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Immediate effect of dynamic soft tissue mobilisation versus novel mobilisation technique on hamstring flexibility in college students of age 18-25 years– A comparative study

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Abstract
Topic: Immediate effect of Dynamic soft tissue mobilization verses Novel mobilization technique on hamstring flexibility in college students of age 18 to 25 years- a comparative study.
Background: Hamstring tightness is a common musculoskeletal condition with an incidence of 80% in college students [1]. Poor hamstrings flexibility has been associated with low back pain in cross-sectional studies in both adolescents and adults. Poor hamstring flexibility is also considered a risk factor for the development of patellofemoral pain and hamstring strain injury [3] Without proper hamstring flexibility, individuals will not be able to perform simple daily activities which require extending at the hip or bending at the knee [4]. Novel's Technique includes mulligan traction straight leg raise combined with post-isometric relaxation applied to the hip [6]. Dynamic soft tissue mobilization (DSTM) is a technique that combines with the delivery of manual treatment, such as joint and soft tissue positioning and movements (passive or active) involving concentric or eccentric muscle activity [8].
Objective: To compare the immediate effect of dynamic soft tissue mobilization technique and novel mobilization technique on hamstring flexibility in college students using Sit and Reach test.
Methodology: Ethical clearance was obtained from the institution.
Informed consent was taken from the participants. Participants were screened according to inclusion and exclusion criteria. Purpose of study and procedure was explained to participants.
Participants were divided into two group by odd and even method. Sit and Reach test was taken prior and at the end of intervention.
Group A: Receiving Novel Mobilization Technique.
Group B: Receiving Dynamic soft tissue mobilization
Result: Total 60 students of age group 18-25 years, with Hamstring tightness volunteered to participate in the study and have completed the program. Pre and post analysis was done within group using paired t test which showed significant results and unpaired test was done inter-group which also showed significant results and p value, mean and mean of difference was calculated. Results from the statistical analysis were tabulated and presented in graphical formats for better understanding and easier interpretations.
Conclusion: In this study, pre-treatment assessment and post treatment assessment showed significant results on outcome measures, Sit and Reach Test, while increasing flexibility of the hamstring muscle of students. Both the Novel's and Dynamic Soft Tissue Mobilization ae individually effective in increasing the flexibility, but, a comparison between the groups produced a significant difference of 0.5 which shows that Dynamic Soft Tissue Mobilization has a clinical and statistical advantage than Novel's Mobilization Technique for improving Hamstring flexibility in college students.

Keywords: hamstring flexibility, novel's mobilization technique, dynamic soft tissue mobilization technique

Introduction

Hamstring tightness is a common musculoskeletal condition with an incidence of 80% in college students. [1] Flexibility is an essential component of physical fitness, required for the normal biomechanical functioning of human body and is often evaluated from the joint range of motion (ROM). Also plays an important role in the efficiency and effectiveness of human movement [2]. Poor hamstrings flexibility has been associated with low back pain in cross-sectional studies in both adolescents and adults. Poor hamstring flexibility is also considered a risk factor for the development of patellofemoral pain and hamstring strain injury [3] Without proper hamstring

flexibility, individuals will not be able to perform simple daily activities which require extending at the hip or bending at the knee [4].

Hamstring muscles are important contributors to control human movement and are involved in wide range of activities during standing and sitting and range of postural control actions. Therefore, it is important to reduce hamstring tightness [5].

Novel's Technique includes mulligan traction straight leg raise combined with post-isometric relaxation applied to the hip. [6] The mulligan traction straight leg raise (SLR) technique is used therapeutically to increase range of SLR when it is limited due to hamstring tightness. The post-isometric relaxation technique is targeted at hypertonic muscles, when the muscle is stretched to its increased resistance.

Dynamic soft tissue mobilization (DSTM) is a technique that combines with the delivery of manual treatment, such as joint and soft tissue positioning and movements (passive or active) involving concentric or eccentric muscle activity [8]. Increasing the muscle length is a preliminary aim of DSTM and it includes the techniques of classical massage followed by a dynamic component, where the limb is moved throughout its range [8].

