revealed that both Myofacial Release Technique and Mulligan Bent Leg Raise Technique has improved hamstring flexibility bilaterally, but Mulligan Bent Leg Raise Technique was more effective than Myofacial Release Technique as there was significant increase in flexibility after giving Mulligan Bent Leg Raise Technique.

Introduction

Flexibility is ability to move a single joint or series of joints through an unrestricted painful range of motion (ROM). It is dependent upon the extensibility of muscle which allows muscle that cross a joint to relax, lengthen and yield to a stretch force. Often the term flexibility is used to refer more specifically to the ability of musculotendinous unit to elongate as a body segment or when joint moves through ROM. Maintenance of flexibility is an essential component of any conditioning program in developing its mobility, improving athletic performance and preventing injuries. Good flexibility provides relaxation, posture eases muscular pain, helping quick recovery, reducing stress, keeps the body feel loose and agile. As two joint muscles, the ability to produce effective force at the knee is influenced by the relative position of the other joint over which that muscle crosses [1-3]. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person's level of function. 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. Hamstring stretching 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. 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. Myofacial Release and Mulligan Bent Leg Raise Technique releases the scar tissue adhesions to allow full lengthening of muscle and to regain flexibility for functional use [4, 5]. Greater hamstring force is produced with the hip in flexion when the hamstring is lengthening over that joint regardless of the knee position. When the two joint hamstrings are required to contract with hip extended and knee flexed to 90 degree or more, the hamstring must shorten over both the hip and knee. The hamstring will weaken as knee flexion proceed because not only are they approaching maximum shortening capability but also the muscle group must overcome the increasing

tension in rectus femoris muscle that is approaching passive insufficiency. Under ordinary condition two joint muscles are seldom used to move both joints simultaneously and more often the action of two joint muscles is prevented at one joint by resistance from gravity or continuation of other muscle, so a two joint muscle have tendency to shorten quickly. Running long distance causes the muscle that are active to become strong and less flexible whereas opposing muscle which are relatively underused, becomes weaker. Immobilization for prolonged period also cause muscle tightness as the muscle is not used since longer time. Slow muscle fiber maintain posture; they activate more easily and are capable of more sustained contraction and tend to become shortened and tight [6].

According to B.Mulligan, Bent Leg Raise is a painless technique and can be applied on any patient who has limited or painful straight leg raising (SLR). It can be tried with patients who have a gross bilateral limitation of straight leg raise (SLR). BLR technique consists 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 [7].

Myofascial Release (MFR): Fascia is a tough connective tissue which spreads throughout the body in 3 dimensional web from head to toe, the fascia is ubiquitous surrounding every muscle, bone, nerve, blood vessel, organ and all the way down to the cellular level generally the facial system provides support stability and cushioning, it is also a system of locomotion and dynamic flexibility forming muscle.

Tightening of the fascia is a bio mechanic protective mechanism due to the response to trauma; it loses its pliability and becomes restricted. Over time this can lead to poor muscular biomechanics, altered structural alignment and decreased strength, endurance and motor co-ordination. Subsequently the patient is in pain and functional capacity is lost. Myofascial Release is a hands on soft tissue technique that facilitates a stretch into restricted fascia. A sustained pressure is applied into a restricted tissue barrier after 90-120 seconds the tissue will undergo histological length changes allowing the first release to be felt. The therapist follows the release into a new tissue barrier and holds. After a few release the tissue will become softer and more pliable. The restoration of length and health to the Myofascial tissue will take the pressure off the pain sensitive structures such as nerves and blood vessel as well as restoring alignment and mobility of the joints [8].

Materials and methods

The study was done to measure hamstring flexibility after giving Myofascial Release Technique (MFR) and Mulligan Bent Leg Raise (BLR) and comparing the effects between the two techniques. The study was comparative study design in which physiotherapy students were selected from Dr.D.Y Patil College of Physiotherapy Pimpri, Pune.

In this study, 30 subjects were selected of age 18-25 year in the study fulfilling the inclusion criteria. The inclusion criteria

comprised of asymptomatic male and female individuals, age group from 18-25year, students with fair hamstring tightness ranging from -9 cm to -1 cm and subjects willing to participate whereas the exclusion criteria comprised of any musculoskeletal defects, any neurological disorder, low back ache, spinal deformity, lower extremity or spinal fracture up to 1year, any infective and inflammatory disease, knee and hip osteoarthritis. Subjects were selected on the basis of simple random sampling and were divided into two groups, Group 1 in which BLR was given and Group 2 in which MFR was given for 1week and hamstring flexibility was checked using sit and reach test pre treatment, post treatment, and follow up at the end of 2nd week. A written informed consent was filled by the students prior to the treatment. An assessment was taken to record their demographic details and other parameters.

