



IMMEDIATE EFFECT OF SUBOCCIPITAL MUSCLE INHIBITION TECHNIQUE VERSUS MULLIGAN BENT LEG RAISE TECHNIQUE ON HAMSTRING TIGHTNESS IN YOUNGER INDIVIDUALS: A COMPARATIVE STUDY

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ABSTRACT

Aim : To compare the immediate effect of suboccipital muscle inhibition technique and mulligan bent leg raise technique on hamstring tightness in younger individuals.

Background : Hamstring tightness is one of the common faced problem among college students due to their sedentary life style. This influences lumbopelvic rhythm and increases compressive loads on lumbar spine. It also affects sacroiliac joint indirectly . Recently, it has been reported that there is effect using intervention targeting suboccipital muscles and mulligan BLR technique.

Procedure : This comparative study was conducted on 48 younger individuals of age group 17-25 fitting in inclusion criteria. They were divided into two group by simple random sampling using lottery method of allocation. Group A received single session of suboccipital muscle inhibition technique for 5 mins. And group B received single session of mulligan BLR technique. Popliteal angle measurement was taken pre intervention and post intervention. Data was analysed using paired t test and unpaired t test using instat software.

Results : The result showed that hamstring flexibility in mulligan BLR and suboccipital muscle inhibition increased immediately post intervention within the group and there was a significant difference on comparison between both the groups.

Conclusion The single intervention of Mulligan BLR was more effective oversuboccipital muscle inhibition technique.

Keywords : Hamstring tightness, Mulligan BLR technique, suboccipital muscle inhibition technique

INTRODUCTION

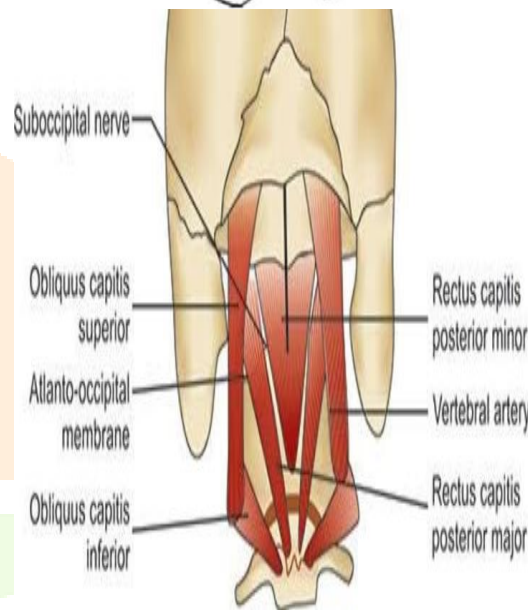
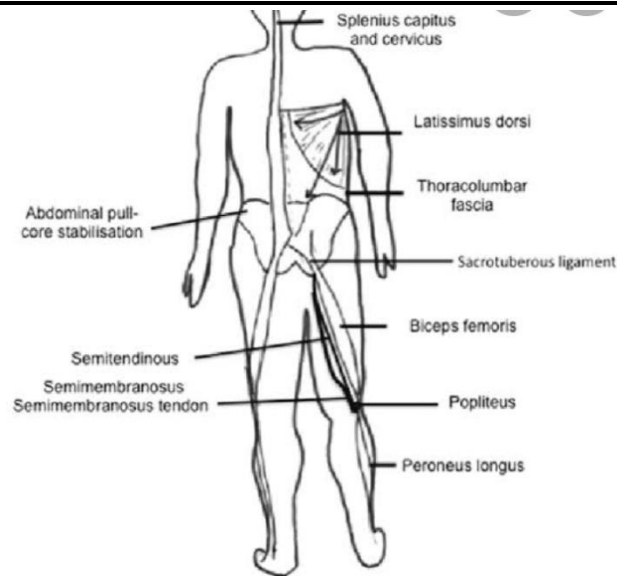
The ability of an individual to move smoothly depends on his flexibility which is the ability of a joint or series of joint to move smoothly or easily through an unrestricted pain free range of motion^(1,2). Flexibility dysfunction is a widespread problem faced by common as well as sportsperson, especially in hamstring group of muscles^(2,3). Hamstring tightness is not only a causative factor for reduced range of motion but it can also lead to various musculoskeletal problems.⁽⁴⁾



Tightness is the adaptive shortening of the contractile and non contractile elements of the muscle which usually occurs in muscle groups in set pattern, with the biarticular muscle showing greater tendency to shorten.⁽⁵⁾ Hamstring tightness influences the lumbopelvic rhythm⁽⁶⁾. It also limits anterior tilt of pelvis in spinal flexion resulting in aggravated muscle and ligamentous tension in the lumbar region which leads to significantly higher compressive loads on the lumbar spine⁷. It also influences the stability of sacroiliac joint in an indirect way⁽⁸⁾.

