

# Prevalence of Hamstring Tightness among School Children in Surat USING 90-90 SLR Test

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**Abstract:** ***Background and Objectives:** Flexibility is considered an essential element of normal biomechanical function. Limited flexibility causes neuro-musculoskeletal symptoms. These musculoskeletal symptoms will lead to decrease in strength, stability, endurance and much more. All these things will lead to recurrent injury and might affect psychosocial aspect of the athlete. Hence, the objective of this study was to find out the prevalence and severity of the hamstring tightness among school going student. **Method:** 220 students with age group of 6 to 13 years were selected on basis of inclusion criteria. The tightness was measured by 90-90 SLR test. One time measurement was taken and result was taken according to their reading. **Result:** Analysis showed higher prevalence of hamstring tightness among school students. More students were affected with 90-90 SLR Test and angle between 0°-20°. **Conclusion:** Prevalence of hamstring tightness is very high in school going student of age group 6 to 13years.*

**Keywords:** Prevalence, 90-90 SLR test, Hamstring tightness.

## Abbreviation

**ROM:** RANGE OF MOTION

**AKE:** ACTIVE KNEE EXTENSION

**MET:** MUSCLE ENERGY TECHNIQUE

**LBP:** LOW BACK PAIN

**STM:** SOFT TISSUE MANIPULATION

**DSTM:** DYNAMIC SOFT TISSUE MANIPULATION

**SLR:** STRAIGHT LEG RAISE

**SEM:** STANDARED ERRORS OF MEASUREMENT

**MDD:** MINIMAL DETECTABLE

## 1. Introduction

The ability of an individual to move smoothly depends on his flexibility, an attribute that enhances both safety and optimal physical activity.<sup>1</sup> Flexibility is a vital component of fitness required for most desirable musculoskeletal functioning and maximizing the performance of physical activities.<sup>5</sup> Flexibility is considered an essential element of normal biomechanical function.<sup>2</sup> Normal or ideal range of muscle extensibility is thought to promote optimal joint kinematics and have the potential to reduce the risk of injury.<sup>7</sup> When a muscle displays insufficient extensibility and is considered “short” or “tight” the motion between joint surfaces may be reduced, resulting in restricted joint range of motion (ROM). When a muscle shows excessive extensibility, the motion between joint surfaces may be disproportionately larger resulting in excessive joint ROM.<sup>7</sup>

Limited flexibility causes neuro-musculoskeletal symptoms. These musculoskeletal symptoms will lead to decrease in strength, stability, endurance and much more. All these things will lead to recurrent injury and might affect psychosocial aspect of the athlete.<sup>2</sup> Reduced flexibility generates a vicious circle of range reduction and resulting increase in postural problems. Tight muscles also compress the blood vessels and lead to reduced optimal performance.<sup>5</sup>

The definition of posture according to the American Orthopaedic Association, made in 1947 says “Good posture

is a state of equilibrium of muscles and skeleton that protect the body’s supporting structures from damage or deformation in any state of rest or work. Bad posture is a relation of body parts that causes increasing effort on the supporting structures, wherein there is less efficient body-base equilibrium.”<sup>8</sup>

Children spend about 80% of their school time in the classroom performing various activities like reading, writing, etc. which require them to sit continuously for long hours. Thus, the school children are at a special risk of adapting poor postural habits. The students of the primary school in India use bench and desk in the classroom in urban setups, however in rural areas the students sit on the floor with folded knees in an Indian traditional sitting posture. In right angled seating, such as in bench or desk, the children acquires a “slumped” posture to compensate for fatigue and discomfort, resulting in posterior rotation of the pelvis, accentuation of thoracic kyphosis and cervical lordosis, loss of lumbar lordosis of the spine and increased risk of tissue trauma in the sacral area.<sup>8,2</sup>

The hamstring is examples of muscle group that have a tendency to get shorten. Three muscles that are known collectively as the hamstring muscle cover the posterior thigh consisting of the semitendinosus, the semimembranosus, and the biceps femoris muscles. Inability to achieve greater than 160° of knee extension with hip at 90° of flexion is considered as hamstring tightness.<sup>1</sup> Hamstring is an important antigravity muscle of the lower limb and its flexibility is important for maintaining normal posture and gait in both adults and children.<sup>8</sup>