Materials and Methodology

1. **Sample Size:** 60
2. **Study design:** Comparative Study
3. **Sampling Method:** Purposive method
4. **Study Population:** College students with hamstring tightness in and around the city
5. **Study Duration:** 6 months
6. **Study setting:** various college's in and around the city will be visited
7. **Materials used:**

- Consent form
- Floor Mat
- Record Sheet
- Pillow
- Ruler
- Sit and Reach Box
- Pen and paper

Criteria

The students were included in this study on the basis of following criteria

- Students willing to participate in the study
- Subjects having average grade hamstring tightness by sit and reach test
- Age: 18-25 [1]
- Both male and female [9]
- Subjects not undergoing any form of flexibility training or exercises

Students were excluded from the study if

- Hamstring injury within the past year (**strain** or tear to the tendons or large muscles at the back of the thigh)
- Any history of musculoskeletal injuries like soft tissue injuries within past 3 weeks (around the treatment area in lower limb)
- Verbal report of performing regular lower extremity muscle stretching exercises
- Recent history of lower limb fracture or sprain
- Recent surgeries around hip, knee & ankle joints and spine surgeries (open wounds & surgical incisions)
- History of neurological disorders like spasticity, polio etc.
- Limb Length Discrepancy
- Dislocations of lower limb.
- Muscle imbalance of lower limb.
- Pregnant women
- Obese subjects
- Subjects having lower back pain more than 3 weeks [10,11].

Procedure

- Study began with presentation to the ethical committee of PES MODERN COLLEGE OF PT. PUNE -05
- Study was conducted in colleges, in and around the city & the participants were selected according to the inclusion & exclusion criteria.
- Purpose was explained to the participants and written consent was taken from the participants & they were assured that the collected data will not be misused in any form.
- Participants were divided into two group by odd and even method.
- Sit and Reach test was taken prior and at the end of intervention.
- Group A: Receiving Novel Mobilization Technique.
- Group B: Receiving Dynamic soft tissue mobilization

Group A

The subjects undergoing novel mobilization technique procedure

- The student was positioned in supine with a pillow under his/her head.
- The therapist then fixed the ankle in neutral position & flexes the student's hip.
- The student's knee was kept extended throughout the technique.
- The hip was flexed until the therapist felt the first onset of resistance to passive movement of the hip in flexion.
- At this point, traction was applied to the entire limb by applying a longitudinal force down the long axis of the limb using a grip of the ankle.
- Once the traction was applied, the student was instructed to "gently push the limb back down towards the plinth".
- This position was maintained for 10 secs and then the student was told to relax.
- This procedure was repeated 9 times, each time moving into further limb flexion & stopped every time at a new point of tension that was felt by the therapist [12].

