

A Study to Find Out the Effect of Dynamic Soft Tissue Mobilization (DSTM) with Retro - Walking on Hamstring Flexibility and Dynamic Balance in Young Collegiate Students – An Interventional Study

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Abstract

Background: Prevalence of hamstring muscle tightness among undergraduate students shows 40.17%. Hamstring muscle tightness is “inability to extend the knee completely when the hip is flexed accompanied by discomfort or pain along the posterior thigh and/or knee is usually attributed to. Dynamic soft tissue mobilization developed with the aim of increase muscle length. It utilizes combine technique classic massage followed by dynamic component with the limb is moved through its range. Retro – walking is a dynamic activity which can improve be used to treat the flexibility as well as dynamic balance. **Aim:** To find out the effect of dynamic soft tissue mobilization with retro - walking on hamstring flexibility and dynamic balance in young collegiate students. **Methodology:** 25 subjects were selected Based on the selection criterion, the whole procedure of the study was explained to all the subjects. Prior and after to treatment both the outcome measures, Active Knee Extension Test and Y - Balance Test were measured. Intervention in the form of Dynamic Soft Tissue Mobilization Technique with Retro – walking were given alternate 3 sessions per week for 4 weeks. **Results and Discussion:** The data were analysed by Paired t test. P value for both the outcome measures were <0.05 which shows significant improvement by improving flexibility and dynamic balance. **Conclusion:** Intervention of the study was effective, very simple and easy to apply in Hamstring tightness subjects. So it can be implemented clinically as well.

Key Words: *Dynamic Soft Tissue Mobilization (DSTM), Retro- Walking, Y - Test, Active Knee Extension Test, Manual therapy, Hamstring Flexibility*

Introduction

Prevalence of hamstring muscle tightness among undergraduate students shows 40.17% in which tightness has found more in male than female participants.¹ The hamstring muscles are commonly linked with movement dysfunction at the lower lumbar spine, pelvis and lower limbs, and have been coupled with low back pain and gait abnormality.²

The back of thigh Muscles are called as a hamstring muscle. This includes semitendinosus, semi-membranous, Long head biceps femoris and the ischial head of the adductor magnus.³

The biomechanically hamstring muscle is proved as a knee flexors. However, it is important to recognize that because these muscles attach on both the medial and lateral aspect of knee joint, pure knee flexion requires activity of both the medial and lateral muscle mass. Medial hamstring Contraction produce medial rotation with knee flexion and also lateral hamstring Contraction produce Lateral rotation with knee flexion.⁴

In addition to flexion and rotation of knee, hamstrings reportedly contribute to stability of knee. The hamstring provide resistance to anterior glide on tibia on femur. Thus, they are described as important adjunct to the anterior cruciate ligament and perhaps a

critical substitute in the ACL deficient knee. The most prominent period of activity is at the transition of swing and stance period of gait cycle.⁴

The Weakness of hamstring muscles causes loss of knee flexion. Weakness in knee flexion in the erect posture produces little disability. However, weakness of hamstring muscle also leads to affect functional impairments at hip, where hamstring muscle provides substantial part of extension strength. The flexion moment is resisted by an extension moment generated at least in part by the hamstring muscle. Weakness of hamstring may result in difficulty in lifting and bending.⁴

Hamstring muscle tightness is “inability to extend the knee completely when the hip is flexed accompanied by discomfort or pain along the posterior thigh and/or knee”.¹ Hamstring tightness commonly found in both symptomatic and asymptomatic subjects. The hamstring is a group of muscle that have tendency to shorten. Decrease hamstring flexibility leads to increase chances of hamstring injuries in athletes. Tightness of hamstring muscle result in limitation in knee extension ROM when hip is flexed. Tight hamstring causes increased patello femoral compressive force. This may lead to patello femoral syndrome. And also causes low back pain in young adult.⁴

Flexibility is considered as an essential element for normal biomechanical function. Tightness of hamstring lead to post- exercise soreness and decreases coordination among athletes.⁵ the literature reports few associated benefits of flexibility including improved athletic performance, reduced injury risk, prevention or reduction of post-exercise soreness, and improved coordination. Some studies have shown that decreased hamstring flexibility is a risk factor for the development of patellar tendinopathy and patellofemoral pain, hamstring strain injury and symptoms of muscle damage following eccentric exercise.⁶⁻⁹

Body balance consists of maintaining the centre of gravity within the base of support defined by the feet, and it may be static or dynamic.¹⁰ In static balance, the base of support remains fixed while the centre of gravity moves. In this case, the sense of balance maintains the centre of gravity within the base of support defined by the feet. Whereas, in dynamic balance, both the canter of gravity and the base of support are in constant motion,

and the canter of gravity never aligns itself to the base of support during the stance phase of the movement.¹

DSTM technique is developed with the aim of increase muscle length. It utilizes combine technique classic massage followed by dynamic component. Determine specific area of tightness, where the treatment is concentrated. And Retro – walking is a dynamic activity which can improve be used to treat the flexibility as well as dynamic balance.