Hamstring tightness are associated with a posterior rotation of the pelvis in standing due to attachment of hamstring muscle is on ischial tuberosity. Tightness in hamstring muscle causes posterior pelvic tilt which leads to decrease in lumbar lordosis result in low back pain.<sup>2</sup> Some studies have shown that decreased hamstring flexibility is a risk factor for the development of patella tendinopathy and patellofemoral pain.<sup>3</sup> The influence of hamstring extensibility on the patella-femoral joint A possible cause for anterior patellar pain and

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antero-medial knee pain is reduced hamstring extensibility (Whyte, Moran, Shortt, & Marshall, 2010). Reduced hamstring extensibility causes posterior translation and external rotation of the tibia, changing the angle between the femur and tibia and thus placing a greater amount of stress on the pes anserine junction and patellar (Blackburn et al., 2004; Elias et al., 2011; Kwak et al., 2000). This biomechanical alteration in patella posture contributes to and exacerbates patella-femoral disorders (Hamill & Knutzen, 2009).<sup>7</sup>

Length-tension relationship of muscle as well as shock absorbing ability of the limb is affected by tightness of muscle.<sup>5</sup> Hamstring tightness is also associated with the development of plantar fasciitis.<sup>5</sup> It has been indicated that reduced hamstring extensibility is a possible etiological factor in the development of plantar fasciitis.<sup>7</sup> Reduced hamstring extensibility limited knee extension, which induced prolonged fore-foot loading pressure during gait, creating prolonged tension in the plantar fascia.

Hamstring tightness leads to high risk of recurrent injury, decreases the performance in athletes, lead to post-exercise soreness and decreases coordination among athletes.<sup>2</sup>

Flexibility can be enhanced by simple, non-surgical procedures like stretching the shortened muscles. Stretching techniques such as cyclic stretching (Turner et al, 1988), isometric exercise (Medeiros et al, 1977), proprioceptive neuromuscular facilitation protocol and static stretching (Worrell et al, 1994) have been used to enhance muscular<sup>3</sup> flexibility.

One of the factors that may likely affect the outcome of the non-surgical intervention is the duration for which any of the techniques is applied.<sup>4</sup>

This study was undertaken as there is lack of literature on prevalence and severity of hamstring tightness among school going student. Hence purpose of the study was to find hamstring tightness among school going student.

## 2. Methodology

A total 220 children were selected from the different schools in Surat for this study. Prior permission was taken from the school's principal and then the written consent was also taken from the parents of children who are selected for this study. Convenient sampling technique was used. Children was selected on the basic of inclusion criteria (1) Age 6 to 13 years (2) children who voluntarily participate in this study (3) Children who understand and can able to follow command in English, Gujarati and Hindi language. Children were excluded who had any past lower limb injury within last 3 years and who underwent for any lower limb surgery within last 3 years.

## 3. Procedure

### 90-90 SLR TEST:

90-90 SLR test is used to check hamstring tightness. Participants were assessed on a plinth in supine position. Patient flexes both the hips to 90 degree while the knees are bent. The participant may grasp behind the knees with both

hands to stabilize the hip at 90 degree of flexion. The participant extends each knee as much as possible. For normal flexibility in the hamstring, knee extension should be within 20degree of full extension and called this angle the POPLITEAL ANGLE. The Active knee extension measurement was defined as the degree of knee of knee flexion from terminal knee extension. Each knee was measured once and the angle of 90-90 SLR test was used for analysis.

### Statistical Analysis

Given the normal distribution of data, t-test was used for the statistical inference, to know the Hamstring tightness. The Pearson Correlation Coefficient was applied to know which side, whether Right or Left limb had more tightness.

In this study, there were 220 participants were examined for Hamstring tightness. An Anthropometric data was collected before assessing hamstring tightness.

Numerical representation of BMI DISTRIBUTION with frequency and percentage can be seen in table 1. Out of 220 students; according to W.H.O. classification of BMI; 182 Students were in underweight range, 34 students were in normal range and 4 students were in over weight range.

**Table 1: BMI Distribution**

BMI	Frequency	Percentage
Underweight	182	82.73%
Normal	34	15.45%
Over weight	4	1.82%
Total	220	100.00%

Mean value of both, RIGHT AND LEFT LIMBs  $\pm 79.62$  and  $\pm 75.46$  respectively has shown in table 2.

**Table 2: Mean value of both right and left limb**

LIMB	MEAN
Right	$\pm 79.62$
Left	$\pm 75.46$

By the Mean value of Both, Right and Left sides of the lower limb, we can find out the significant hamstring tightness in Right side of lower limb more of taken population than left side of lower limb.