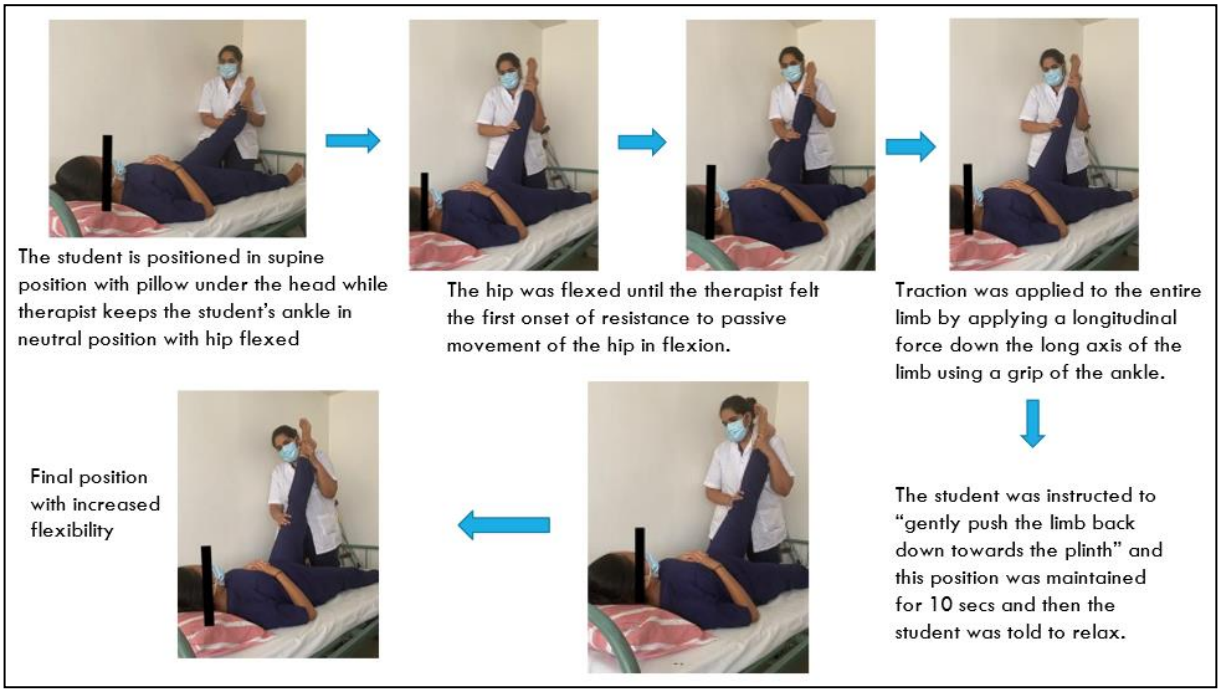


Fig 1: Novel's Mobilization Technique

Group B

The subjects undergoing dynamic soft tissue mobilization procedure

- The subject was positioned in prone and deep longitudinal strokes were applied to the entire hamstring muscle group to locate the specific area of hamstring muscle tightness.
- Once the specific area of was located, the remaining treatment was limited to this target area.
- After that the student was positioned supine with the hip and knee flexed to 90 degrees.
- Deep longitudinal strokes were applied in a distal to proximal direction to the area of hamstring tightness when the leg was passively extended.
- Then the next progressive, dynamic technique was applied.
- During this technique, the student was required to actively extend their leg, in order to achieve reciprocal inhibition of the hamstrings.
- In the final procedure, the student was instructed to contract the hamstring muscle group eccentrically against the resistance offered by the therapist's hand as the muscle is elongated up to the end range of motion.
- During this movement, five deep distal to proximal longitudinal strokes over the reduced hamstring area of muscle tightness were performed [11].