There are many reasons for tightness such as genetic predisposition, injury to muscle, and shortening due to chronic condition.⁽⁹⁾ Modern sedentary style of living is one of the main reason in this modern society. The prolonged sitting hours required in most of the jobs, and educational setups for attending long sedentary hours of teaching can affect flexibility of soft tissues, especially two joint muscles⁽¹⁰⁾. According to studies, prevalence of hamstring tightness is very high in younger individuals of age group 18-25.⁽¹¹⁾ It was also found that right side is more affected than left side⁽¹²⁾.

Recently, it has been reported that there is an improvement in hamstring tightness as a result of an intervention targeting the suboccipital muscle. Suboccipital muscle inhibition (SMI) technique is a method of relaxing the tension in four muscles (rectus capitis posterior major, rectus capitis posterior minor, obliquus capitis inferior and obliquus capitis superior) that are located between the occiput and the axis. There is a myofascial bridge between the suboccipital muscles, especially the rectus capitis posterior minor muscle and the dura and also between the ligamentum nuchae and the dura. In addition there is attachment between the dura and the posterior aspect of bodies of lumbar, thoracic vertebrae and the posterior longitudinal ligaments



Mulligan concept is also now being an integral component of many manual physiotherapist. Mulligan bent leg raise (BLR) technique increases the flexibility of hamstring muscles. It consist of gentle isometric stretching of hamstring in specific direction and progressively greater position of hip flexion⁽¹⁴⁾

A study was conducted on the title of evaluation of intra subject difference in hamstring flexibility in patients with low back pain by Radwan Ahmed et al. in January 2015. Participants included in this study with mechanical low back pain were 72 and it was concluded that hamstring tightness and mechanical low back pain have a possible relationship among them . severity of low back pain was more evident among participants with hamstring tightness . unilateral non dominant lower extremity hamstring tightness was more observed in patients with mechanical low back pain .⁽¹⁵⁾

A study was done by David O Draper et al. on the title of shortwave diathermy and prolonged stretching alone. 30 college students with hamstring tightness were recruited in the study. It was observed that hamstring flexibility was increased more with the use of shortwave diathermy in conjunction with prolonged hamstring stretching.⁽¹⁶⁾

MATERIALS:

- Pen
- Paper
- Goniometer
- Informed consent form

METHODOLOGY

Type of study: comparative study

Study setup: Dr. Ulhas patil college of physiotherapy, Jalgaon

Sample size: sample size is 48 subjects, i.e.,24 in each group.

Study sampling: simple random sampling Using lottery method.

Selection criteria

Inclusion criteria:

1. Age between 17-25 yrs.
2. Presence of hamstring tightness with popliteal angle more than 30 degree
3. Subjects having negative RTPCR reports.
4. Subjects who are willing to participate.
5. Subjects able to comprehend commands.

Exclusion criteria

1. Tumor
2. Infection
3. Fractures in cervical and lumbar spine.
4. Patients with previous lumbar ,hip and knee surgery
5. Patients with hamstring injury in past 2 years
6. Patients with lumbar and lower limb unstable neurological conditions
7. Acute severe low back pain

OUTCOME MEASURE :

popliteal angle measurement

PROCEDURE

To conduct the following study permission was taken from the principal of Dr. Ulhas Patil college of physiotherapy, Jalgaon. Ethical clearance was obtained from institutional ethical committee. Subjects were screened as per the inclusion and exclusion criteria and the procedure was explained. A written consent was obtained from the subjects. Initially the demographic data that is Name, age , gender, height, weight and BMI were assessed. Popliteal angle was measured to check for hamstring flexibility. Popliteal angle was measured for only right leg. Subjects with popliteal angle more than 30 degree were considered. In this study ,48 subjects were divided into two groups, group A(n=24): suboccipital muscle inhibition group and group B (n=24): bent leg raise group by simple randomization method. There were no dropouts from the study. Popliteal angle was measured before and immediately after the intervention for each subject and score was noted.

