

# Prevalence of Hamstring Tightness Among School Children Between 7-15 Years of Age Group in Pune, Maharashtra: A Cross Section Study

Ms. Shruti Jori<sup>1</sup>, Dr. Kiran Jeswani<sup>2</sup>

<sup>1</sup>Student, Intern, PES Modern College of Physiotherapy, Pune, Maharashtra, India

<sup>2</sup>Senior Assistant Professor, Orthopaedics department, PES Modern College of Physiotherapy, Pune, India

## Abstract:

**Background:** Hamstring are located at the posterior compartment of the thigh from hip to knee and from medial to lateral aspect. They perform flexion of knee and extension of hip. Back pain amongst children is common nowadays. Hamstring tightness is known to have effect relationship with low back pain[2].

**Aim:** The purpose of this study is to assess the prevalence of hamstring tightness in school going children of age 7-15 years

**Methods:** 912 samples of school students of age 7-15yrs were included in the study according to inclusion and exclusion criteria. An outcome test known as the active knee extension test was used.

**Result:** Total prevalence of hamstring tightness in females in right lower extremity - 415 i.e.(88.2%) and in left lower extremity 379 i.e.(80.6%). In male, right lower extremity -374 i.e.(84.6%) and in left lower extremity - 356 i.e.(80.5%). Average 86.5% have hamstring tightness. It was more in females being 88.2% and lesser in males with 84.6% which is statistically significant  $p < .05$ .

**Conclusion:** The study concluded that females showed statistically significant higher percentage of hamstring tightness than male participants.

**Keywords:** Prevalence, Hamstring tightness, School children

## Introduction

Hamstring consist of three muscles semi-membranous, semi-tendinosus and both long and short head of bicep femoris, located at the posterior compartment of the thigh from hip to knee and from medial to lateral aspect. They perform flexion of knee and extension of hip. The muscle semi-tendinosus arises from ischial tuberosity and insert at medial side of tibial. Semi-membranous arises from ischial tuberosity and insert at medial aspect of tibia. Long head of bicep femoris originates from ischial tuberosity and insert at lateral side of fibula. Short head of bicep femoris originates from femur and insert at lateral aspect of fibula. When the hip is flexed the inability of knee to extend fully is known as hamstring muscle tightness[1]. Hamstring muscle tightness is defined as when the knee extension angle becomes greater than  $20^\circ$ . There are different methods to access hamstring flexibility. That is straight leg test, active knee extension test, passive knee extension test[1]. Straight leg test is mostly performed to

evaluate the tightness of hamstring, but it is less specific to hamstring muscle due to movement of pelvis. Active knee extension test is considered very specific for measuring tightness of hamstring because it involves the movement at knee joint, rather than the hip joint. While straight leg raise test involves movement of both hip and knee joint[1]. Active knee extension test is an actively performed test because during this test the end position is totally depends on the tension of the subject which is developed in quadriceps of subject and in available pain free range of motion of joint and is an excellent for finding hamstring flexibility. In active knee extension as the end point is mentioned by user himself that is why this test is safer. This test is performed within the pain free range of subject's range of motion and is more reliable than any test[1]. Back pain amongst children is on the rise exponentially. Tightness of hamstrings is known to have effect on low back pain[2].

### Need Of Study

Muscle tightness is not only the cause of reduction of ROM but also leads to various musculoskeletal problems. Hamstrings are attached to tuberosity of ischium; this tuberosity is a part of posterior aspect of pelvis due to extended sitting in school children continuous pressure on ischium tuberosity can lead to hamstring tightness. That is why tightened hamstring may affect the low back area & may cause low back pain in school children also causing postural changes which can lead to low back pain. But no study has been conducted on prevalence of hamstrings tightness among school children between 7- 15 years of age group in Pune, Maharashtra. Hence this is the purpose to highlight the prevalence of hamstring tightness among school children between 7- 15 years of age groups in Pune, Maharashtra.

### Objectives

1. To find the prevalence of hamstring tightness in school children between 7-15 years of age group in Pune Maharashtra using active knee extension test.
2. To compare the severity of hamstring tightness in males and females by using active knee extension test
3. To compare the severity of hamstring tightness between right and left leg using active knee extension test.