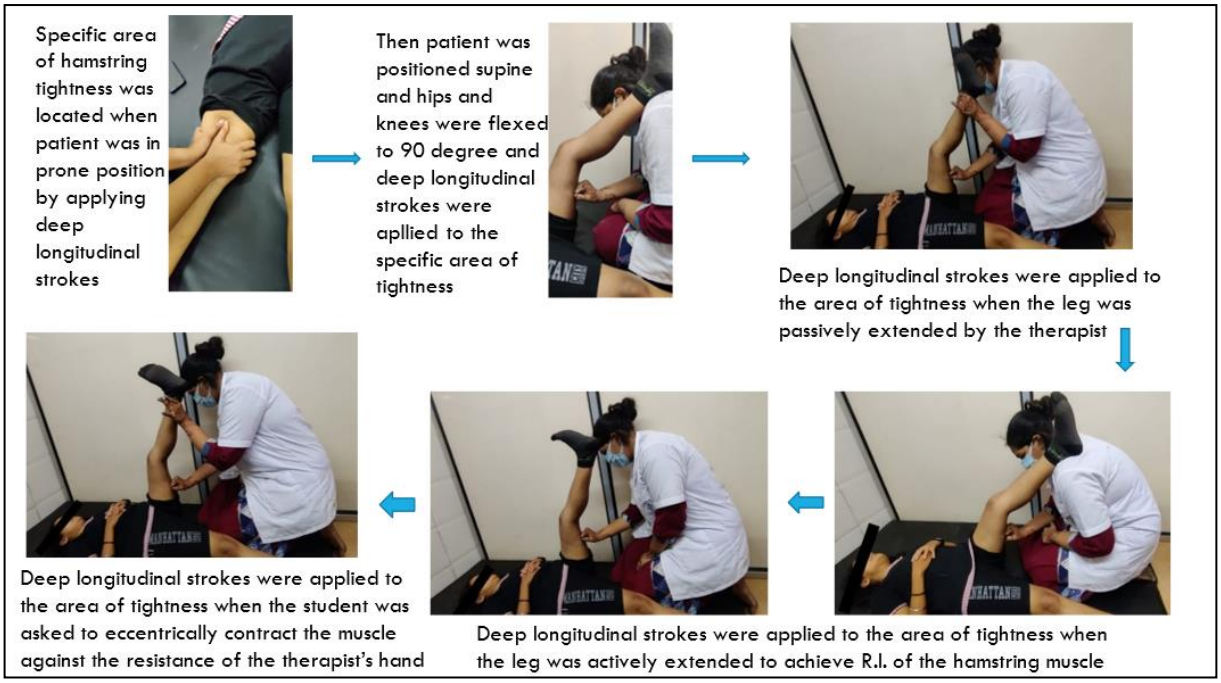


Fig 2: Dynamic Soft Tissue Mobilization Technique

Outcome Measure

Sit and Reach Test: (criterion-related validity, mean correlation coefficient, r= 0.46-0.67)
It is a common measure of flexibility and specifically measures the lower back and hamstring muscles.

Test procedure

- Participant's Position: Long Sitting against a sit and reach box.
- Ruler was kept on the box to measure for the hamstring tightness.
- The student was made to sit with the ruler between the legs, with the legs extended at right angles to the taped line on the floor.
- Student was then instructed to bend forward to his maximum with the extended arms, placing one hand on top of the other facing palms down, as far as possible, and try to reach maximum on the markings.
- The participant keeps the hands parallel and does not lead with one hand. Fingertips can be overlapped and should be in contact with the measuring portion of the sit-and-reach box.
- The student reaches out and holds that position for at one-two seconds while the distance is recorded.
- Then the measurements were taken.

Results and Statistical Analysis

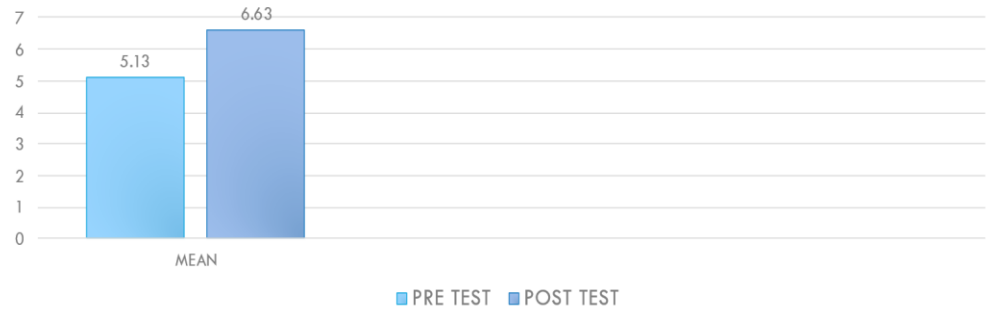
Total 60 students of age group 18250 years, with Hamstring tightness volunteered to participate in the study and have completed the program.
Pre and post analysis was done within group using paired t test which showed significant results and unpaired test was done inter-group which also showed significant results and p value, mean and mean of difference was calculated. Results from the statistical analysis were tabulated and presented in graphical formats for better understanding and easier interpretations.

