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Prevalence of Hamstring muscle tightness among undergraduate physiotherapy students from Dakshina Kannada, District: A cross sectional study

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Abstract
Background: Inability to extend the knee completely when the hip is flexed, accompanied by discomfort or pain along the posterior thigh or knee is hamstring muscle tightness. The sit and reach test is commonly used to assess flexibility of the spine and length of the hamstring muscles.
Aim: This study aims to find the prevalence of the hamstring muscle tightness among the undergraduate physiotherapy students from Dakshina Kannada District. It was tested to determine the hamstring muscle length by use of the sit and reach test in both males and females.
Results: Out of 107 respondents, the study showed 40.17% with prevalence of hamstring muscle tightness, in which tightness was found to be high in males than females. Generally, females, adults and participants with high levels of hamstring extensibility tends to have greater mean values of criterion-related validity for estimating hamstring extensibility. When the use of angular tests is limited such as in a school setting or in large scale studies, scientists and practitioners could use the sit-and-reach tests as a useful alternative for hamstring extensibility estimation, but not for estimating lumbar extensibility.
Conclusion: The present study shows medium prevalence of hamstring muscle tightness among physiotherapy students from Dakshina Kannada District.

Keywords: Hamstring muscle tightness, sit and reach test, Physiotherapy students

Introduction
Hamstring muscles are the primary muscles responsible for flexion of the knee, and as such play a significant role in normal performance of functional activities. Hamstring muscle tightness is present in all age group population and it increases with age. Sit and reach tests are widely used measurement tools for evaluating hamstring flexibility. These tests involve a slow and gradual lumbar, thoracic and hip (pelvis) flexion. This test is present in most health related fitness test batteries because it is believed that maintaining hamstring flexibility may prevent acute and chronic musculoskeletal injuries. Sit and reach tests are found on nearly all youth and adult fitness tests because of the perceived relation between performances on these tests.
The hamstrings comprise three large muscles, namely semitendinosus- membranous and biceps femoris which originate from the infero-medial impression on the upper part of the Ischial tuberosity and get inserted on the upper parts of posterior surface of tibia. They are located in the posterior compartment of the thigh and acts on the hip and knee joint. Hence, they are extensors of the hip and flexors of the knee. Muscle tightness is caused by decrease in the ability of the muscle to deform, resulting in a decrease in the range of motion at the joint on which it acts [1]. "Inability to extend the knee completely when the hip is flexed accompanied by discomfort or pain along the posterior thigh and/or knee is usually attributed to hamstring muscle tightness" [2]. Methods to assess hamstring flexibility include the Straight-Leg Raising (SLR) test, Sit and Reach (SR) test and Active Knee Extension (AKE) test [1, 4, 5].
The SLR test specificity has been questioned, as it is also widely used as a neurological test. Further, cinematographic study showed that pelvic rotation may influence the validity of SLR angle measurement Hamstring tightness occurs in early childhood and it tends to increase with age. The progressive decline in flexibility with age has been attributed to change in elasticity and decreased level of physical activities [1, 8]. Hamstring extensibility is a physical fitness component widely recognized as an important marker of health and quality of life [9].

Females tends to be more flexible than males of same age throughout the life, this is because of anatomical variation in joint structure and also performance of more rigorous physical work by men, resulting in greater micro trauma [8]. The Sit and reach test is one of the linear flexibility tests which helps to measure the extensibility of the hamstrings and lower back. It was initially described by Wells and Dillon in 1952 and is probably the most used flexibility test. It has a simple procedure, is easy to administer, requires minimal skills training for its application, and the equipment necessary to perform the test is affordable. Furthermore, it is also a field test which is easy to administer in a community setting with a large scale of population size [2].

