

Effectiveness of Foam Rolling Versus Static Stretching on Pain, Hip Adduction ROM in ITB Tightness in Athletes

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ABSTRACT

Background: Foam rolling is a relatively new technique in improving ranges and reduction in pain so its effectiveness has to be studied.

Study Design: 1 week interventional comparison study

Objectives: To assess & compare the pre and post interventional results of a 1 week Static Stretching programme in one group versus Foam Rolling programme in other group on ITB tightness in athletes.

Methods: Forty male subjects were enrolled in study out of which forty male subjects (age group 19-25 years) having ITB tightness defined by active hip adduction test, nobles test and Ober's test were included and randomly assigned to foam rolling and static stretching groups (20 each). Active hip adduction, VAS values measurements pre, mid and post-intervention were taken. Foam rolling: Subject did continuous rolling of ITB on the foam roller, from the ischial tuberosity to the lateral knee for 1 minute.

Static stretches: For the static stretch the subjects placed their leg behind normal leg with their knee extended and their ankle neutral in standing posture. Subjects were then instructed to lean sideways from the hip, with their spine in neutral until a stretch was felt in the lateral thigh in ROM which were highly significant on analysis

Results: Unpaired t-test for comparison of one week findings of both static stretching and foam rolling group showed significant changes with $p=0.00$, there is significant variation in mean observed for static stretching and foam rolling

Conclusion: This study revealed that both foam rolling and Static stretching were effective techniques for increasing hip adduction ROM and reducing pain showing improvement but Foam rolling produced more significant results as compared to static stretching group over a week intervention plan

Keywords: Myofascial release; active hip adduction; autogenic inhibition; Foam Rolling; Static Stretching

INTRODUCTION

Iliotibial Band (ITB) is one of the most common overuse muscles among runners. ITB arises from the proximal end from the tendon of tensor fascia lata and gluteus muscle and travels along the lateral side of thigh and crosses the knee joint, inserting on the lateral condyle of tibia. The action of

ITB is to extend, abduct and laterally the hip and stabilize knee while running. ITB tightness does not only involve pain but also reduces performance in many other athletes.

Tightness results in increase in tension from active and passive mechanism. Actively muscle can become shorter due to spasm or any contraction, passively muscle

can become shorter due to postural adaptation¹. Regardless of the cause it limits joint ROM and hamper athlete's performance.

By examining running biomechanics, the main sources of power generation are from: Hip extensors (swing phase and 1st half of stance), Hip flexors (after toe off), Knee extensors, hip abductors (during stance)

Tightness and pain being an important aspect of the sport has yet to be explored as seen Previous studies.

Static stretching is the type of stretching where you take a muscle to its outer range, until you can feel a gentle stretch in the muscle belly, and hold it at that point. Stretching is used to increase the extensibility of soft tissues, thereby improving flexibility of muscles by elongating the structures that have adaptively shortened and have become hypo mobile over a period of time³.

Foam roller technique is self myofascial release technique which is basically to cover larger areas. It helps in breaking the adhesions to maintain the muscle motion and function. Foam rolling is quickly becoming a staple in training programmes worldwide. From elite athletes to weekend warriors, one can walk into many training facilities and see people using a foam roller as part of their exercise regimen. Despite the world wide popularity of this tool there have not been enough studies to endorse the benefits accompanied with its use. Our effort in this study was to explore and get some more objective data on a smaller scale though and to question its effectiveness.²

Aim: To study and compare effectiveness of foam rolling versus static stretching on ITB tightness in athletes.

Objective:

- 1) To study the effect of static stretching on ITB tightness in athletes.
- 2) To study the effect of foam roller on ITB tightness in athletes.
- 3) To compare effectiveness of foam rolling versus static stretching on ITB tightness in athletes.

