

Immediate Effect of Active Release Technique versus Foam Rolling on Hamstring Tightness in Computer Workers

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ABSTRACT

Background and need of research: In computer workers due to their prolonged sitting throughout the day can lead to various problems like tightness of muscle, decreased joint range of motion and decreased flexibility. As hamstring is a key component of flexibility in the lower body and it is more prone to get tightened. Due to prolonged sitting in Computer workers, the hamstring muscles are in shortened position (posterior pelvic tilt & knee 90° flexion) which causes the tightness of the hamstring muscles. Therefore, the objective of study is to find out the immediate effect of active release technique versus foam rolling on hamstring tightness in computer workers.

Methods: 32 computer workers with age of 20-35 years, were taken through purposive sampling technique and randomly divided in two equal groups. Group A received Active Release Technique and Group B received foam rolling. Active knee extension test was used to measure Pre and post intervention measurements. Ethical approval has been taken.

Result: For data analysis, SPSS Version 23 software was used. A Paired t-test was used for within-group analysis and showed a significant difference in Active Knee Extension for both groups. The unpaired t-test was used for between-group analysis, and it showed that ART has a superior effect on hamstrings tightness than the Foam Rolling. The significance level was kept at $p < 0.05$.

Conclusion: This study concluded that ART is more effective than Foam Rolling in reducing hamstring tightness in computer workers.

Keywords: Active Release Technique, Foam Rolling, Hamstring Tightness, Computer Workers.

INTRODUCTION

Flexibility of the muscle is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to a variety of musculoskeletal overuse injuries and to have a significant impact on a person's level of function.^[1] Muscular tightness is frequently proposed as an inherent risk factor for muscle injury

development.^[2] These musculoskeletal symptoms will result in a loss of strength, stability, endurance, and other abilities.^[3]

Hamstrings are the muscles of posterior thigh which include semimembranosus, Semitendinosus and the Biceps Femoris. These muscles are extensors of the hip and flexors of the knee and they act opposite to the extensors of the knee.^[4] Hamstrings

arise from the ischial tuberosity and inserts on the tibia and fibula bones on their condyle and heads.^[5] Hamstring tightness occurs due to decreased muscle flexibility and ability to deform which results in reduced range of motion (ROM) around a joint. Inelasticity is a deformation of the muscle fibers that results in a decrease in joint range of motion.^[6] The action of the hamstring muscle is to control the extension at knee and perform the flexion at knee. In the same manner, it performs the extension at hip and it controls the flexion at hip it also induces rotations and tilting of the pelvis anteriorly and the posteriorly.^[7]

A sedentary lifestyle can cause a number of issues, such as muscle tightness, reduced joint range of motion, and decreased flexibility, which can interfere with an individual's daily activities.^[8] People whose job includes prolonged sitting throughout the day like computer professionals or desk workers are more prone to have adaptive changes that can shorten the hip muscles this makes the hamstring muscles tight, produces more discomfort, and impairs their ability to execute to the demands of their jobs.^[8] Prolonged sitting causes alteration in pelvic position (posterior pelvic tilt & knee 90degree flexion) and my lead to shortening of hamstring length. Sitting for an extended period of time drives prolonged load on the muscle and increases the risk of injury.^[9,10]

Hamstring strains are more likely when hamstrings are inflexible, but incorporating hamstring stretches into warm-ups, especially after aerobic activity, can improve flexibility and lower the risk of strains during exercise, providing a straight forward injury prevention measure.^[11]

The Active release technique, was originated by Dr. P. Michael Leahy to work on a variety of muscle, tendon, ligament, fascia and nerve issues. ART treatments involve tension and guided movements. Active release technique therapy for the hamstrings is designed to decrease pain and tightness and help the hamstring to return to its normal condition.^[11]

Foam rollers can be used for self-massage or myofascial release and hence foam rollers improve the muscle flexibility and joint ROM It has a relaxing effect on the fascia and it also relaxes the muscles by releasing the tension.^[12]

Therefore, the objective of study is to find out the immediate effect of active release technique versus foam rolling on hamstring tightness in computer workers.