### Materials And Methodology

1. **Sample size:** 912
2. **Study setting:** school children in and around Pune area.
3. **Study population:** Boys and girls (7-15 years of age).
4. **Study design:** cross sectional study.
5. **Study sampling:** convenient sampling.
6. **Study duration:** 6 months
7. **Tools & materials:** school consent form, parent's consent form, goniometer, pen, paper.
8. **Inclusive Criteria :**
  - a. School children within age group of 7-15 years school children volunteering to participate in the study.
  - b. Subjects with at least 15-20° loss of knee extension, when hip is held in 90° flexion were included in the study
9. **Exclusive Criteria :**

- Subjects with any past hamstring injury within last 2 years, low back pain since last two months.
- Lumbar and lower limb neurological conditions like cerebral palsy, meningitis etc. Recent injuries or surgeries
- History of fracture of lower limb.
- Sports players, children who are doing regular exercises and yoga are excluded

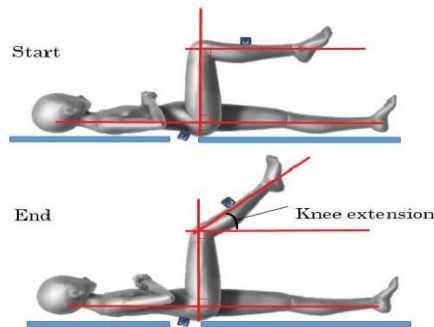
## Outcome Measures

Active Knee Extension Test : Reliability of active knee extension test : The result of the ICC(2,1) for right lower extremity AKET was 0.79. According to Portney and Watkins, results greater than 0.75 indicates good reliability. The modified active knee extension test utilizes readily available equipment's and offers a quick, reliable and low-cost alternative for measurement of hamstring flexibility.

## Procedure

The study begins with a synopsis presentation in front of the ethical committee in P.E.S Modern College of Physiotherapy. Ethical clearance was obtained from the committee. Consent was taken from schools prior to the study. Assent was taken from each student parent prior to the study. School children were selected according to inclusive and exclusive criteria. Active knee extension test was performed. The subject positioned on the examination table in supine, the lower limb that is not examined was positioned and stabilized on the support surface. The opposite limb was elevated so that the hip is in  $90^\circ$  of flexion and the knees extended to reach a position perpendicular to the ground. A lag of  $20^\circ$  was considered normal from full extension, anything less than  $20^\circ$  was considered as hamstring tightness. The data was collected and analysed.

**Figure 1**



**Figure 2**



**Figure 3**



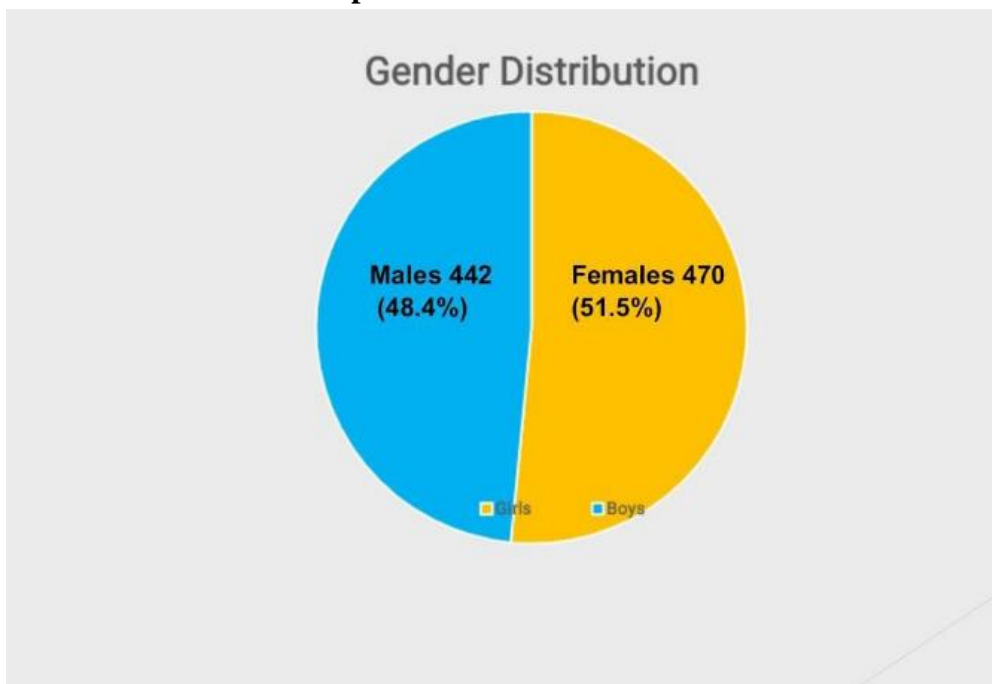
### Data Collection and Statistical Analysis

For the purpose of study, ( Excel ) was used to analyse the data. Mean and standard deviation was also assessed to check the descriptive statistics for variable.