MATERIALS & METHODS

45 male athletes were randomly enrolled in study by randomized computerized table, out of which 5 were excluded from the study. Forty healthy male athletes within age group of 19-25 years (Age 20.7 years \pm 2.51 SD) having ITB tightness defined by modified Obers test and noble's test participated in this study. Subjects having recent ITB injuries in last 6 months, recent upper limb, Lower limb or spinal musculoskeletal injuries in last 6 months, & any previous experience with foam rolling technique were excluded. An ethical clearance was obtained from institution's ethical committee. All subjects read and signed the informed consent form. Subjects who met the inclusion criteria were randomly assigned to treatment groups. Forty subjects were assigned to the treatment group, out of which twenty were assigned to Foam rolling group and remaining twenty to Static stretching group.

PRE-PARTICIPATION SCREENING

Active Hip adduction Test was done. This procedure was repeated three times and the average was used in the statistical analysis after one week. Active Knee Extension Test Procedure Both the anterior superior iliac spines (ASIS) were marked and a marking was made from ASIS to anterior midline of femur referencing patella midline using a tape measure (cm). The goniometer was placed with fulcrum on the ASIS of involved leg and stationary arm at the imaginary horizontal line extending from one ASIS to other ASIS and the moving to anterior midline of femur referencing patella midline. Active hip adduction (AHA) measurements were taken with the subject starting in supine with the test hip at 0 degrees of flexion, extension and rotation, knee extended were measured by the goniometer. Contralateral hip is abducted to allow full ROM.

MID AND POST TESTING MEASUREMENTS

Midway through the protocol period i.e. at 3rd day experimental measurements of this test were taken using the same procedure performed during the pre-test. Post-test

measurements were taken following the one week using the identical Active Hip adduction testing procedures. As mentioned in Table 1, it gives a brief idea of the total protocol of foam rolling and static stretching for a 1 week time frame.

Table 1: Intervention Protocol for the study

	STATIC STRETCHING	FOAM ROLLING
DURATION	30-60 SECS *3 REPS	1 MIN *3 REPS
FREQUENCY	6 times/week	6 times/week
FEEL	Until a stretch is felt in the lateral aspect of thigh	To stay in the painful spot for 20 sec and then find another painful spot or else keep rolling for 1 min
REST PERIOD	60 secs in between reps	60 secs in between reps
PROTOCOL PERIOD	1 week	1 week

FOAM ROLLING TECHNIQUE

The subjects received visual and verbal instructions on how to properly perform the foam rolling technique. Each repetition of foam rolling consisted of staying on the painful spot for 20 seconds and then find another painful spot or else keep rolling for 1 min on the foam roller, from the ischial tuberosity to the lateral knee. During foam rolling the subject sustained terminal knee extension of the foam rolling leg and used arms for support as shown in figure 1 . They were encouraged to use their body weight to maintain pressure on the foam roller.



Figure .1

STATIC STRETCHING TECHNIQUE

For the static stretch the subjects placed their leg behind normal leg with their knee extended and their ankle neutral in standing posture. Subjects were then instructed to lean sideways from the hip, with their spine in neutral until a stretch was felt in the lateral thigh as shown in figure 2. This

position was held for 30 seconds, and then repeated 3 times.



Figure.2

RESULTS

GRAPH 1 show it depicts a gradual significant increase in difference of the Active hip adduction Range of Motion measurement from start of the study and by end of 1 week of Intervention. ROM: The pre post analysis of ROM of both group individually using paired t-test showed definite increase in hip adduction ROM (p value 0.002) and when the difference between both group using unpaired t-test was compared it was also significant (p value <0.001)

GRAPH 2 shows significant decrease in pain from start of the study and by end of 1 week of intervention. The pre post analysis of both groups individually showed definite pain relief with significant (p value <0.001)

using Wilcoxon test. However when compared the difference between the group (p value-0.881) using Mann Whitney test

was not significant with foam roller being on a higher side.

