

## SUPINE OR STANDING HAMSTRING STRETCH: WHICH IS EFFECTIVE FOR FLEXIBILITY? A COMPARATIVE STUDY TOWARDS ANALYSIS OF A MYSTERY

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### ABSTRACT

**Purpose:** To find and compare the effectiveness of standing and supine hamstrings stretching techniques in increasing hamstring flexibility.

**Methods:** A Total of 25 subjects were selected for the study from girl's hostel at NIMS University by random sampling. The design used was experimental design. A plastic hand held full circle goniometer was used to measure the hamstring flexibility. Crossbar was used to maintain hip in 90 degree flexion during active knee extension test. A stop watch was used for the time management.

**Results:** The change in Pre stretching and Post stretching values of knee extension range of motion (in degrees) was  $9.77 \pm 5.54$  in right and  $9.66 \pm 4.35$ . The comparison of post stretching mean range of motion was 145.27 while standing and 143.61 while in supine position. The mean increase range of motion by standing and supine hamstring stretching techniques were 9.77 on standing and 9.66 while in supine position.

**Conclusion:** Improvement in the knee extension range of motion as calculated were approximately equal. The "t" value calculated was 0.11, which was not significant at any level. Thus, standing hamstring and supine hamstring stretching techniques are equally effective in improving hamstring flexibility.

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### INTRODUCTION

Stretching is a popular among physical therapies. The popularity exists as stretching is used to reduce risk, enhance athletic performance, or decrease post muscle soreness. The lifestyle of students is becoming sedentary day to day and they don't have enough to do physical exercise. Due to prolonged sitting and lack of exercise, the muscles of lower limb become tightened. Most commonly tightened muscles are - iliopsoas, adductors of thigh, rectus femoris, tensor fascia lata, piriformis, hamstrings, gastrocnemius and soleus. Most commonly tightened muscle is Hamstring (semitendinosus, semimembranosus, biceps femoris). The tightness of hamstrings leads to major problem, especially in girls, that is low back pain that hampers normal activities of daily living. In athletes excessive hamstring tightness leads to hamstring injuries. Tight hamstring can also be responsible for various postural problems as they tend to pull the pelvis posteriorly and distort normal position. Tight hamstring are associated with back pain as they limit the

hip flexion component during forward bending that force the lower back beyond its strong middle range.

Hamstring tightness occurs due to insufficient flexibility and mobility in them. This tightness may lead to altered biomechanics and cause pelvis to rotate posteriorly and/or spine to flex. This hamstring are bi-articular structures acting at the hip joint and knee joint. Due to this configuration the contraction of muscles cannot be localised to a particular joint. In the GAIT cycle hamstrings are active at the beginning of the stance phase and through a larger part of SWING phase. Hamstring injuries are most common during late SWING phase as the muscle is often strained during this phase to decelerate the forward swing.

Most common site of injury is proximal third of biceps femoris at musculotendinous junction. The elasticity of the muscle protects it from injury when a sudden jerk is placed on it. This elasticity is influenced by temperature of the muscle, biomechanical consideration, mental state of the athlete. This, the best way to

maintain the elasticity of the muscle is by stretching.

### MODES OF STRETCHING

- Manual stretching
- Mechanical stretching
- Self stretching

### METHODS OF STRETCHING

- Static stretching- Muscle is moved slightly beyond its normal range of position.
- Ballistic stretching- This is exaggerated form of dynamic stretching which uses a bouncing motion to move a muscle beyond its normal range of motion.
- PNF Stretching- This refers to proprioceptive neuromuscular stretching.

### POSITION:

Can be performed in various positions according to needs, comfort and condition of the patient. Various positions used are – lying, sitting, standing etc

### METHODOLOGY

**SAMPLE** – A total of 25 subjects (females) were selected from NIMS University by random sampling.

### DESIGN

Study designed was experimental design. A plastic hand held full circle goniometer was used to, measure the hamstring flexibility. Crossbar was used to maintain hip in 90 degree flexion during active knee extension test. A stop watch was used for the time management.

### INCLUSION CRITERIA

- Age from 18 to 28 years.
- Subjects lacking at least 20 degrees of active knee extension with hip flexed to 90 degree were included in the study.
- No lower limb or back injury within last 1 year.

### EXCLUSION CRITERIA

- Any injury around hip, knee or thigh.
- Any previous surgical history of lower limbs.
- Any kind of neurological discomfort during taking measurement.

### PROTOCOL

The knee extension range of motion was measured using Active Knee Extension Test. Then the subjects were asked to do standing hamstring stretch on right leg and supine hamstring stretch on left for next three weeks. The knee extension range of motion was again measured after stretching was complete.