Sit and reach test involves sitting on the floor with legs stretched out straight ahead. Shoes were removed. The soles of the feet were placed flat against the box. Both knees were locked and pressed flat to the floor. With the palm facing downward, and the hands on top of each other, the subject reached forward along the measuring line as far as possible. Ensuring that the hands remained 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 one to two seconds while distance is recorded.

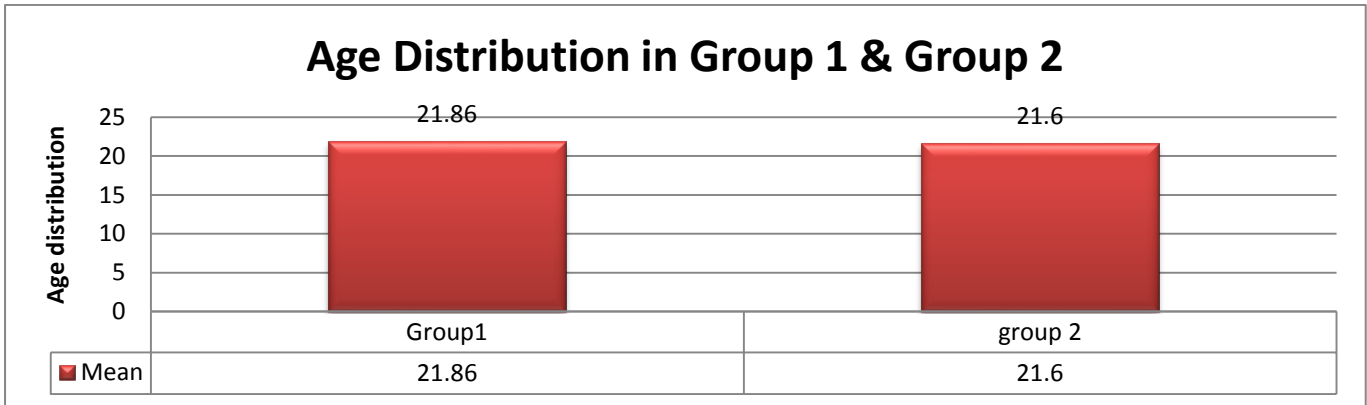
First group of fifteen students was given bilateral BLR. This technique consists of gentle isometric stretching of hamstring in specific directions in progressively greater positions of hip flexions; the expecting results were increased flexibility of hamstring muscle with increased ROM of active knee extension. The procedure for performing BLR was as follows- Patient was in supine lying on a high couch with the investigator in walk stance position lateral to the leg, which was being stretched. Hip and knee of the side to be stretched was bend at 90-90. Investigator placed student's flexed knee over his shoulder, the popliteal fossa of the subject's knee rest on investigator's shoulder. A distraction (longitudinal traction force along the long axis of femur) was applied at the lower end of femur and the subject was asked to push the investigator's shoulder with his/her leg followed by voluntary relaxation. At this point of relaxation, the investigator pushes the bent knee up as far as possible in the direction of shoulder on the same side in a pain free range. This stretch was sustained for 5 to 10 seconds and then relaxed. Each hamstring stretch was repeated 3 times per session, daily one session for 6 days. If the pain or restriction eased, the hip was taken further into 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 subject was beyond the shoulder of the investigator. The contralateral leg was kept relaxed and allowed to move as it went. At the end of the range, the position was held for 10 seconds and limb was brought back to neutral position. The traction was maintained throughout the technique. Another group of 15 students was given bilateral MFR. In this technique subject was in prone lying with hip in

neutral position and knee in 90 degree flexion. Investigator stood besides the subject in walk stance position, and then the investigator placed his palm on patient's lateral thigh i.e. lateral hamstring and other hand holded the foot of the subject. Then the investigator pushed the lateral thigh medially and simultaneously pulled the leg outward, this lead to the twisting movement of the thigh as well as that of the investigator's

body. A similar procedure was performed on the contra lateral side of the same limb i.e. the investigator facing the medial side of the thigh. This technique covered entire thigh of the subject first laterally and then medially; and was performed for 90 to 120 seconds once a day and was given for consecutive 6 days.

