Prevalence of Hamstring Tightness among School Going Students Aged 13 to 17 Years

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Abstract: Several studies have found that inactivity has negative impacts on the musculoskeletal system in children and adolescents [1]. Adolescents pick up a variety of sitting issues at school that are in line with the established infrastructure and traditional teaching system, such as bench sitting and extended sitting hours. The students spend 5.5 to 6.5 hours each day in the same sedentary position, with little physical activity to support an active lifestyle [2]. Prolonged sitting, such as that experienced by students, causes alterations that can shorten the hip muscles. Additionally, prolonged sitting causes a shift in pelvic alignment, which causes the hamstring to contract during extended periods of sitting, which generates a significant amount of tension on the muscle, increasing the likelihood of pathology [3].

Introduction

"Tightness" in muscles is defined as a decrease in the actual length of a muscle, with little to significant shortening or a limited ability to lengthen from a typical state [4]. The length-to-tension ratio of muscles and the limb's capacity to absorb shock are both impacted by this. The lack of flexibility has also been linked to hamstring strain [5]. Tight muscles can also put direct pressure on blood vessels, which can reduce blood flow to the limb and cause poor performance.

The semitendinosus, semimembranosus, and biceps femoris are the three primary muscles that make up the hamstrings. They originate from the ischial tuberosity and insert into the fibula and tibia. Consequently, they serve as knee joint flexors and hip joint extensors [6].

Sitting for long periods of time might cause a decrease in hamstring flexibility [7]. Muscle tension affects both the length-tension relationship of a muscle and the limb's capacity to absorb impact. The cycle of decreased range and postural issues brought on by decreased flexibility ultimately diminishes maximum performance [8].

Tight hamstrings can restrict one's range of motion and lead to a variety of other musculoskeletal issues [9]. Due to the brevity of the hamstring muscles, the knee cannot be extended when the hip is bent, and hip flexion is impossible when the knee is extended. In the pelvic region, changes in posture cause flat back and posterior pelvic tilt. [10, 11] Due to hamstring stiffness, the ranges of active knee extension (AKE) and dorsiflexion are limited, as is the lumbar lordosis, resulting in postural abnormalities, a bending forward deficit, and a reduction in the ability to perform active knee extension (AKE).

Need for the study

Research focusing on the musculoskeletal health of school-aged children is scarce, particularly in the area of hamstring flexibility. Due to heavy schedules, lengthy classroom sessions, and a lot of screen time for homework, students may experience musculoskeletal problems like stiff hamstrings. Tight hamstrings can restrict a student's movement, comfort, and general performance, which might have an impact on their attendance at school, participation in physical activities, and learning. Students make up a significant portion of the population, and their health and well-being are essential to the quality of life as well as the effectiveness of the educational system. By understanding the prevalence and effects of hamstring tightness among pupils, prevention strategies, early intervention programs, and management plans can be guided, ultimately lowering the risk of long-term musculoskeletal issues.

Objectives

- To find the prevalence of hamstring tightness in school children between 13-17 years of age group in Nilambur Kerala using active knee extension test.
- To compare the severity of hamstring tightness in males and females by using active knee extension test

Methodology

Determining the prevalence of hamstring stiffness was the purpose of this cross-sectional study conducted over six months in the Nilambur schools of Pothukal Panchayath. Participants in the study comprised school children ranging from 13 to 17 who volunteered as well as those with at least a 15 to 20 degree knee extension loss when their hip was angled at a 90 degree. Prior existence of tumors, infections, herniated or protruded discs, spinal abnormalities, intense back pain, and muscular tendon injuries of the back and lower legs. All ruled out were recent operations to the afflicted side, hamstring hypermobility (Beighton score> 4), and adherence to a regular flexibility/yoga practice. Selection of students based on inclusive as well as selective

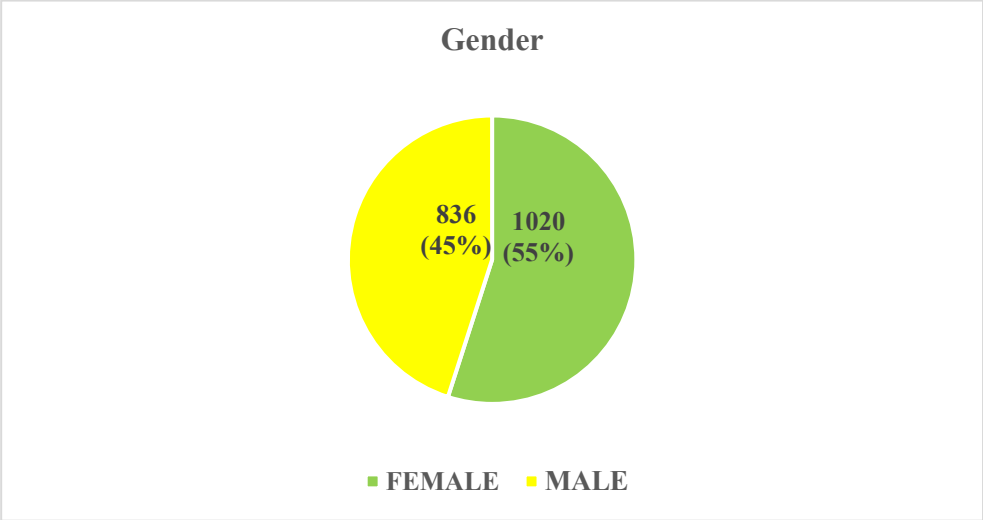
criteria. The active knee extension test was carried out. On the examination table, the patient was resting supine; the lower limb not being tested was positioned and fastened on the supporting surface. The opposing leg was lifted to help the hip be at a 90° flexion angle and the knees to extend to a position perpendicular to the ground. Any deviation of more than 20° from total extension was regarded to indicate hamstring tightness; a lag of 20° was considered normal. The data was gathered and read.

