

# Prevalence Of Hamstring Tightness Due To Prolonged Sitting Among Administrative Staff : Cross Sectional Study

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## ABSTRACT

**Background:** Hamstring muscle (HMS) tightness is known as the impotence of full knee extension while the hip is flexed which creates discomfort or pain along hip to knee in posterior compartment of thigh.

**Aim:** To evaluate the prevalence of HMS tightness among administrative staff due to prolonged sitting.

**Study Design:** Cross sectional study.

**Methodology:** Present study was conducted among 274 participants from administrative staff of Government College University Faisalabad (GCUF), Faisal Hospital and Commissioner Office Faisalabad (Fsd). To measure the popliteal angle, Active Knee Extension Test (AKE) was performed. Data analyzed by SPSS 17.0v.

**Results:** This study showed that out of 274 participants 152 subjects showed hamstring tightness with prevalence of 55.5%. As the age advances, the HMS tightness also increases.

**Conclusion:** This study concluded that almost more than half participants from administrative staff of GCUF, Faisal Hospital and Commissioner Office Fsd have HMS tightness.

**Keywords:** Active Knee Extension Test, Popliteal Angle, Hamstring Tightness, Prevalence, Prolonged Sitting.

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## INTRODUCTION

Hamstrings consist of three muscles semi membranous, semitendinosus and both long and short heads of Biceps Femoris. HMS are located at the posterior compartment of thigh from hip to knee and from medial to lateral aspect. These all muscles pass from hip and knee joint. They perform flexion of knee and extension of hip. The muscle semitendinosus arises from ischial tuberosity and insert at medial side of tibia. 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 side of fibula. Muscle tightness is caused by the reduction in the ability of a muscle to deform. When the hip is flexed, the inability of knee to extend fully is known as Hamstring muscle tightness.<sup>1,2</sup>

Hamstring Muscle tightness is defined as when the knee extension angle becomes greater than 20 degree.<sup>3</sup> There are different methods to access HMS flexibility i.e. Straight Leg Raising (SLR) test, Active Knee Extension (AKE) test and Passive Knee Extension (PKE) test.<sup>4</sup> Straight leg raise test is mostly performed to evaluate the tightness of HMS but it is less specific to hamstring muscle due to movement of pelvis. That is why straight leg raise test is in appropriate for the measurement of HMS tightness to some extent. Active knee extension test is considered very specific for measuring tightness of HMS because it involves the movement at knee joint, rather than the hip joint. While straight leg raise involves movement of both hip and knee joint. SLR is basically a passive test in which the physiotherapist administers the force and final point of this test is merely force dependent. While, AKE test is an actively performed test because during this test the end position is totally depend on the tension of the subject

which is developed in quadriceps of subject and in available pain free range of motion of joint.<sup>5</sup> In AKE test as the end point is mentioned by user himself that is why this test is safer. This test is performed within in the pain free range of subject's range of motion. So this test is more reliable than any test. AKE test is excellent for finding hamstring flexibility.<sup>6</sup>

Flexibility is vital component of fitness. It is required for most of the musculoskeletal function. It is also necessary for the optimal performance of physical activities. When the muscles get tightened then the performance of these muscles is affected and the person is unable to do work with in pain free range of motion.<sup>7</sup> Muscle tightness is not only the cause of reduction of range of motion but also leads to various musculoskeletal problems. HMS are attached to tuberosity of ischium. This tuberosity is part of posterior aspect of pelvis. That is why tightened HMS may affect the low back area and may cause LBP in some persons. Now in present times it is known as a very common health issue. Obesity, absence of regular exercise and sedentary daily routine are being observed as risk factors of it. Shortened HMS are cause of LBP. Prolonged sitting position which are adopted in many work places and sedentary daily lives are related to hamstring muscle tightness along with associated LBP. Extended sitting can cause HMS tightness. Fitness is the most important component to perform different physical activities. HMS tightness reduces range of motion. Hamstring tightness also causes postural changes. If muscle get tightened then blood vessels under the muscles compresses and hence muscle performance is reduced. Tightness can also effects the motor control pattern and due to this HMS work as stabilizers instead of their own main function i.e. Prime movers. Sitting for longer duration can cause hamstring tightness. The person who has sedentary life style is more prone to HMS tightness.<sup>8</sup>

Age is also contributing factor for hamstring flexibility and cause HMS tightness along with factor prolonged sitting. As the age advances, there is a decline occur in muscle mass, strength and functional capacity. Hamstring flexibility reduces as the age advances and tightness increases as the age progresses.<sup>9</sup> Age has a proper impact on hamstring tightness. HMS tightness increases from 5-12 years of age group to 40-49 years of age.<sup>10</sup>

The person's ability to move without any difficulty is mainly depends upon flexibility. HMS are related to such a muscle group which has ability that their flexibility can be reduced due to many factors. Muscles get tightened when the tendency of muscles deformation decreases. That is why the range of motion decreases. When HMS are unable to achieve extension of knee higher than 160 degree with flexion of hip with 90 degree, it is said to be hamstring tightened. Due to HMS tightness hamstring injuries can occur which are difficult to heal. LBP is also cause by hamstring tightness.<sup>11</sup>

The objective of the study was to evaluate the prevalence of HMS tightness among administrative staff due to prolonged sitting.