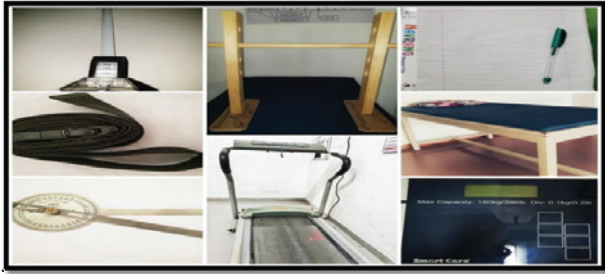
Many literature shows many benefits of hamstring flexibility including reduce injury risk and that’s why improved performance. Various techniques are available for soft tissue mobilization. Among them DSTM is also effectively improving flexibility individually. DSTM combine with Retro – walking may effective in improvement of flexibility and dynamic balance but lack of evidences are available. So, the Hypothesis of the study was that there was significant effect of DSTM with Retro – walking on hamstring flexibility and dynamic balance on young collegiate students.

Method

After approval from Institutional Ethical committee and CTRI registration process 25 subjects were selected Based on the inclusion and exclusion criteria. The whole procedure of the study was explained to all the subjects and written informed consent was taken. Prior and after to treatment both the outcome measures, Active Knee Extension Test and Y - Balance Test were measured. Intervention in the form of Dynamic Soft Tissue Mobilization Technique with Retro – walking were given alternate 3 sessions per week for 4 weeks.

- Consent Form
- Data Collection Form / Assessment Form
- Pen
- Paper
- Goniometer
- Active Knee Extension Frame
- Stabilizer belt
- Couch

- Treadmill
- White tape for Y-TEST
- Measure tap
- Weight machine
- Stadiometer



Materials used in study

Study Design: An Interventional Study.

Study Setting: RK University.

Sampling Technique: Purposive Sampling

Study Population: Young Collegiate Students

Study Sample: 25

Study Duration: 6 Months

Inclusion Criteria:

- Males and females of age between group 17 - 25 years
- Inability to achieve active knee extension above 160 degrees in active knee extension test.²⁴

Exclusion Criteria:

- Hamstring injury at least for the past 1-year.
- Any past traumatic and non-traumatic lower extremities of history
- Individual engaged with Sports activity
- Hyper mobility of the lower extremity joints²⁴

Intervention:

DSTM:

The Subject was positioned in prone and researcher

stand on same side of hamstring tightness and following the steps explained here.

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 subject 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 subject was required to actively extend their leg, to achieve reciprocal inhibition of the hamstrings. In this final procedure, the subject was instructed to contract the hamstring muscle group eccentrically against the resistance offered by the investigator's hand as the muscle is elongated up to the end range of motion.

During this movement, five deeps distal to proximal longitudinal strokes over the reduced hamstring area of muscle tightness are performed.¹²

Retro Walking:

In starting of retro walking on treadmill first subject opportunity to acclimate with backward walking on a treadmill by one supervise 10 min practice section at 0-degree inclination.

During intervention period the treadmill will adjust to produce a speed of 4 km/h and 0-degree inclination for 6-minute period of retro walking 3 times a week.²⁴

Result & Statistics

The present study was carried out to find out the effectiveness of Dynamic Soft Tissue Mobilization with Retro - walking On Hamstring Flexibility and Dynamic Balance in Young Collegiate Students. Data was analysed using SPSS software version 20 and Microsoft Excel 2016. Before applying statistical tests, data was screened for normal distribution. All the outcome measures were analysed before and after intervention.

Table: 1 INTRA GROUP ANALYSES FOR AKE TEST.