Mean Value for the Right limb from the taken population is  $\pm 79.62$ . Mean value for the Left limb from taken population is  $\pm 75.46$ . Standard deviation value for the Right limb from the taken population is  $\pm 16.95$ . Standard deviation value for the Left limb from the taken population is  $\pm 15.62$ .

Mean and standard deviation were calculated as measure of Right and Left Popliteal angle. As Pearson Correlation Coefficient value of this statistical analysis is 0.007709 which means it is  $>0.05$ . Therefore, this hamstring tightness is significant in school students of age group between 6 to 13 years.

**Table 3: Severity of hamstring tightness with mean and standard deviation value**

Limb	Mean	SD	T-Test	P Value
Right	$\pm 79.62$	$\pm 16.95$	2.67695	0.007709
Left	$\pm 75.46$	$\pm 15.62$		

#### 4. Discussion

The objective is to find out the Prevalence of hamstring tightness among school going student. The sample frame consists of 220 students from different schools in surat. Based on the selection criteria, a simple random sampling according to the age required was conducted. Uniform age group and same educational setup are the strengths of this study. In goniometry, locating the end point is essential and must be exact to ensure accurate repeatability of measurements. In the 90-90 SLR test, locating the end point of motion was reliable because we used strict body stabilization of adjacent joints. Because 90-90 SLR was active and subjects were instructed not to force the leg past the point of initial mild resistance, we believe motion in the hip of tested extremity, the sacroiliac joints were eliminated. we found a significant reduction in flexibility in young population. One main reason for this is prolonged sitting hours and sedentary lifestyle of students. It was hypothesized in the current study that tightness of hamstring is a very common problem in students, especially the students having prolonged sitting hours, and in results, it was seen that majority of the population have hamstring tightness. Akinpelu conducted study on influence of age on hamstring tightness in apparently healthy Nigerian, subjects' mean age was  $29.63 \pm 16.72$  years. All subjects had hamstring tightness (absolute extension lag) and this increased with age up to age group 40-49 years. The male subjects had significantly higher hamstring tightness than the females in all the age group. National Academy of Sport Medicine said that mechanical tightness of constantly shortened or contracted state over the time muscle will adopt by becoming physically shortened and tighter. Sheetal Mahadik conducted a study prevalence of hamstring tightness in youngster 18-25 years age- a cross sectional study. In this study they conclude that prevalence of hamstring tightness in youngsters is 82% when assessed by using active knee extension test & prevalence of hamstring tightness is more in female than male. Akinpelu conducted study on influence of age on hamstring tightness in apparently healthy Nigerian, subjects' mean age was  $29.63 \pm 16.72$  years. All subjects had hamstring tightness (absolute extension lag) and this increased with age up to age group 40-49 years. The male subjects had significantly higher hamstring tightness than the females in all the age group 15 .The mean of Right side of lower limb was  $\pm 79.62$  and Mean of left side of lower limb was  $\pm 75.46$ . The difference between the means of two sides was statistically significant. This study indicates that the Right side of students exhibit greater hamstring flexibility than the Left side. In the current study, it was seen that there is a tendency of increase in hamstring tightness with increase in the sitting hours. Highly significant difference between mean of Right side of lower limb and Left side of lower limb i.e,  $P = 0.007$  was seen. This is less than 0.05, which suggests that prevalence of hamstring tightness in Right lower limb of taken population from age group between 6 to 13 years is significantly higher.

#### 5. Conclusion

It is concluded that tightness of hamstrings is observed in a majority of the students. Long-duration sitting can be a contributory factor in hamstring tightness. Hence, Prevalence

of hamstring tightness is very high in school going student of age group 6 to 13years.

#### 6. Limitation

- 1) Small sample size.
- 2) The population is not homogeneous.
- 3) Result cannot be generalized to all population because study age group is between 6 to 13 years.
- 4) Participants were only from one occupation.
- 5) Activity level of participants not assessed

#### 7. Summary

90-90 SLR TEST can use to find out the Hamstring muscle Tightness. While performing the test, patient may feel some stretching pain, which is because of their hamstring muscle is getting stretched. Long-duration sitting can be a contributory factor in hamstring tightness. Hence awareness of hamstring stretching is important to prevent musculoskeletal problem of lower quadrant.

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