



## Original Research

## Prevalence of hamstrings tightness and its impact on lower extremity function in asymptomatic individuals with prolonged standing hours

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## Abstract

**Background:** Hamstrings undergo adaptive shortening. It is common in healthy individuals having sedentary lifestyle affecting males (91.8%) more than females (78.7%). Hamstring tightness can interrupt ADL's predisposing the person to further health problems i.e. plantar fasciitis, sacroiliac joint pain, decreased lumbar lordosis, knee pain, quadriceps malfunction, postural disturbances, overstretched lumbar ligaments, reduced muscle strength. **Aims and Objectives:** To analyze the prevalence of hamstrings tightness and its effects on lower extremity function in individuals with prolonged standing. **Materials and Methods:** 65 participants were chosen for this cross-sectional study by convenient sampling and all of them were female nurses. The hamstrings tightness was measured by the data collection tools i.e. lower limb task questionnaire, straight leg raise test, active knee extension test after having the consent forms signed by the participants. The data was collected from three big hospitals of the city. **Results:** The results of the study conducted to see the prevalence of hamstrings tightness and its impact on lower extremity function in asymptomatic individuals with prolonged standing hours showed that only 15.38% of the sample (n=65) with mean age 31-35 years were found with bilateral hamstrings tightness while 84.62% were found with no hamstrings tightness. **Conclusion:** The prevalence of hamstrings tightness in asymptomatic individuals with prolonged standing hours is low.



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## Introduction:

A group of large muscles in the body, occupying posterior compartment of thigh, that enables a person to walk, run or jump by providing the ability to extend the hip joint and flex the knee joint is referred to as hamstrings muscle group. It is among the most important muscle groups to support gait cycle yet the most common amongst the ones that are more often prone to injury. A healthy hamstrings can make a person active, agile and responsive in performing activities of daily living effectively<sup>1</sup>.

Hamstrings occupy great importance in the body as it is necessary for locomotion at all ages and in every profession. It has a significant impact on athletes, elderly people, young and middle-aged men and women, students and professionals as an injured hamstring makes a person unable to move pain free. It can affect an athlete's performance badly if it is not in a good form<sup>2</sup>. It can also affect postures of students who had long sitting hours. It can also affect the professionals that have long standing hours. It can affect males and females with low back pain. On the contrary, a hamstrings in good form makes it easier for everyone to effectively perform the ADL's<sup>3</sup>.

### Hamstrings Tightness and Prolonged Standing

Static postures when adopted for prolonged periods predispose the body to overuse syndrome, which can be very harmful for the musculoskeletal health. In order to avoid such health problems, people are educated to adopt healthy postures. A good posture can help prevent musculoskeletal injuries, on one hand, by aligning the body segments properly and, on the other hand, by transferring the upper body weight to the lower body safely. Health care professionals emphasize on adopting safe postures to preserve spinal health<sup>4</sup>.

Prolonged standing period can have a negative effect on hamstrings flexibility<sup>5</sup>. It may occur due to disturbances in the length tension relationship of the muscle. Undue stress can affect the musculotendinous unit thus predisposing the muscle to abnormal length i.e. shortened or lengthened which eventually cause tightness or reduced flexibility in the muscle<sup>6</sup>. Moreover, as the hamstrings muscle group has the same origin as lumbar extensors, tightness in one group can lead to reduced flexibility in the other group thus affecting spinal health<sup>7</sup>.

During prolonged standing, abnormal length of hamstrings i.e. shortened or lengthened may cause the pelvis to rotate abnormally. For example, during standing, shortened or tight hamstrings cause the pelvis to rotate backwards, leading to posterior pelvic tilt. While a lengthened hamstring causes the pelvis to rotate anteriorly leading to anterior pelvic tilt. Both these abnormal postures make the hamstrings less flexible, inducing a feeling of tightness<sup>8</sup>.

A muscle group shows adaptive shortening if it is immobilized in a shortened position due to which it loses its elasticity and flexibility making the musculotendinous unit more susceptible to injury<sup>9</sup>. Hamstrings shortening is caused by aging, sedentary lifestyle, abnormal postures, immobilization, injury or genetic predisposition. Disturbed length tension relationship of muscle increases resistance to several anatomical structures. It also disrupts the neuromuscular control, altering joint's arthrokinematics, affecting synergistic patterns of entire kinetic chain. It can lead to undue stress on soft tissue, vascular or lymphatic stasis, and neural compromise<sup>10</sup>.