Muscle flexibility is defined as "The ability of a muscle to lengthen allowing one joint (or more than one joint in series) to move through range of motion and loss of muscle flexibility "as decrease in the ability of the muscle to deform" resulting in decreased range of motion about a joint Hamstring tightness is higher in males than females. Anatomical causes of reduced muscle extensibility have been categorized as "muscle shortness' and "muscle stiffness. A short muscle is a musculotendinous unit that has a reduced capacity to be lengthened due to a reduction in the number of sarcomeres, or a reduction in the length or elasticity of the connective tissues (such as occurring with scar tissue formation following injury). Physiological cause of reduced muscle extensibility relate to the contractility of the muscle cells. Activity in alpha motor neurons that results in muscle contraction can increase the force necessary to elongate the homologous, muscle and his muscle will have increased stiffness, and decreased flexibility [1].

Muscle tightness is caused by sedentary lifestyle, inadequate or low levels of physical activity which leads to decrease in the ability of the muscle to deform, resulting in decrease in the range of motion at the joint on which it acts. It could make the musculotendinous unit more susceptible to injury, increase resistance to various anatomical structures, which may lead to overuse syndrome. The Shortening of hamstring occurs in those who spend a lot of time in sitting, and if they are constantly held in position that tends to shorten them they become adjusted to that position. If these people stand with hip and knee fully extended this will cause both direct pain in the immediate area and referred pain in the low back. "Many people suffer with tight hamstrings and most of the time it will not cause a problem but can be more prone to tear and also limit the activity. Tight hamstring can also be responsible for postural problems and other back problems as they will tend to pull the pelvis out of the normal position (posterior pelvic tilt), and in long run can possibly influence the sacroiliac and lumbar spine dysfunction (Reduce the lumbar lordosis) In general, an individual with tight hamstring will have a limited stride length. This translates to taking more steps over a given distance than an individual with more flexibility. More steps mean more work and more impact, greatly increasing to potential for fatigue".

Poor extensibility is a predisposing factor to muscle injury, especially with regards to the hamstring muscle group According to the USA National Collegiate Athletic Association Injury Surveillance System (1988-1989 through 2003- 2004), upper leg muscle-tendon strains constituted 10% of the practice injuries in men's football and 11% of the game injuries in men's baseball. In women's field hockey, 26.9% of the practice injuries consisted of upper leg strains. The prevalence of hamstring tightness in normal individuals is at very high rate. Many studies have proved the prevalence of hamstring tightness among normal individuals and how that functionally limits both Basic activities of daily living (BADL) and Instrumental activities of daily living (IADL).

Objectives

Primary Objective

To identify the hamstring muscle tightness among the undergraduate Physiotherapy students from Dakshin Kannada, District

Methodology

Study design: Cross sectional study.

Study Site and justification

The study was conducted at Alva's college of Physiotherapy, Moodabidri.

Sample Size

107 students

Study population

Physiotherapy students studying in Alva's college of physiotherapy.

Selection criteria

Inclusion criteria: All undergraduate physiotherapy students studying in Dakshina Kannada, District

Sampling method

Convenient sampling

Equipment

- Measuring tape
- Adhesive tape
- Permissible alternative: A standard sit-and-reach
- Yoga mat

Personnel

1. One tester/recorder

Procedure

1. Tape the measuring stick or tape measure to the floor. Place one piece of tape about 24 inches (61 cm) long across the measuring stick and at a right angle to it at the 15-inch (38 cm) mark.
2. Students warm up with non-balletic exercises involving the hamstrings and lower back (for example, by walking rapidly for 3 to 5 minutes), performing several repetitions of flexing forward from a standing, knees- straight position, reaching toward the toes, then reaching upward toward the ceiling (all without jerking): Jogging in place while trying to kick the heels into the upper thighs from behind, and finishing with standing toe- touching or similar stretching on the floor
3. Students sit shoeless with the measuring stick between the legs with its zero end toward the body, the feet 12 inches (30 cm) apart, the toes pointed upward, and the heels nearly touching the edge of the taped line at the 15-inch (38) cm) mark.
4. Students slowly reach forward with both hands as far as possible on the measuring stick, holding this position momentarily. To get the best stretch, the student should exhale and drop the head between the arms when reaching. Be sure the athlete keeps the hands adjacent to each other and does not lead with one hand. The

fingertips should remain in contact with the measuring stick. The tester may hold the athlete's knees down, if necessary, to keep them straight. A score of less than 15 inches (38 cm) indicates that the athlete could not reach the bottom of the feet.