	Pre treatment		Post treatment		p value
	Mean	± SD	Mean	± SD	
RIGHT SIDE	113.60	5.50	134.2	6.72	0.000
LEFT SIDE	116.0	6.61	134.2	8.25	0.000

Here the intra group analysis for AKE test was done by using Paired T test. Where the p-value is <0.05. It is statistically significant and it shows improvement in hamstring flexibility after intervention.

Table 2: INTRA GROUP ANALYSES FOR Y TEST

	Pre treatment		Post treatment		p value
	Mean	± SD	Mean	± SD	
RIGHT SIDE	81.106	10.71	90.90	11.71	0.000
LEFT SIDE	80.24	11.43	89.33	11.68	0.000

Here the intra group analysis for Y- test was done by using Paired T test. Where the P- value is <0.05. It is statistically significant and it shows improvement in dynamic balance after intervention.

Discussion

The result of the present study demonstrated that hamstring flexibility and dynamic balance improved after intervention.

Dynamic soft tissue mobilization technique releases the scar tissue adhesions to allow full lengthening of the muscle and to regain flexibility for functional use. In the DSTM component, the hamstring muscle group receives progressive dynamic techniques that work in synchrony as the muscle moves to the end ROM. In last stage of technique the muscle works eccentrically at its functional length and hamstring flexibility is optimised. For DSTM, it is hypothesized that incorporating active contraction into a massage protocol may increase muscle perfusion and decrease muscle stiffness.¹⁵

During Retro - walking, the stance begins with toe contact and ends with heel being lifted off the ground the normal eccentric contractions of the rectus femoris is replaced by propulsive concentric contraction, during the

activity at 0 degrees of inclination the knee was flexed approximately 31 degrees during initial contact. By mid-stance, the knee had extended position of approximately 14 degrees of knee flexion. period, the rectus femoris is also contracting, presumably Concentrically to assist with knee extension during backward walking, at the ankle, backward walking produced greater demands on dorsiflexion range of motion.

Active knee extension test was found as the gold standard test for the measurement of hamstring flexibility with intra-tester reliability (ICC) of 0.94 in a study done by **D. Scott Davis** on concurrent validity of four clinical tests.^{16, 17} The Y Balance Test is a dynamic stability test, it considered efficient and clinically applicable to provide an accurate assessment of the lower limb neuromuscular control.²¹

Sachin maghade et al (2018)¹⁵ compared immediate effect of DSTM and Active release technique on hamstring tightness in young adults. Hamstring tightness was assessed by sit and reach test.

After the treatment session again assessed hamstring flexibility and it shows improvement in flexibility of hamstring muscle. Both the technique shows equal effect on hamstring flexibility. **Suraj bhusal (2013)**¹⁶ when compared the DSTM and Active release technique for hamstring muscle flexibility and measured the Flexibility by AKE test, concluded that DSTM was effective as compared to Active knee release in improving knee extension test. **D Hopper et al (2005)**⁵ conducted study to compare DSTM and Classical massage technique on hamstring muscle flexibility in hockey players. By Passive straight leg raises (PSLR) and Passive knee extension (PKE) were used to measure indirect hamstring length before, following and 24-hour post intervention. It was concluded that both classic massage and DSTM had an immediate, significant effect on hamstring length in competitive female field hockey players. This all literature supports the present study.

Adilah Logde (2018)¹² studied the effect of retro - walking on hamstring flexibility in normal healthy individual. And concluded that Training protocol for 4 weeks, showed significant improvement in the hamstring flexibility. **Sami S. Alabdulwaha et al (2018)**¹⁹ studied an analysis of physical performance between backward and forward walking training in young healthy individuals and it shows the Backward walking training has been proved to be effective in improving the lower limb functional strength, aerobic and anaerobic capacities of the normal healthy individuals.

According to **whitely et.al (2009)**, an increase in length of muscle could be the possible reason for increase in the dynamic balance. As well as **costa 2009** had reported that stretching duration of 15 seconds hold may improve balance performance by decreasing postural instability. Here, intervention was effective in improving the flexibility which is reflected in AKE score and Retro – walking. Hence these shows strong correlation between improvement in flexibility and dynamic balance.

Further Recommendation

- Study can be done in other population
- Study can be done to
- Compare male and female.

Conclusion

The result of the present study showed that subjects were improved after the study intervention by improving flexibility and dynamic balance. Hence, concluded that the DSTM with Retro – walking was very effective, simple and easy to apply in Hamstring tightness subjects. So it can be implemented clinically as well.

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