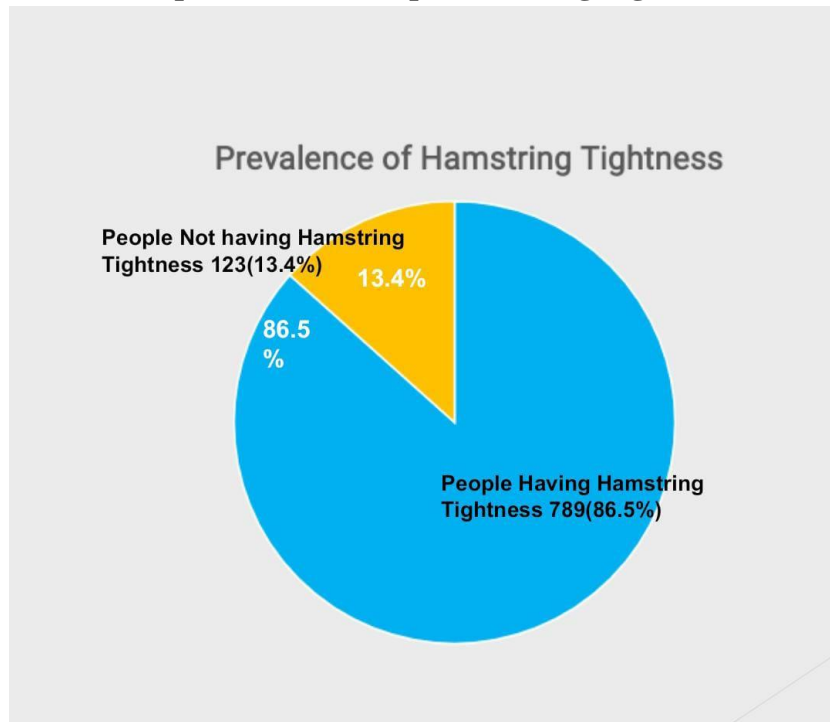
**Table 1: Gender Distribution**

| Total no. of samples | Females | Males |
|----------------------|---------|-------|
| 912                  | 470     | 442   |