5. The best of three trials is recorded to the nearest 0.25 inches

Data collection

Data was collected administrating the sit and reach test.

Table 1: Prevalence of hamstring muscle tightness according to gender

Gender	Normal hamstring	Tight hamstring	Total
Males	15	18	33
Females	45	29	74
Total	60	47	107
percentage	56%	44%	

Table 2: Prevalence of hamstring muscle tightness according to ages

Ages	Male (18)	Female (29)
19 yrs-21 yrs	6	12
22 yrs-24 yrs	12	17
Total	33	74
Percentage	30.9%	69.2%

Table1. Showed that Hamstring Tightness was seen in 18 male students (56%) and 29 female students (44%) out of total 107 participants. According to the table, the prevalence of Hamstring Muscle Tightness is greater in male compared to female students.

Table 2. Showed the number of participants from 19 yrs to 24yrs according to gender wise in male 33 students (30.9%) and female 74 students (69.2%) out of total 107 participants.

Discussion

Several sit and reach tests are commonly used in health-related physical fitness test batteries to evaluate the hamstring flexibility. Hamstrings muscle tightness leads to decrease range of motion of lumbar flexion and pelvic tilt. Stiffness of one muscle group can cause compensatory movement at an adjoining joint that is controlled by muscles or joints with less stiffness.

The result of present study shows that females tend to be more flexible than males of the same age throughout the life. Results also showed that males recorded higher values of hamstring tightness compared to their female counterparts across the age groups. Our study also showed that the prevalence of hamstring muscle tightness is greater in male compared to female students. These result that we should modify our expectations for hamstring muscle length based on gender.

The sit and reach test continue to focus on the distance of the fingertips to the tape as the final measure. In the majority of cases, the typical action taken in response to the sit and reach test score is to have the child practice forward bending in the long sitting position as an exercise to improve the score.

Undergraduate physiotherapy students represent a group of young-adults expected to have a good working knowledge of physical activity and related health benefits [18]. It is also predicted that prolonged tight hamstring muscle causes low back pain (Bellew et al., 2010) [19]. But Stutchfield and Coleman (2006) in their study found no association between low back pain and hamstring flexibility while studying university male rowers.[8]Regarding our study shows that prevalence of hamstring muscle tightness is more in male as compared to female.

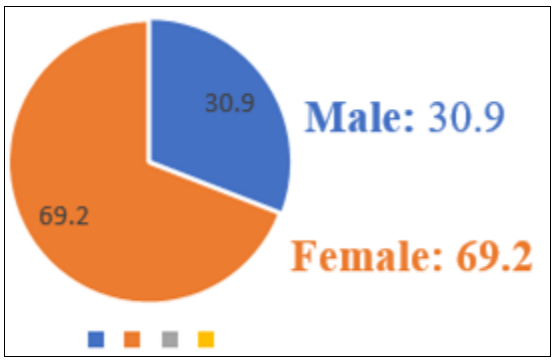

Fig 1: Percentage in gender wise Demographic data N=107

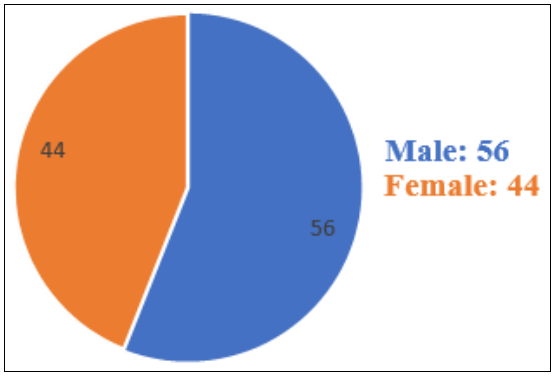

Fig 2: Percentage in prevalence of hamstring muscles tightness. N=107

Conclusion

The present study showed medium prevalence of hamstring muscle tightness among physiotherapy students of Dakshina Kannada. The prevalence of hamstring muscle tightness is found to be greater in male compared to female students.

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