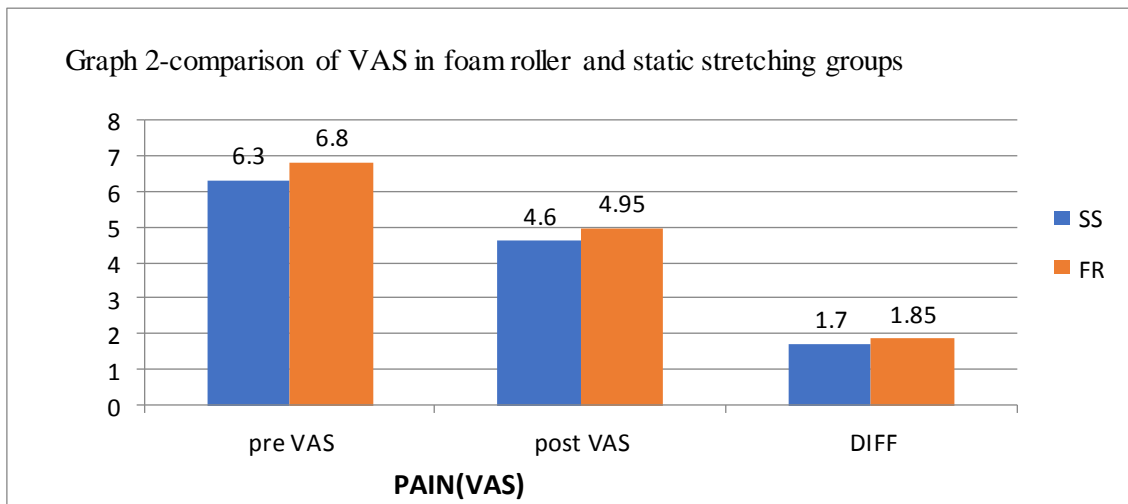
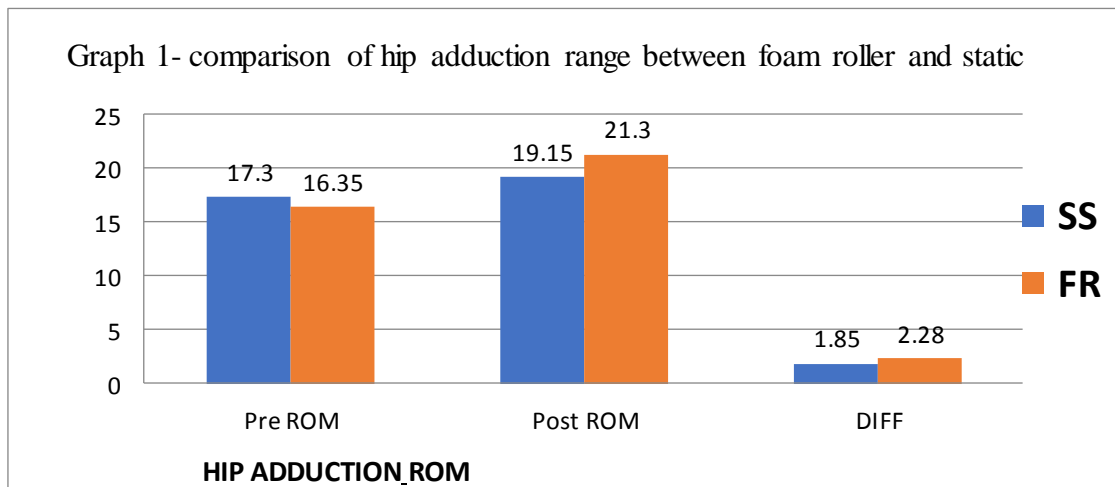