MATERIALS & METHODS

After obtaining approval from the institutional ethics committee, an experimental study was initiated in which purposive sampling was employed to recruit 32 healthy and normal computer workers, aged 20-35 years, from various IT companies in Ahmedabad, Gujarat, India. Inclusion criteria encompassed individuals with an active knee extension lag exceeding 20°, engaging in 6-8 hours of daily sitting, possessing work experience exceeding 1 year, and working at least 5 days per week. Exclusion criteria comprised a history of lower limb trauma, recent surgeries in the low back and lower limb within the past 6 months, and participation in sports and gym activities. The computer workers were then randomly divided into two groups: Group A received the Active release technique, and Group B underwent Foam rolling, each comprising 16 participants. Hamstring flexibility was assessed using the active knee extension test (AKE test) in both groups before and after the treatment. Informed consent was obtained from each participant after a detailed explanation of the study's purpose, testing procedures, and training program.

Outcome Measure:

▪ **Active Knee Extension Test (AKE)**

Active Knee Extension test: The participant was positioned supine with hip and knee flexed at 90°. Using a universal goniometer, knee range of motion (ROM) or popliteal angle was measured. The fulcrum of the goniometer was centered over the lateral joint line of the knee, with the proximal arm

parallel to the femur and the distal arm parallel to the tibia. The participant was instructed to actively extend the knee until a mild stretch sensation was felt in the hamstrings. Subsequently, a universal goniometer was employed to measure the angle of end-range knee extension.^[11,13,14] The inter-rater reliability intra class correlation coefficients (ICC) were 0.87.^[15]

Intervention:

❖ **Group A:-**

The participant underwent a single session of Active Release Technique (ART) on the dominant side, involving a three-step process.

Step 1: The subject lay supine on the plinth, and gentle tension was applied to the hamstring muscle along its entire length while varying leg positions to optimize muscle engagement.

Step 2: Included the application of gentle tension at both the origin and insertion points of the hamstring muscle.

Step 3: Gentle tension was applied around the adductors and gluteus muscles, considering their connection to the hamstring and their potential contribution to hamstring tightness.

This cycle is repeated for 5 times.

❖ **Group B:-**

The participant underwent a single session of Foam Rolling (FR) on the dominant side.

Involving the application of a foam roller to the hamstring for 30-40 seconds, followed by a 10-second rest, repeated for 5 cycles.

The session began with the participant seated on the foam roller, supporting their body weight with hands on the ground, the dominant leg in contact with the foam roller, and the non-dominant leg in a figure-of-four position on top of the dominant leg.

The rolling motion involved moving back and forth from the knee upwards towards the thigh, reaching the gluteal region, with a focus on tight muscle areas. Additionally, lateral movements were incorporated to cover the entire hamstring muscle.

STATISTICAL ANALYSIS

SPSS Version 23 software was used for data analysis. For normality of data Shapiro-Wilk Test was used. Data was normally distributed. So, Paired t-test was used for within-group analysis and unpaired t-test was used for between-group analysis. The significance level was kept at $p < 0.05$.

RESULT

In this study, 32 participants, divided into two groups of 16, included both males and females aged 20-35 years. Active Knee Extension was evaluated before and after the intervention. Statistical analysis reveals that Active Release Technique is more effective than Foam Rolling.

TABLE 1: SHOWING DISTRIBUTION OF AGE AND GENDER IN GROUP A AND GROUP B.

VARIABLE	GROUP A	GROUP B
MEAN±SD AGE IN EACH GROUPS IN (YEARS)	27.44±3.44	27.63±3.42
GENDER	M=10 F=6	M=10 F=6

WITHIN GROUP ANALYSIS

TABLE 2: MEAN AND STANDARD DEVIATION VALUES OF ACTIVE KNEE EXTENSION TEST IN GROUP A AND GROUP B.