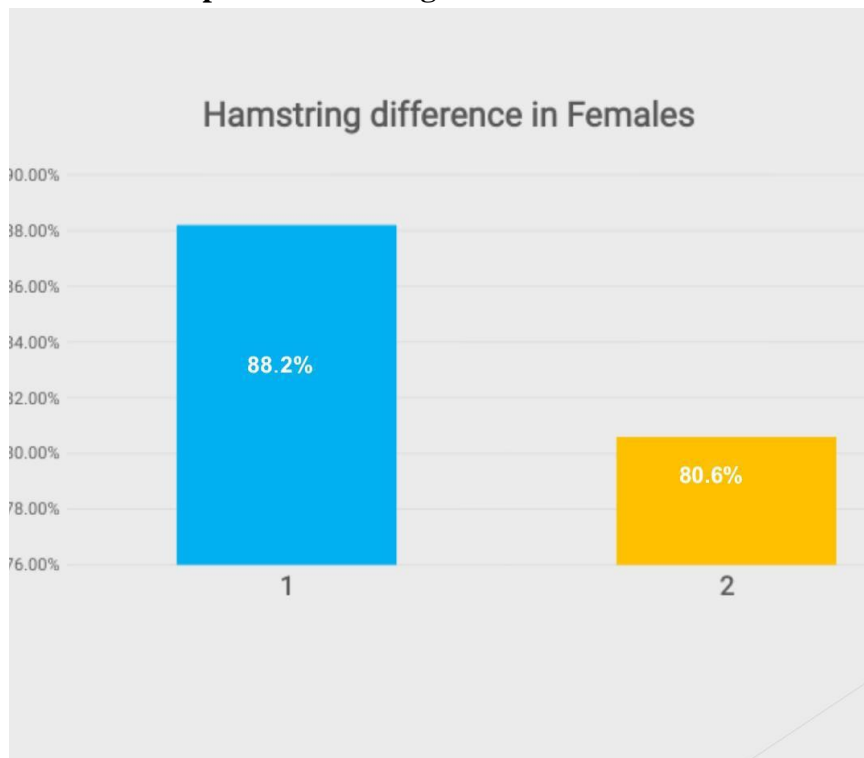
**Graph 1- Gender Distribution**



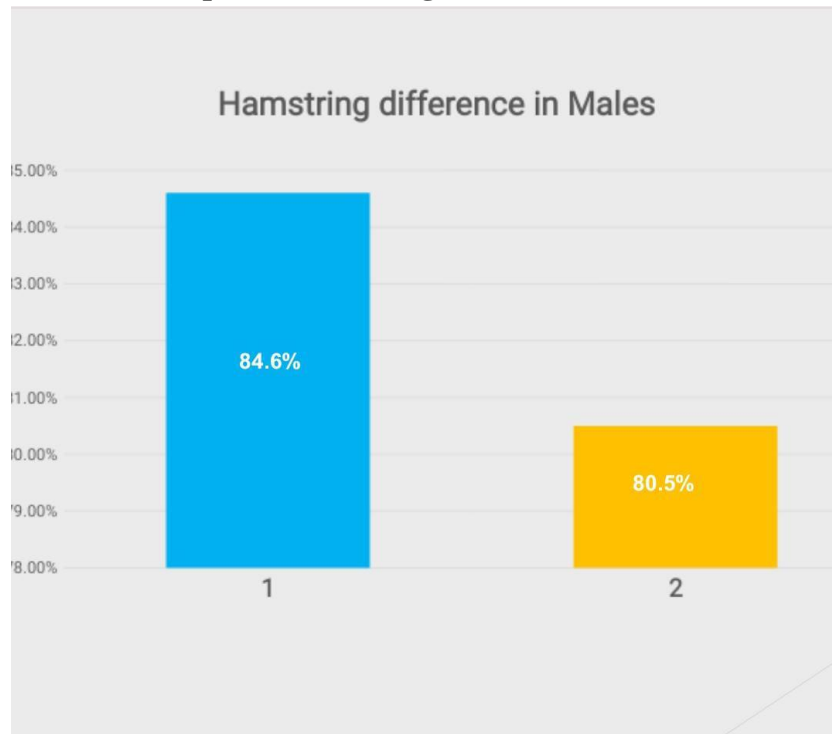
**Graph 2- Prevalence pf Hamstring Tightness**



**Graph 3- Hamstring Difference in Females**



**Graph 4- Hamstring Difference in Males**



**Results**

In this study, there were total 912 subjects out of which 470 i.e.(51.5%) were females and 442 i.e.(49%) were males. Out of the 912 subjects, 789 participants had Hamstring Tightness while 123 did not. Among those who presented with tightness 415 subjects were Females and 374 Males. Among those who did not have tightness,55 were females and 68 were males. In female total prevalence of hamstring tightness in right lower extremity is 415 i.e.(88.2%) and in left lower extremity is 379 i.e.(80.6%). In male total prevalence of hamstring tightness in right lower extremity is 374 i.e.(84.6%) and in left lower extremity is 356 i.e.(80.5%). 78.00% 79.00% 80.00% 81.00% 82.00% 83.00% 84.00% 85.00% Right LE Left LE Males Hamstring difference in Males 84.6% 80.5 % 20 .The outcome showed an average of 86.5% having hamstring tightness. Hamstring tightness was among the females being 88.2% and lesser in males with average 84.6% which is statistically significant  $p < .05$

**Discussion**

Over the years it has become clear that hamstring tightness occurs not only in adults but also in the children[8,9]. From our study prevalence of hamstring tightness is 86.5 %. In females an average hamstring tightness was 88% and in males was 84.6%. The high prevalence of hamstring tightness among girls could be because of more females than males in our study. The above study was conducted on seemingly healthy group of children by active knee extension test that has an excellent interrater and intra-rater reliability[10]. It was alarming to see a significant proportion of school going children having hamstring tightness in this study who showed at least some degree of hamstring tightness. This leads to concern about its aetiology. The reason for this can be multitudinous, which include growth spurts, prolonged sitting while spending more time on studying, video gaming, digital gadgets usage and viewing television rather than going outdoors for play or other activities. Even the homework and class assignments and most of projects are done on computers which only adds to hours in front of the

computer and other devices. Increased sitting and inactivity cause a certain fixture in posture due to which the hamstring muscle may develop tightness and recent research points out towards this association [11]. Additionally, sudden growth spurts are also known to cause the stretching of the muscle leading to reduced flexibility[12]. Some previously reported studies provide linkage of hamstring tightness with low back pain. Hamstring tightness causes pelvic tilt thereby changing the biomechanics of lumbar region and causing back pain[13]. Stiffness of one muscle group can cause compensatory movement at an adjoining joint that is controlled by muscle or joints with less stiffness[14]. This indeed is an issue which needs immediate attention and also measures to curb or get it in control. If not, this can lead to bigger health issues in early adulthood.

### Conclusion

As far as the authors are aware this is the first study conducted in Pune Maharashtra to assess prevalence of hamstring tightness in school children. The results of the above study showed that the hamstring tightness among school going children is highly prevalent in the Pune, Maharashtra thus, such a high percentage of positive results in them can only speak for the rest of the paediatric population. Although the sample in this study was not equally distributed among ages, most of the age group were found having hamstring tightness and this shows that the problem is not age specific. Females showed statistically significant higher percentage of hamstring tightness than male participants.

### Limitations

1. Every grade did not have equal number of students.
2. Females and Males were not distributed equally.
3. Sample size was limited.
4. This study is a non-homogenous mix of available subjects.

### Future Scope

1. The study can be done with inclusion of equal number of males and females.
2. Further study can be conducted with equal number of students in every grade.
3. Further study can be conducted on severity of degree of hamstring tightness.
4. Further study can be conducted in different population.
5. The study can aim at recording any improvement in degree of hamstring tightness.

**Conflict of Interest:** No conflict of interest.

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