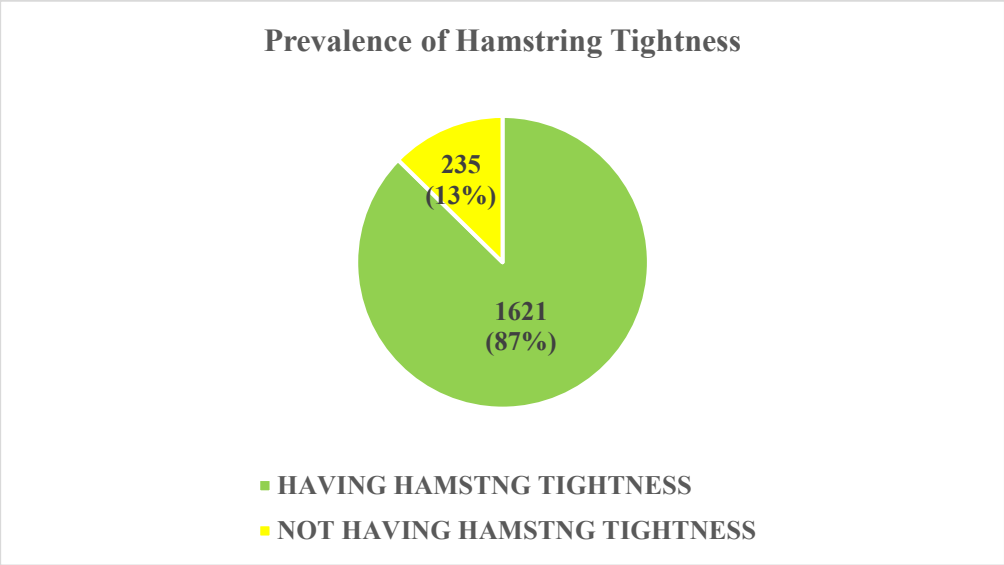
Data analysis & results

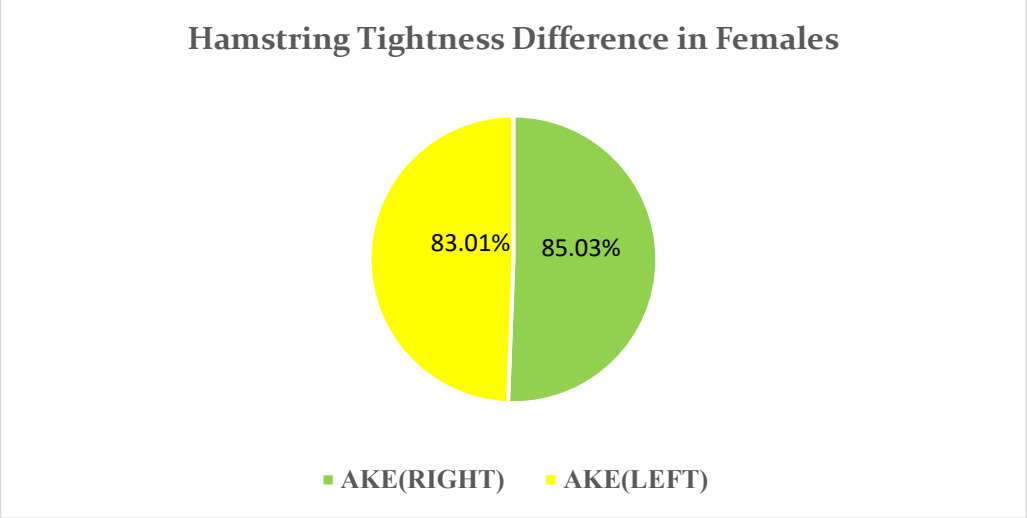
For the purpose of study, (Excel) was used to analyze the data. Mean and standard deviation was also assessed to check the descriptive statistics for variable.