Intra-group comparisons

Group A: Novels Mobilization Technique
Group B: Dynamic Soft Tissue Mobilization Technique

SIT AND REACH TEST SCORE POST NOVEL MOBILIZATION TECHNIQUE using paired T test:

Graph 1: Comparison of Pre and Post Values of Sit and Reach Test

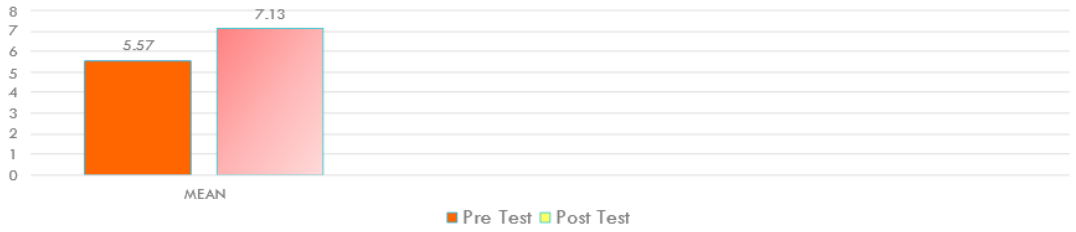


	Pre mean value	Post mean Value	P value	T value	Result	Inference
Hamstring tightness	5.13	6.63	0.0001	10.5763	Extremely significant	Novel Mobilizatior Techqis effective ir increasing hamstring flexibility

Fig 3: Graph and Table of Pre and post values of Sit and Reach Test of Novel's Technique

SIT AND REACH TEST SCORE POST DYNAMIC SOFT TISSUE MOVILIZATION using paired T test:

Graph 2: Comparison of Pre and Post Values of Sit and Reach Test



	Pre mean value	Post mean Value	P value	T value	Result	Inference
Hamstring tightness	5.57	7.13	0.0001	8.8333	Extremely significant	DSTM is effective in increasing hamstring flexibility

Fig 4: Graph and Table of Pre and post values of Sit and Reach Test of Dynamic Soft Tissue Mobilizatio Technique

INTER-GROUP COMPARISON:

Post and Post analysis was done using Unpaired t-test :

Graph 3: Comparison of Post and Post Values of Sit and Reach Test

	Post Novel's	Post DSTM	P value	T value	Result	Inference
Hamstring tightness	6.63	7.13	0.1724	1.3815	Not significant	DSTM is more effective than Novel's in increasing hamstring flexibility

Fig 5: Graph and Table of Post and post values of Sit and Reach Test of both the technique

INTER-GROUP COMPARISON:

Post and Post analysis was done using Unpaired t-test :

Graph 4: Comparison of difference of mean Values of Sit and Reach Test

	Pre mean value of Novel's	Post mean value of Novel's	Difference of mean value of Novel's	Pre mean value of DSTM	Post mean value of DSTM	Difference of mean value of DSTM
Hamstring tightness	5.13	6.63	1.5	5.57	7.13	1.56

Fig 6: Graph and Table of Difference of mean values of both the techniques

Discussion

Muscle tightness is one of the limiting factors for restricted range of motion and reduced flexibility of joint. Hamstring muscles are more prone for tightness causing Musculoskeletal problems. This study focused on checking effects of Novel's technique and Dynamic soft tissue mobilization in increasing ROM and flexibility of subjects with hamstring tightness. [7]

The study aimed to compare the effects of Dynamic Soft Tissue Mobilization Technique and Novel Mobilization Technique on hamstring flexibility in college students. It was a study where 60 samples were chosen according to the inclusion and exclusion criteria. The collected data was analyzed. As there were two groups, within the group paired t test was done and Pre and post values were compared. To compare both groups, unpaired t test was done.

The primary outcome of this study was the significant increase in Sit and reach test ($p<0.001$) with result being statistically and clinically significant.

In the present study the group which received Dynamic Soft Tissue Mobilization (DSTM) showed a significant improvement in hamstring flexibility which is in accordance with the previous articles as Increasing the muscle length is a preliminary aim of DSTM and it includes the techniques of classical massage followed by a dynamic component, where the limb is moved throughout its range.