Popliteal angle measurement (ICC=0.98)

The subject was positioned supine on an examination table. The lower extremity not being tested was placed in hip and knee extension. Examiner positions the hip and knee of side to be tested in 90 degree of flexion, thus making a starting position for the test. Examiner stabilizes the patients distal thigh by one hand and other hand cupping the heel. At this time, angle between thigh and leg was measured by using a goniometer. The axis was positioned at patients lateral epicondyle of femur , fixed arm along the long axis of femur on a straight line between the greater trochanter and lateral femoral condyle and moving arm along the line between fibular head and lateral malleolus. (7)



Suboccipital muscle inhibition technique

With the patient in supine position, the therapist sits near the head of table and places the palm of head under the subject's head. Pads of therapists finger were placed over posterior arch of atlas which was palpated between the external occipital protuberance and the spinous process of axis vertebrae. The therapist located this with middle and ring fingers of both hands in the space between the occipital condyles and the spinal process of second cervical vertebrae. Then, with the metacarpophalangeal joints in 90 degree of flexion, therapist rested the base of skull on hands. Pressure was exerted in upward direction and toward the therapist. The pressure was maintained for 2 minutes until tissue relaxation was achieved. During the SMI technique, the subject was asked to keep his eyes closed to avoid eye movements affecting the suboccipital muscle tone. The technique was applied for 5 minutes



Bent leg raise technique

Participant was in supine lying on a high couch with the investigator in walk stand position lateral to the leg, which is to be stretched. Hip and Knee of the side to be stretched was bent at 90- 90 degree. Investigator places participant's flexed knee over his shoulder such that the popliteal fossa of the knee rest on his shoulder. A distraction (longitudinal traction force along the long axis of femur) was applied at the lower end of femur. Therapist took the hip into flexion(towards same side shoulder) until first resistance was felt. If patient complains of stretch pain or if therapist feels resistance due to muscle tightness, contract relax was applied by asking the patient to push the therapist shoulder gently (hold for 10 sec.) . 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 10 seconds and then relaxed. If there was no pain or restriction, then the hip is further taken into flexion. It was ensured that there is no pain during the procedure, if the patient complains of 'THE' pain during this maneuver, then hip can be moved into abduction or external rotation before further hip flexion is added. The process was repeated till the knee of the participant is beyond the shoulder of therapist. The contra

lateral leg is kept relaxed and allowed to move as it goes. At the end of the range, the position is held for 20 seconds and limb is brought back to the neutral position. The traction was maintained throughout the technique.



DATA ANALYSIS

After data collection, data entry is done in Excel. Data analysis is done using instat software. Following table shows the demographic characteristic of 48 subjects enrolled for the study.

Table 1 :showing the age characteristic of the subjects.

Technique	Age group (yrs.)	Median age(yrs.)
BLR	17-25	22
SMI	17-25	20

Table 2 :showing the gender characteristic of the subjects.

Technique	Total no. of subjects	Male	Female
BLR	24	3 (12.5%)	21(87.5%)
SMI	24	3 (12.5%)	21 (87.5%)

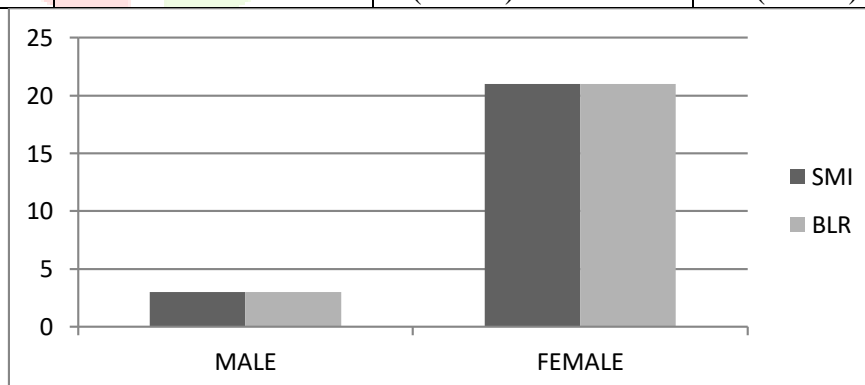
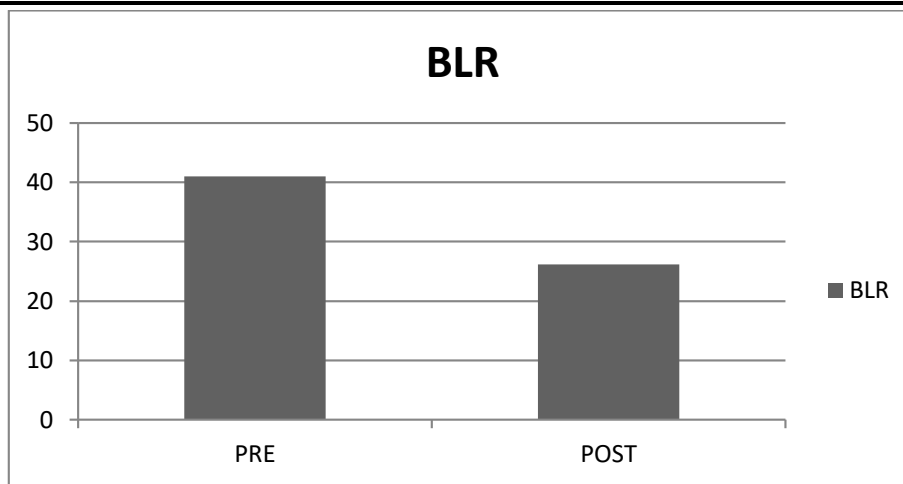