### PROCEDURE

The knee extension range of motion was measured using Active Knee Extension Test. During this test the patients were positioned supine on the plinth. The subjects were then asked to flex their hip and knee at 90 degrees. They were then asked to extend their knees as much as they could do without any discomfort. The knee extension was checked with the help of goniometer for both the knees. The range of motion was checked by placing the goniometer on lateral femoral condyle while stationary arm was aligned with greater trochanter of the femur and moving the arm with midpoint of lateral malleolus.

After taking measurements, the subject's were asked to do standing hamstring stretch on right leg and supine hamstring stretch on left leg. For standing hamstring stretch, the subjects were asked to place right leg forward on elevated surface while standing on left leg and simultaneously bending forward at the waist (without flexing the spine) to achieve an adequate stretch. Supine hamstrings were stretched by lying supine on doorway and placing the left leg on wall while right leg rest flat on the floor. The subjects did both standing and supine stretches with three repetitions at a time per day, three days a week, for three weeks. Each stretch was held for 30 seconds and rest period between two consecutive stretches was of

15 seconds. Only 18 patients were left at the end of study as 7 patients were excluded from the study due to

discontinuation of stretching protocol. The whole study was conducted at NIMS medical college, Jaipur.



**STANDING HAMSTRING STRETCH**



**SUPINE HAMSTRING STRETCH**

**DATA ANALYSIS**

The data was analysed using SPSS software, version 14. The mean values of pre stretching and post stretching knee extension were calculated for both right and left knees. The mean values of improvements in the knee extension range of motion was calculated by standing and

supine hamstring stretching. The amounts of standard deviation in pre-stretching, post stretching, and improved range of motion of knees were also calculated.

The related t-test was performed on data collected. No value of significance was pre-determined in the study.

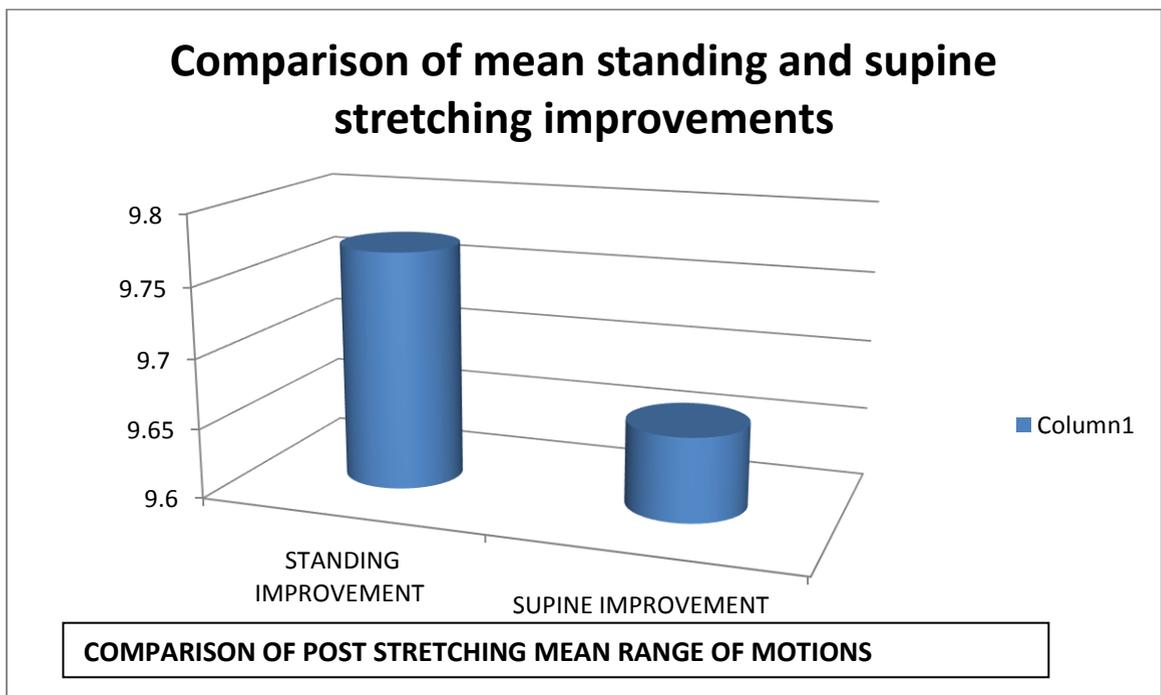
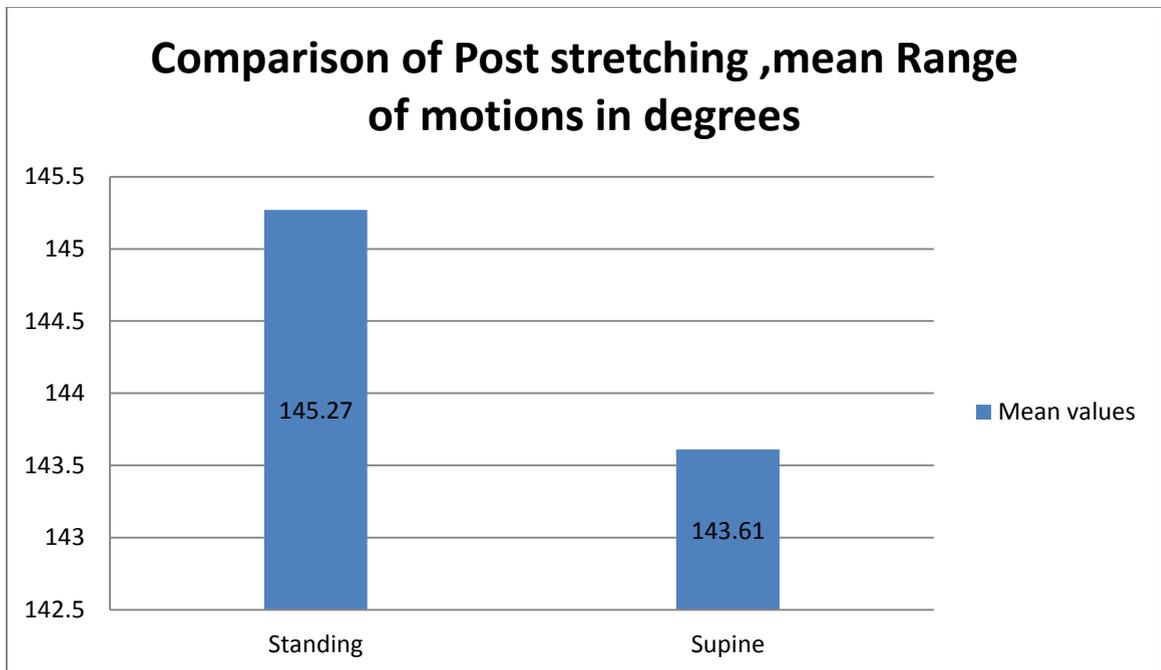
**RESULTS**