GROUPS	MEAN±SD	p-VALUE
GROUP A	PRE AKE 130.69±9.13	p<0.001
	POST AKE 139.75±8.79	
GROUP B	PRE AKE 128.00±7.61	p<0.001
	POST AKE 133.13±7.85	

Interpretation: There was a significant difference found on comparison of pre mean and post mean values of Active Knee Extension test (AKE) in both group A and group B.

BETWEEN GROUP ANALYSIS

TABLE 3: MEAN DIFFERENCE OF ACTIVE KNEE EXTENSION TEST BETWEEN THE GROUPS.

GROUPS	MEAN±SD		p-VALUE
	GROUP A	9.06±3.09	
AKE	GROUP B	5.13±0.81	p<0.001

Interpretation: There was a significant difference found on comparing the mean difference of active knee extension test between the groups. (group A {ART} illustrate more significant difference in comparison to group B {FR}).

DISCUSSION

This study was conducted to evaluate the immediate effect of active release technique versus foam rolling on hamstring tightness in computer workers.

A study was conducted in multiple IT companies in Ahmedabad, selecting 32 subjects aged between 20-35 years. These participants were divided into two groups based on inclusion and exclusion criteria. Group A underwent (ART), while Group B received (FR) in a single session. Outcome measures were assessed before and after the single session. The findings indicated significant improvement in both groups, with Group A showing a more pronounced enhancement compared to Group B.

The study conducted by Dr. Shrunkhala Kaushik et al. (2022) This study, involving sewing machine operators with prolonged sitting and hamstring tightness, demonstrated that both Active Release Technique (ART) and Muscle Energy Technique (MET) led to a significant reduction in hamstring tightness. However, the greater effectiveness of ART may be attributed to its ability to break cross-fiber adhesions, promoting smooth tissue movement and elongation of muscles. In contrast, MET relies on post-isometric relaxation to lengthen tight hamstrings. The study concludes that ART's approach of addressing adhesions and enabling smoother tissue movement renders it more immediately effective in enhancing hamstring flexibility and range of motion for sewing machine operators.^[16]

In a clinical trial by Vijay Kage et al. in (2014) titled Immediate Effect of Active Release Technique Versus Mulligan Bent Leg Raise in Subjects with Hamstring

Tightness, comparing the effects of Active Release Technique (ART) and Mulligan Bent Leg Raise, a single ART session, following chiropractor Dr. P. Michael Leahy's approach, notably improved popliteal angle and sit-and-reach flexibility tests compared to Mulligan Bent Leg Raise. ART focuses on restoring soft tissue movement, releasing entrapped nerves and vasculature, and optimizing texture, resilience, and function. The study suggests that, based on statistical analysis, ART is more effective than Mulligan Bent Leg Raise in enhancing hamstring flexibility and range of motion in healthy individuals, indicating its potential recommendation for those with hamstring tightness.^[11]

Pratibha Yogeshwar et al. (2021) conducted a study on college students, uncovering that both foam rolling and dynamic stretching significantly enhance hamstring flexibility and vertical jump performance. The study attributes the effectiveness of foam rolling to its self-myofascial release technique, which promotes muscle flexibility and joint range of motion through targeted mechanical pressure, while dynamic stretching improves muscle extensibility. These findings advocate for integrating these interventions into warm-up routines, offering valuable insights for optimizing exercise preparation and performance enhancement.^[17]

Ji-eun Choi et al. (2022) studied the immediate effects of foam rolling (FR) and proprioceptive neuromuscular facilitation (PNF) stretching on hamstring flexibility. Participants, strategically assigned to Control, FR, and PNF groups, experienced notable improvements in range of motion (ROM) within all groups. The study

revealed that both FR and PNF stretching effectively increased hamstring flexibility. Interestingly, FR demonstrated a more comprehensive impact, influencing not only ROM but also the pennation angle (PA), emphasizing its potential for addressing both structural and functional aspects of hamstring flexibility.^[18]

CONCLUSION

This study concludes that both the Active Release Technique and Foam Rolling are effective interventions for reducing hamstring tightness in computer workers. Notably, the research suggests that the Active Release Technique demonstrates superior efficacy compared to Foam Rolling.

Declaration by Authors

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