One study compared subject applied hamstring post-isometric relaxation or muscle energy technique and gluteus maximus strengthening exercises combined with hamstring static stretches, over a 6-week period. The study demonstrated statistically significant improvements in both groups in the straight leg raise. The most significant improvement was seen in the group combining stretching with the muscle strengthening. This supports the idea of manual therapy techniques combined with active exercises for improved results.[7]

Traction straight leg raise (TSLR) described by Mulligan is said to improve straight leg raise (SLR) range effectively & decrease the extent of impairment by improving the muscle performance, flexibility of biceps femoris and pelvic rotation. The factor limiting normal mobility of SLR may elicit the Mechano-sensitive receptors of lumbar neural tissues, that means TSLR may suppress the Mechano receptor activity. [13]

As, Dynamic soft tissue mobilization technique releases the scar tissue adhesions to allow full lengthening of the muscle and to regain flexibility for functional use and also it in-cooperates active contraction into a massage protocol, that increases muscle perfusion and decreases muscle stiffness and provides effective treatment. [14]

Conclusion

In this study, pre-treatment assessment and post treatment assessment showed significant results on outcome measures, Sit and Reach Test, while increasing flexibility of the hamstring muscle of students. Both the Novel's and Dynamic Soft Tissue Mobilization ae individually effective in increasing the flexibility, but, a comparison between the groups produced a significant difference of 0.5 which shows that Dynamic Soft Tissue Mobilization has a clinical and statistical advantage than Novel's Mobilization Technique for improving Hamstring flexibility in college students.

References

1. Prevalence and severity of hamstring tightness among college student: a cross sectional study bhagyashree k. Koli 1, Deepak b. Anap2
2. Zachezewski JE. Improving flexibility. In: Scull? RM, Barnrs MR, eds. Physical Therapy. Philadelphia, Pa: JB Lippincott Co, 1989, 698-699.
3. Witrouw E, Lysens R, Bellemans J, Cambier D, Vanderstraeten G. Intrinsic risk factors for the development of anterior knee pain in an athletic population: a two-year prospective study. American Journal of Sports Medicine, 2000, 28:480-
4. Penny E Bolton Rachel L Pittman-Kremmer, Sarah N Stucky. Effects of Cold Packs on Hamstring Flexibility. Proceedings of the 4th Annual GRASP Symposium, Wichita State University, 2008.
5. Carol A. Oatis. Kinesiology, The Mechanics and Pathomechanics of Human Movement.
6. Hall T, Cacho A, McNee C, Riches J, Walsh J. Effects of the Mulligan traction straight leg raise technique on range of movement. Journal of Manual & Manipulative Therapy.,2001:9(3):128-33.
7. Woolley S. The efficacy of a 'novel mobilisation technique'on thoracic, lumbar, hip and knee range of motion (Master's thesis).
8. Hopper D, Deacon S, Das S, Jain A, Riddell D, Hall T, *et al*. Dynamic soft tissue mobilization increases hamstring flexibility in healthy male subjects. British Journal of Sports Medicine.,2005:39:594-98.
9. The Influence of Gender and Age on Hamstring Muscle Length in Healthy Adults James W. Youdas, PT, MS 1 David A. Krause, PT, MBA, OCS 1 John H. Hollman, PT, PhD1 William S. Harmsen, MS 2 Edward Laskowski, MD3
10. Predisposing Factors for Hamstring Tightness among University Students Chellapillai FMD1, Wijayalath WPLD1, Dayarathna WMS1, Safinaz ZMFZ1, Ihsan AN1, Neranjan EPL1, Ariyasinghe AS2 and Kariyawasam AP2
11. Comparative Study Between The Effectiveness Of Bowen Technique And Dynamic Soft Tissue Mobilization In Increasing Hamstring Flexibility" By Saroj Kumar Yadav
12. Hunter G. Specific soft tissue mobilization in the management of soft tissue dysfunction. Man Ther.,1998:3(1):2-11.
13. Sathe DS, Gauri D. e, To Compare The Effectiveness Of Mulligan's Bent Leg Raise And Traction Straight Leg Raise On Hamstring Flexibility In Young Individuals. International Journal Of Yoga, Physiotherapy And Physical Education.,2018:3(3):30.
14. Immediate effect of active release technique (ART) and dynamic soft tissue mobilization (DSTM) on hamstring tightness in young adults. Sachin Maghade, Keerthi Rao Physiotherapy Intern, India, 2018, 3(1).