Table 2: Demographic data of the Patients

DEMOGRAPHIC DATA AND BASELINE PARAMETERS FOR EXPERIMENTAL GROUPS			
Outcome Measures	Group A= FR(N=20) MEAN(SD)	Group B=SS(N=20) MEAN(SD)	Value of significance (P Value-COMPARISON)
Age (years)	21.8(2.54)	19.7(2.05)	
VAS baseline	6.8(1.23)	6.3(1.12)	0.8811
Hip adduction ROM baseline	16.3(3.13)	17.3(2.22)	0.0002

DISCUSSION

The study was done to find the effectiveness of this new emerging tool foam roller in improving hip adduction range and also reducing muscle pain in healthy young males. Foam rolling & Static stretching showed significant increase in ranges and decrease in pain within one week. The variation in results of foam rolling and static stretching is possibly due to the mechanism

of foam rolling which targets all the components of kinetic chain.

Foam rolling aptly being called “partner free, hands free” technique is also known as ‘self-myofascial release^{1,2} which works on the principle known as autogenic inhibition. The source of the pressure when using foam rollers is the individual’s body weight. The Golgi Tendon Organ (GTO) is a special mechanoreceptor found at the musculotendinous junction. It detects

change in tension in the muscle and works as a safety mechanism by increasing muscle tension when the force becomes too great to potentially cause an injury to the muscle. When we apply a force or a pressure to the muscle via a foam roller it actually adds muscle tension, thereby causing the Golgi Tendon Organ to relax the muscle hence improving the flexibility of muscle¹. This phenomenon is called as Autogenic Inhibition because the contracting agonist is inhibited by its own receptors. This reduction in soft-tissue tension decreases pain, restores normal muscle length-tension relationships and improves function³.

Mohr A et al, in a study while checking the effects of foam rolling on passive hip range of motion when compared to static stretching explained that, during foam rolling there is a possibility that due to constant friction there is a local rise in the intermuscular temperature and blood flow which can lead a variety of changes in the viscoelastic property of the muscle. This helps in increase of viscosity of muscle leading to less resistance to the muscle while doing the movement? Due to increase in viscosity the gliding of muscle fibers is smoothed causing reduction in pain.

However, in a review done by Herbert RD et al, observed that stretching before or after the exercise program does not show any reduction in the soreness or protect the muscle from any risk of injury. On the other hand, Pearcey G et al, in a study highlighted that, foam rolling can help in reduction of the soreness and enhances the muscle recovery and improve tenderness if present. They stated that it is an efficient tool which is relatively affordable, easy to perform, and time competent and that helps in improving muscular recovery. This effect in the muscle could have been brought by few biochemical changes like increase in circulating neutrophil levels and activating mechanosensory receptors.

Young WB explained the mechanism as to why there is decrement in the strength post stretching. Neural inhibition plays a major

role in this phenomenon and its further facilitated by an increase in muscle tendon compliance which leads to a decreased rate of force transmission from the muscle to skeletal system. A lot of studies have been done on different stretching techniques with variation in frequency and repetitions but for a general fitness program, the American College of Sports Medicine recommends static stretching for most individuals at least 2 to 3 days per week⁴. Each stretch should be held 15-30 seconds and repeated 2 to 4 times.

A few alterations in the experimental design could have enhanced this research study. Generally before stretching 10-15 minutes of warm up session is suggested. Our subjects did not perform warm up prior to the start of each stretching session.

Whereas, Static stretching technique causes transient increase in muscle length, Foam roller works at local myofascial tightness areas present in the entire muscle and thereby foam rolling offers benefits similar to static stretching with addition to breakdown of soft-tissue adhesions and scar tissue.

CONCLUSION

This study revealed that both foam rolling and Static stretching were effective techniques for increasing hip adduction range and reducing pain over one week time period.

Both the Interventions showed gains in ROM which were highly significant when analyzed but Foam rolling produced more significant results as compared to static stretching group over 1 week intervention plan.

CLINICAL IMPLICATION

Foam roller is rapidly becoming staple throughout globe but lacking a strong research background. It shows quick and effective results as compared to the traditional stretching techniques.

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Ethical Approval: Approved

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