Table 3 : comparison of pre and post popliteal angle values in BLR group.

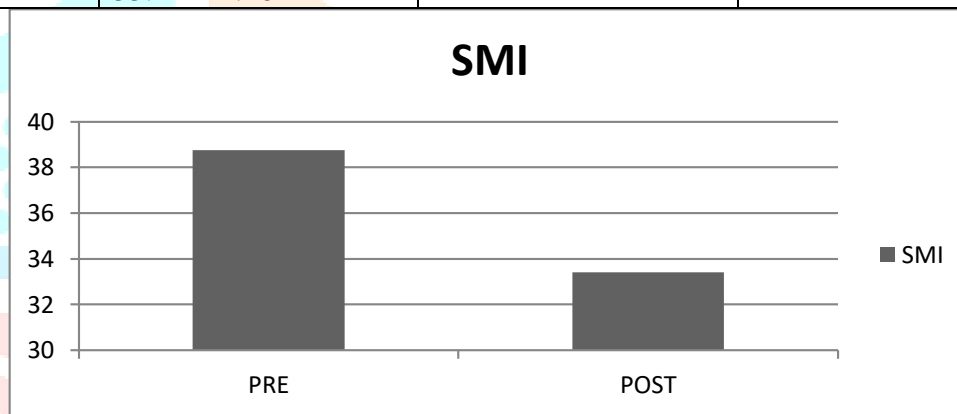
Group	Mean \pm SD	T value	P value
Pre intervention	41 \pm 5.42	2.838	<0.001
Post intervention	26.2 \pm 6,04		



This shows that on comparison of pre and post popliteal angle values in BLR group using paired t test , t value is 2.838 and p value is < 0.001 , it indicates statistically significant.

Table 4 : comparison of pre and post popliteal angle values in SMI group.

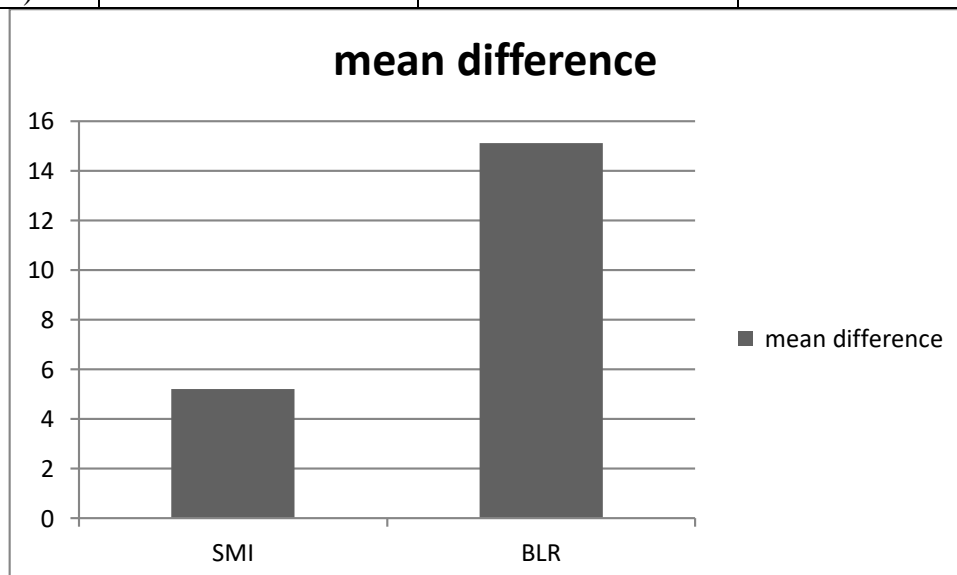
Group	Mean ±SD	T value	P value
Pre intervention	38.75 ± 4.43	9.05	<0.001
Post intervention	33.41 ± 4.46		



This shows that on comparison of pre and post popliteal angle values in SMI group using paired t test, t value is 9.05 and p value is <0.001 , it indicates statistically significant.