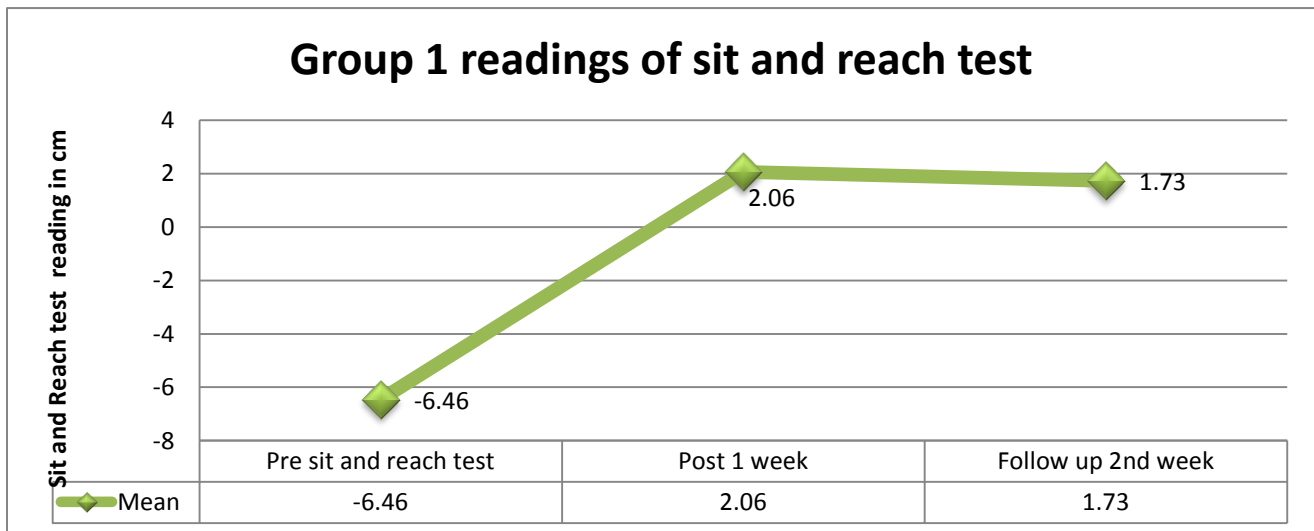
Results

Graph 1: Age distribution of group 1 and group 2



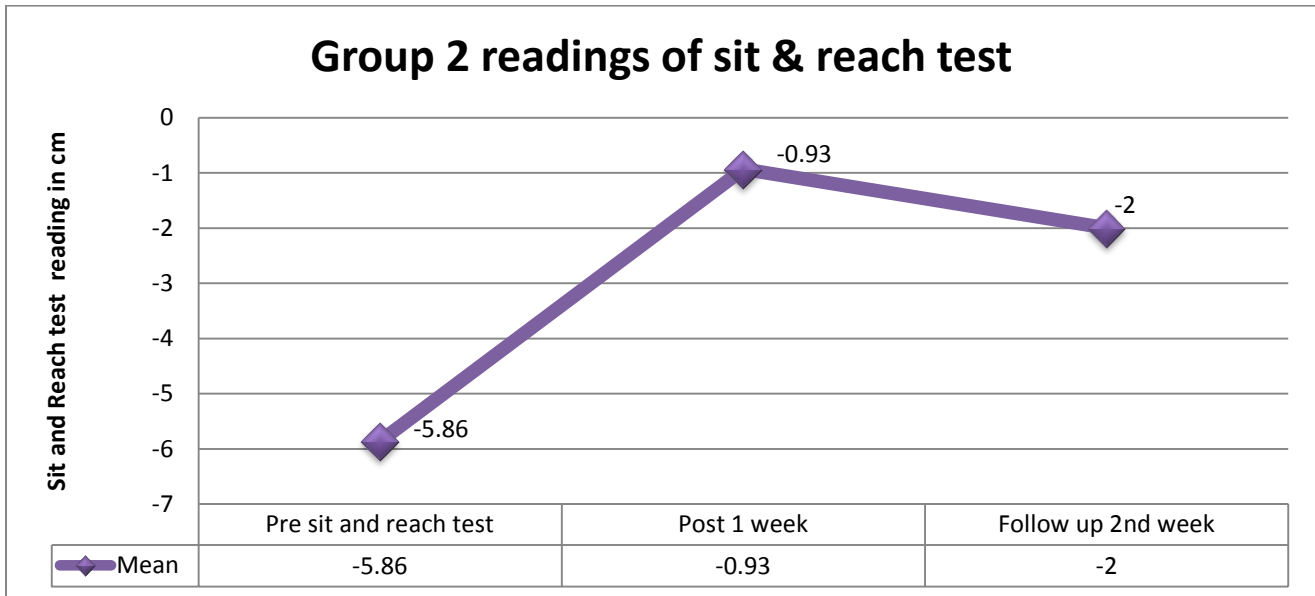
Interpretation: Graph 1 represents that the mean age of the students of group 1 was 21.86 and that of group 2 was 21.6.