	<b>RIGHT</b>	<b>LEFT</b>
PRE STRETCHING	135.5 $\pm$ 9.56	134.5 $\pm$ 6.59
POST STRETCHING	145.27 $\pm$ 8.54	143.61 $\pm$ 6.93
CHANGE	9.77 $\pm$ 5.54	9.66 $\pm$ 4.35

Pre and post stretching change in degrees

	<b>STANDING STRETCHING</b>	<b>SUPINE STRETCHING</b>
MEAN INCREASE IN RANGE OF MOTION	9.77	9.66

Mean values of improvements made by standing and supine hamstring stretching techniques (degrees)



**DISCUSSION**

In this study 18 subjects were included to find out relative effectiveness of standing and supine hamstring stretching techniques in improving the hamstring flexibility. The results of this study show that standing and supine hamstring techniques are equally effective in improving hamstrings flexibility. The

increase in hamstring flexibility in subjects as shown by post stretching knee extension range of motion, was 9.77 degree for standing hamstring stretch and 9.66 degree for supine hamstring stretch. There is great variability in the duration and frequency of stretching program. In various published studies, time ranging from 2 weeks to 8 weeks has been used. In one study on the effect of time and frequency of static

stretching on flexibility of hamstrings muscles, the subjects stretched 5 days per week for 6 week and result of the study was that 30 minutes of effective time to sustain a hamstring muscle stretch was enough in order to increase the range of motion. Some other studies have shown that stretching for 30 seconds once per day, 5 days in a week for 6 weeks increased knee range of motion up to 12.5 degree respectively.

Although this study shows that standing and supine hamstring stretching techniques are equally effective in improving hamstring flexibility, it is essential to mention here that supine stretch was more comfortable, safe and easy as compared to standing stretch. Some of the limitations of this study are:

- Small sample size

- Using dynamometer, instead of goniometer which could have given better results.
- No warm up was done before the stretching, doing could have increased the overall gain in knee extension.

## CONCLUSION

From the study it can be concluded that standing and supine hamstring stretching are equally effective in increasing hamstring flexibility, as no significant differences were found between the gains in knee extension range of motion made by both the standing and supine stretches. It has also been seen that supine stretch is easier, safe, and comfortable for the patients, thus it may be more effectively prescribed for the independent home exercise programs.

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