## Rationale of Study

The rationale of this study is to see the prevalence of hamstrings tightness and its effect on lower extremity function in asymptomatic individuals with prolonged standing. It is a rarely seen phenomenon i.e., hamstrings tightness prevalence in prolonged standing, in the population of nurses. This study is being conducted in order to see if prolonged standing can cause hamstrings tightness.

### Literature Review

A study conducted on college students in order to see if they have tight hamstrings. 100 subjects aging 18-25 years were taken involving both genders. Special tests were performed and results were recorded. Results showed that male subjects have 27.5% severely tight left hamstrings muscle while female subjects showed 44% tightness in the right hamstrings<sup>2</sup>. Linear prevalence of tight hamstrings is greater in females than in males<sup>11</sup>.

A study was conducted to see the effect of hamstrings tightness in male athletes at university of Paradeniya. A tight hamstring caused decreased effectiveness of performance with high incidence of hamstrings injury. For this purpose, healthy male athletes with hamstrings tightness were selected for the trial and received intervention. The results showed that the athletes involved in contact sports are much more affected by hamstrings tightness rather than those who are engaged in martial arts etc. irrespective of the duration of warm up or cool down period<sup>12</sup>.

A descriptive cross-sectional study was conducted on diamond as sorters in order to see the prevalence of hamstrings tightness among them. After performing specialized tests, it was concluded that the incidence of hamstrings tightness is very high among diamond as sorters. According to results, 95.3% workers had tightness right hamstrings while 94% workers had tightness in left hamstrings. The company was suggested to improve workplace ergonomics in order to prevent musculoskeletal disorders<sup>13</sup>.

### Materials and methods

It Cross-sectional Study design was used. The Sample Size was 65. Convenient Sampling technique was used. The Duration of the study was 4 months after approval of synopsis, the data was collected and analyzed. The study was conducted at Faisal Hospital (Oncology Department), OPD Allied Hospital (Nephrology Department), OPD FIC Hospital (Intensive Care Unit). Inclusion Criteria was comprised of Asymptomatic Individuals with prolonged standing period (6-8 hrs.), Female nurses, Age: 20-40 years. The Exclusion Criteria included, Individuals having recent trauma and surgery (in past 6 months), Pregnant nurses, Diabetic patients., Individuals having neurological disorders i.e. unconscious, non-cooperative, Individuals with disability and Individuals having systemic, metabolic, inflammatory diseases. In this study convenient sampling technique was used to select the participants. After taking the consent, standardized questionnaire was given to the participants. This questionnaire was used to collect the data regarding the activities of daily living, recreational activities and lower extremity function. Moreover, the scores/values of standardized tests for hamstrings tightness i.e. SLR and AKE were recorded by the following procedures. The

active knee extension test (AKE) was performed such that the target limb was set free while the other one was strapped to the bed while the subject was asked to be in supine position<sup>14</sup>. The target limb was marked at the greater trochanter of femur and the lateral malleolus of ankle and a line was drawn to join the markings. The knee flexion axis was also marked. The goniometer was placed along the knee in such a way that one of its limbs lied along the thigh and the other one lied along the leg and the subject was asked to bring the thigh in 90° vertical position. Meanwhile, the subject was asked to extend the knee actively as far as he/she could for 3 seconds. The angle at the goniometer indicated the required AKE angle. An angle greater than 20 degrees indicated tightness<sup>1</sup>. The straight leg raise test (SLR) was performed in such a way that the subject lied supine without having pillow under the head. The hip joint was abducted, rotated medially while the knee joint was extended to full extent. The subject was given support at the ankle to help lift the leg with the extended knee and was asked to fully raise the leg. Meanwhile, the goniometer placed along the lateral condyle of femur, with stationary limb toward the greater trochanter and moving limb towards the lateral malleolus, measured the SLR range of the hip joint. An angle less than 80 degrees indicated tightness<sup>15</sup>.