Graph 2: Mean of BLR readings of sit and reach test in group 1.



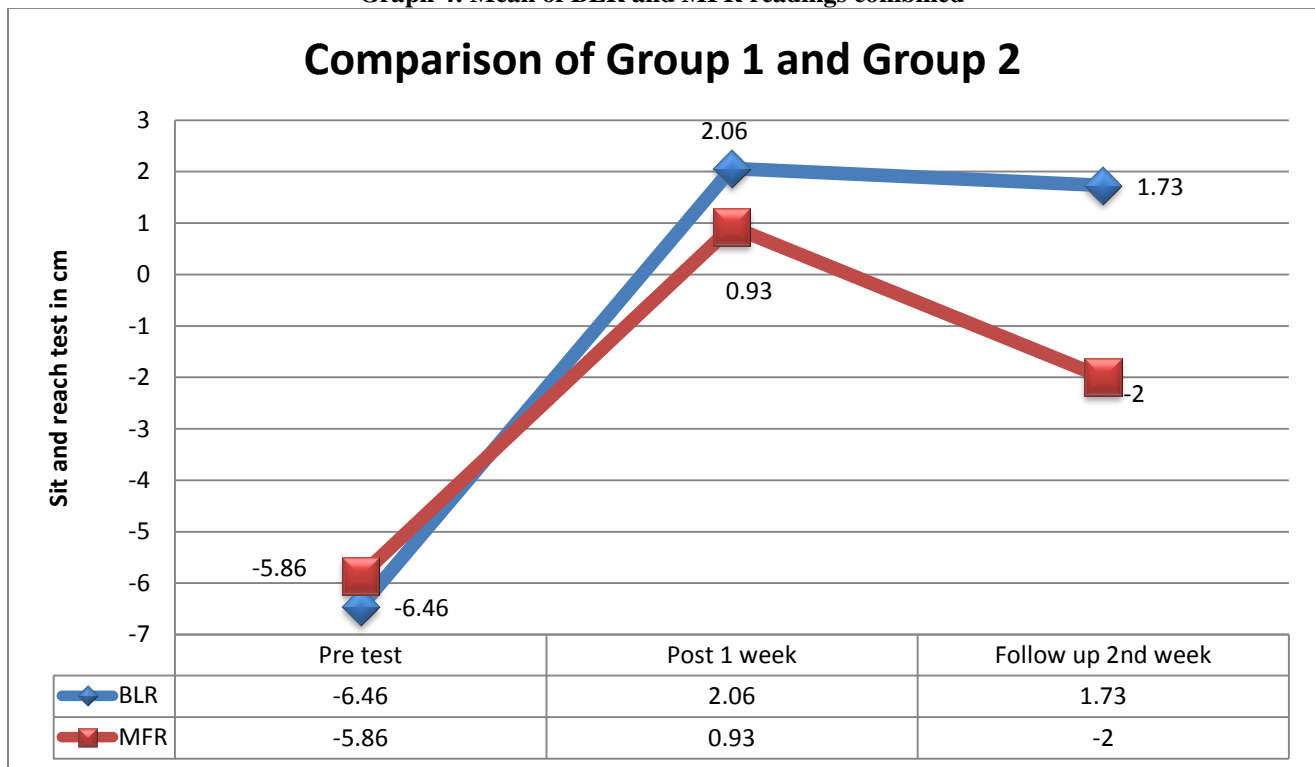
Interpretation: Graph 2 represents that there was increase in hamstring flexibility after treatment of 1 week from -6.46 to 2.06 and then there was decrease in hamstring flexibility after 1 week follow up which was 1.73.

Graph 3: Mean of MFR readings of sit and reach test in Group 2



Interpretation: Graph 3 represents that there was increase in hamstring flexibility after treatment of MFR for 1 week from -5.86 to -0.93 and then there was decrease in hamstring flexibility after 1 week follow up which was -2.

Graph 4: Mean of BLR and MFR readings combined



Interpretation: Graph 4 represents that there was increase in hamstring flexibility after treatment with BLR and MFR after

1 week which was 2.06 and 0.93 respectively. This graph also represents that there was decrease in flexibility after 1 week

follow up of BLR and MFR which was 1.73 and -2 respectively.