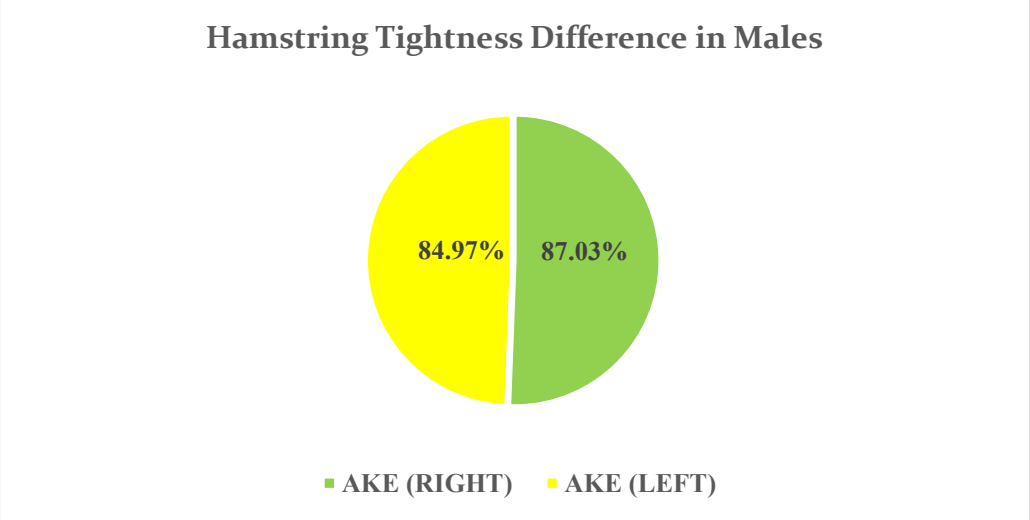
Total no. of samples	Females	Males
1856	1020	836

Table 1: Gender Distribution




Prevalence of Hamstring Tightness
235
(13%)
1621
(87%)
HAVING HAMSTNG TIGHTNESS
NOT HAVING HAMSTNG TIGHTNESS


Hamstring Tightness Difference in Females
83.01%
85.03%
AKE(RIGHT)
AKE(LEFT)


Hamstring Tightness Difference in Males
84.97%
87.03%
AKE (RIGHT)
AKE (LEFT)

Results

In this study, there were total 1856 subjects out of which 1020 i.e.(55%) were females and 836 i.e.(45%) were males. Out of the 1856 subjects, 1621 participants had Hamstring Tightness while 235 did not. Among those who presented with tightness 942 subjects were Females and 679 Males. Among those who did not have tightness, 78 were females and 157 were males. In female total prevalence of hamstring tightness in right lower extremity is 801 i.e. (85.03%) and in left lower extremity is 782 i.e. (83.01%). In male total prevalence of hamstring tightness in right lower extremity is 591 i.e. (87.03%) and in left lower extremity is 577 i.e. (84.97%).The outcome showed an average of 87% having hamstring tightness. Hamstring tightness was among the females being 92.35% and lesser in males with average 81.22% which is statistically significant $p<.05$

Discussion

It has become clear over the years that hamstring stiffness affects both children and adults [12, 13]. According to our research, 87% of people have hamstring tightness. The average hamstring tightness was 92.35% in women and 81.22% in men. The high prevalence of hamstring tightness among females may be explained by the fact that there are more girls than boys in our research. The aforementioned research, which had strong interrater and intra-rater reliability, used an active knee extension test on a seemingly healthy cohort of kids [14]. In this study, a large number of students who attended school and exhibited at least some level of hamstring tightness were found to have hamstring tightness, which was alarming. As a result, there is concern about its cause. This could be due to a variety of factors, such as growth spurts, prolonged sitting, increased time spent studying, video gaming, using digital devices, and watching television instead of engaging in outdoor play or other activities. The majority of class activities, projects, and even homework are completed on computers, which just increases the amount of time spent in front of the computer and other gadgets. Due to increased sitting and inactivity, there is a specific postural fixture that might lead to hamstring muscle stiffness, as highlighted by recent research [15]. Furthermore, it is well recognized that rapid growth spurts can cause muscle stretching, which results in decreased flexibility [16]. Prior studies have linked hamstring tightness to lower back pain. Pelvic tilt, which alters the biomechanics of the lumbar region and results in back discomfort, is caused by hamstring tightness [17]. A muscle group's stiffness can induce compensatory motion in a nearby joint that is governed by muscles or joints with lower stiffness [18]. This certainly is a problem that needs urgent action as well as steps to manage or control it. If not, this might result in more severe health problems in the early stages of adulthood.

Conclusion

To the best of the authors' knowledge, this is the first study to determine the prevalence of hamstring tightness in schoolchildren in Pothukal Panchayath, Nilambur. The aforementioned study's findings demonstrated how common hamstring tightness is among school-age children in Pothukal Panchayath, Nilambur, Kerala; therefore, a high percentage of favorable outcomes in these children can only be indicative of the pediatric community as a whole. The majority of the age group in this study had hamstring tightness, despite the sample's uneven age distribution, indicating that the issue is not age-specific. Compared to male participants, females had a statistically significant higher percentage of hamstring tightness.

Limitations

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

Future Scope

- Future studies could include equal numbers of males and females.
- Research could aim for balanced representation in each grade.
- Investigations into the severity or degree of hamstring tightness are warranted.
- The work could be extended to different populations.
- Tracking improvements in tightness over time would be valuable.

Conflict of Interest:

No conflict of interest.

Acknowledgement:

I would like to express my sincere gratitude to all the contributors for providing me with an exceptional education and invaluable opportunities for personal and professional growth.

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