### Discussion

The study was conducted to see the prevalence of hamstrings tightness and its effects on lower extremity function in asymptomatic individuals with prolonged standing hours and the population of nurses was chosen. With the help of data collection tools i.e. LLTQ, AKE, SLR, the results were collected from three big hospitals of the city and then analyzed with the help of SPSS version 25. The results showed that out of a sample size of 65, 10 subjects were reported with bilateral hamstrings tightness (with a mean age of 30-35 years) and subsequent functional limitations while 55 subjects were reported with no hamstrings tightness. It means that 15.38% of the sample showed bilateral hamstrings tightness while 84.62% were found with no hamstring's tightness. These results suggest that prolonged standing hours do not affect the flexibility of hamstrings muscle group. Prolonged standing is not the only reason for hamstrings tightness to prevail in subjects with hamstrings tightness<sup>2</sup>

A study conducted on college students in order to see if they have tight hamstrings. 100 subjects aging 18-25 years were taken involving both genders. Sit and reach test was performed and results showed that male subjects with a mean age of 21 years have 27.5% severely tight left hamstrings muscle while female subjects with a mean age of 19 years showed 44% tightness in the right hamstrings. The prevalence of tight hamstrings is greater in females as compared to males. But the results of the recent study showed that the prevalence of hamstrings tightness among asymptomatic individuals with prolonged standing hours is low<sup>16</sup>.

### Conclusion

The results of this study concluded that only 15.38% of the asymptomatic individuals with prolonged standing hours had hamstrings tightness which means that prevalence of hamstrings tightness is low among a population of female nurses

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**RESULTS**

Table no:01 This table shows total score in lower limb task questionnaire. The mean value of hamstrings tightness was 67.1000 and standard deviation was 7.57848.

1.Lower limb task questionnaire total score

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 57.00	1	10.0	10.0	10.0
61.00	2	20.0	20.0	30.0
62.00	1	10.0	10.0	40.0
64.00	2	20.0	20.0	60.0
73.00	1	10.0	10.0	70.0
75.00	1	10.0	10.0	80.0
76.00	1	10.0	10.0	90.0
78.00	1	10.0	10.0	100.0
Total	10	100.0	100.0	

Table 2 showing the distribution of patients feeling hamstrings tightness pivoting and twisting while rminute

Pivot or twist quickly while running

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Severe Difficulty	1	10.0	10.0	10.0
Moderate Difficulty	1	10.0	10.0	20.0
Mild Difficulty	1	10.0	10.0	30.0
No difficulty	7	70.0	70.0	100.0
Total	10	100.0	100.0	

Table 3 Table showing the distribution of patients feeling hamstrings tightness in stopping and starting to move quickly

Stop and start moving quickly

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate Difficulty	1	10.0	10.0	10.0
Mild Difficulty	6	60.0	60.0	70.0
No difficulty	3	30.0	30.0	100.0
Total	10	100.0	100.0	

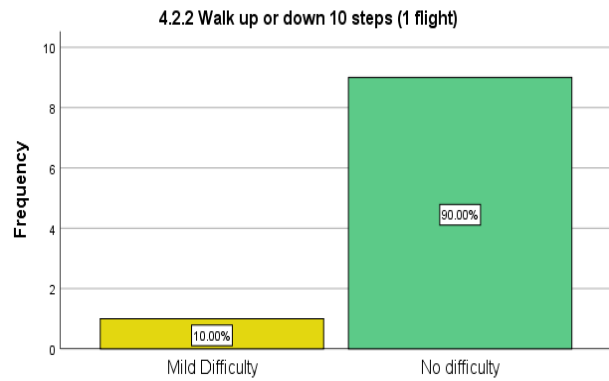


Fig 1. Bar chart showing the distribution of patients feeling hamstrings tightness in walk up or down 10 steps (1 flight)

Pie Chart for clinical diagnosis:

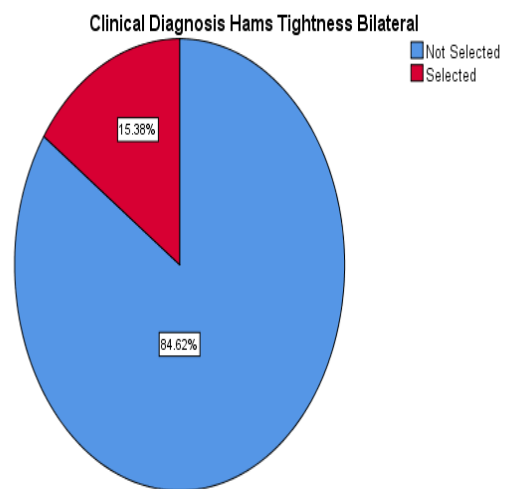


Fig 2. Pie chart showing the distribution of hamstrings tightness bilaterally.