Discussion

The primary aim of the study was to compare the effectiveness of Bent Leg Raise (BLR) technique and Myofacial Release (MFR) technique from 18 to 25 years of Physiotherapy students with bilateral hamstring tightness. The flexibility of the subjects was assessed by 'sit and reach test' pre treatment, post treatment after 1 week as well as follow up at the end of 2nd week. The study was conducted among 30 asymptomatic students of Dr. D Y Patil Physiotherapy College. The study population was divided by simple random sampling into 2 groups in which first group of the students were treated with BLR whereas the second group of students was treated with MFR. If the hamstring muscle is not stretched regularly then there is a great chance of the muscle going into tightness. Tightening of the fascia is a biomechanic protective mechanism due to the response to trauma, it loses its pliability and becomes restricted. Over time this can lead to poor muscular biomechanics, altered structural alignment and decreased strength, endurance and motor co-ordination. Subsequently the patient is in pain and functional capacity is lost Mulligan bent leg raise and Myofacial release technique releases the scar tissue adhesions to allow full lengthening of the muscle and to regain flexibility for functional use [9]. Both the groups showed improvement in sit and reach flexibility measurements. There was very few study done which compare the effect of Mulligan bent leg raise and Myofacial Release technique on hamstring tightness in healthy subjects. Result suggested that in Group 1 in which BLR has been given showed significant increase in hamstring flexibility in sit and reach test even after follow up of 1 week. The mean value of sit and reach test for hamstring flexibility has increased from -6.46 to 2.06 after a 1 week protocol. This result is statistically significant ($p < 0.01$). After a one week protocol a follow up was done on 2nd week which suggested that there was maintenance of flexibility with mean value of 1.73. BLR helps in opening of the facet joints and the intervertebral foramen of lumbar spine (as during end range pelvis goes into posterior tilt) this helps in stretching and releasing thoracolumbar fascia thus increasing the hamstring flexibility[10]. The Study done by Vijay Kage and rakhi Ratnam et al in 2014 in which 40 normal healthy subjects were recruited and immediate effect of active release technique versus mulligan bent leg raise in subjects with hamstring tightness was seen stated that Mulligan BLR was effective in improving the sit and reach flexibility measurements[11]. The study was done by Oves Patni, Aliya Shaikh, et.al in the year 2013 in which 78 asymptomatic individuals with bilateral hamstring tightness were randomly taken and effect of single bout of passive stretching and mulligan bent leg raise was seen and it stated that BLR and Passive stretching intervention did significantly improve hamstring flexibility[12]. Result suggested that Group 2 in which MFR was given showed significant increase in hamstring flexibility in sit and reach test even after follow up of 1 week. The mean value of sit and reach test for hamstring

flexibility had increased from -5.86 to -0.93 after 1 week protocol. This result is statistically significant ($p < 0.05$). After 1 week protocol a follow up was done on 2nd week which suggested that there was maintenance of hamstring flexibility with mean value of -2. Myofacial release is a hands on soft tissue technique that facilitates a stretch into restricted fascia. After a few release the tissue becomes softer and more pliable. The restoration of length and health to the Myofacial tissue will take the pressure off the pain sensitive structures such as nerves and blood vessel as well as restoring alignment and mobility to the joints [8]. The study done by MacDonald, Graham Z, Penny in the year 2013 on an acute bout of self-Myofacial release increases range of motion without a subsequent decrease in muscle activation or force which stated that there was an increase in range of motion i.e. improves in flexibility after Myofacial release technique[13]. Hence, in this study after comparing the effectiveness of Group 1 Bent leg raise (BLR) technique and Group 2 Myofacial release (MFR) technique we found that BLR was more effective than MFR. MYOFACIAL RELEASE TECHNIQUE decreases the muscular tightness at the fascia level whereas BENT LEG RAISE technique releases the adhesion between gluteus maximus and adductor Magnus at hip level. Also there occurs stretching of Gluteus maximus and adductor Magnus which breaks adhesions between these muscles and sciatic nerve. Hence mobilization of sciatic nerve occurs in relation with these muscles without nerve getting stretched. BLR technique also helps in opening of facet joints and the intervertebral foramen of lumbar spine[10].

Conclusion

This study concludes that Group 1 in which BENT LEG RAISE technique was given showed more improvement in hamstring flexibility than Group 2 in which MYOFACIAL RELEASE technique was given.

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Abbreviations, units, Etc:

BLR: Bent Leg Raise

MFR: Myofascial Release

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