Table 5 : comparison of mean difference between pre and post popliteal angle of BLR and SMI technique.

Group	Mean± SD	T value	P value
Difference pre post intervention (BLR)	15.12±4.5	10.414	<0.0001
Difference pre post intervention (SMI)	5.20±1.17		



This shows that on comparison of mean difference between pre and post popliteal angle values of both the groups using unpaired t test, t value is 10.414 and p value is <0.0001, considered extremely significant.

DISSCUSION

Hamstring tightness is a common condition on outpatient physical therapy practice setting, and treatment for this is characterized by large variations in practice patterns. To the best of our knowledge, this is the first study that has compared the effect of suboccipital muscle inhibition technique and mulligan bent leg raise technique on hamstring tightness in younger individuals.

The result of this study showed that in both the groups there was a significant decrease in popliteal angle after treatment in comparison with before treatment. Also there was statistical significant difference between both the groups. There was a clinical difference and high percentage of improvement in group B compared to group A.

Regarding the effect of suboccipital muscle inhibition technique, Aparico et al. found that the suboccipital muscle inhibition technique modified elasticity of hamstring muscles and increased the ROM of straight leg raising in patients with short hamstring syndrome. The participants in their study were young individuals and were nearly of same age as the patients of our study.¹⁷ In addition Basma H Hasaneen found that suboccipital muscle inhibition technique combined with exercises have better clinical effects than exercises alone in patients with chronic mechanical LBP. Improvement in group A may be attributed to many reasons. First, SMI technique induces muscle relaxation through stimulation of autonomic nervous system (parasympathetic system).¹⁸

This may be because during this a soft pressure is applied on the suboccipital area of the patient while he/she is lying comfortably. It is reported that as a result of SMI technique there is decreased tone of knee flexors such as hamstring due to the release of myofascia. This is because the hamstring and suboccipital muscles are connected by one neural system. Meyers call this system as superficial back line.¹⁷

However the result of this study showed that reduction of 10-20 degree in popliteal angle was seen after application of Mulligan BLR, while a decrease of 3-8 degree in popliteal angle after SMI technique was noticed. The reason for this may be that Mulligan BLR technique provided a localized effect on hamstring muscle while the SMI technique did not.

Regarding the effect of Mulligan BLR, Tejashree Bhoir and Deepak B Anap found that single intervention of mulligan BLR and self MFR technique is equally effective in improving hamstring flexibility. During this study 40 normal healthy individuals were taken and divided into two groups. They were given single session of Mulligan BLR and self MFR respectively. Sit and reach flexibility test was measured pre and post intervention and data was analyzed using paired and unpaired t test.

Previously a study was conducted by Aqsa Mobeen and Maham Javed to evaluate the effectiveness of mulligan bent leg raise technique, 2 leg rotation technique and straight leg raise with traction technique in subjects with hamstring tightness. 64 normal healthy subjects were taken and divided into 3 groups. Group a received single session of mulligan BLR, group B received single session of mulligan two leg rotation technique and group c received straight leg raise with traction technique. It was found that all mulligan techniques were effective in improving pain score and straight leg raise ROM but bent leg raise technique was most effective among all.

This is because sciatic nerve passes through gluteus maximus and adductor magnus at hip level and this technique might release the adhesion between them. Stretching of gluteus maximus and adductor magnus (part of hamstring) as knee is kept in flexed position helps in breaking the adhesions between these muscles and sciatic nerve, hence mobilization of sciatic nerve will occur in relation to these muscles without the nerve getting stretched. It also helps in opening of the facet joint and the intervertebral foramen of the lumbar spine as during end range pelvis goes into posterior tilt.

CONCLUSION

On the basis of analysed data, it was concluded that mulligan bent leg raise technique had better immediate effect than suboccipital muscle inhibition technique on hamstring tightness in younger individuals.

LIMITATION

- Only younger individuals were considered.
- Only one outcome measure was taken (PA). Any other like sit to reach test or SLR can be taken.
- Unequal no. of male and female subjects.

FUTURE SCOPE

- Different population can be considered.
- Same techniques can be applied to patients with mechanical low back pain.
- SMI technique can be combined with stretching and strengthening maneuvers and then compared.

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