**METHODOLOGY**

Present study was conducted among 274 participants from administrative staff of Government College University Faisalabad (GCUF), Faisal Hospital and Commissioner Office Faisalabad (Fsd). To measure the popliteal angle, Active Knee Extension Test (AKE) was performed. The questionnaire consisted on two parts; one was related to personal information and second was designed to collect information related to HMS tightness. Males and Females of age 25 years to 60 years were included. Working hours were more than 6 hours a day. AKE test was used to evaluate the Hamstring muscle tightness. Active Knee Extension test has good psychometric properties. Goniometer was used to measure the popliteal angle. When the Popliteal angle becomes greater than 20 degrees then it is considered as HMS tightness.

**Statistical analysis:** The collected data was analyzed in SPSS-17 version for both descriptive and inferential statistics. Frequency distributions were used to present the demographic information of the participants. Chi- Square test was used to assess the association between age and HMS tightness and also to find the association between sitting hours during duty and HMS tightness

**RESULTS**

The results of table-1 showed that 44.5% patients had normal range of motion and normal value of popliteal angle i.e < 20 degree. While 55.5% showed popliteal angle value greater than 20 degree, they showed HMS tightness. The results of table-2 showed the HMS Tightness and its association with sitting hours through chi-square is 0.640 and p-value is 0.887.

Table 1: Hamstring Muscle Tightness.

Popliteal angle	Frequency	%age
<= 20 degree (Normal)	122	44.5
Mean± S.D.	24.62±8.48	
21+ degree (Abnormal)	152	55.5
Total	274	100.0

Table 2: Hamstring popliteal angle/Muscle Tightness and its association with Sitting hours

	Hamstring muscle		Total
	<=20(Normal)	21+(Abnormal)	
<b>3-4 hours</b>	<b>2</b>	<b>1</b>	<b>3</b>
% of sitting hours	66.7%	33.3%	100%
% of popliteal angle	1.6%	0.7%	1.1%
% of total	0.7%	0.4%	1.1%
<b>4-5 hours</b>	<b>2</b>	<b>3</b>	<b>5</b>
% of sitting hours	40%	60%	100%
% of popliteal angle	1.6%	2%	1.8%
% of total	0.7%	1.1%	1.8%
<b>5-6 hours</b>	<b>16</b>	<b>20</b>	<b>36</b>
% of sitting hours	44.4%	55.6%	100%
% of popliteal angle	13.1%	13.2%	13.1%
% of total	5.8%	7.3%	13.1%
<b>More than 6 hours</b>	<b>102</b>	<b>128</b>	<b>230</b>
% of sitting hours	44.3%	55.7%	100%
% of popliteal angle	83.6%	84.2%	83.9%
% of total	37.2%	46.7%	83.9%
<b>Total</b>	<b>122</b>	<b>152</b>	<b>274</b>
% of sitting hours	44.5%	55.5%	100%
% of popliteal angle	100%	100%	100%
% of total	44.5%	55.5%	100%

**DISCUSSION**

In this study a questionnaire survey was conducted to find the prevalence of HMS tightness. The different causes and consequences of this condition were observed and after that they were interpreted by the responses of the participants. In our study the major and the main variable was prolonged sitting duration. In this study we took four intervals of age groups first group was consisted of subjects having age less than or equal to 30 years. They were about 39.8%. The next second group was consisted of subjects having age ranges from 31 years to 35 years. And they were 18.6%. Third group was consisted of subjects having age from 36 years to 40 years and they were 17.5%. In forth group subjects having age 40 plus years are confined and they were 24.1% with mean= 34.49 and S.D of 9.001.

HMS tightness and its associated problems also affect the social life of a person. These conditions affect the activities of daily living of the subjects. There were many surveys done in the past which said that pain is not a good feeling but actually it is a feeling of discomfort that may be in any part of the body but its level is only brain.<sup>12</sup> HMS tightness increases with increasing age. As the age increases there is decline occurs in muscle mass and functional capacity. Muscle mass decreases because the number of individual muscle fiber decreases.<sup>13</sup> Administration profession is that profession in which the chances of HMS tightness are more because of more hours sitting position during their work. HMS are prone to injury and Tightness in HMS leads to the hamstring injuries and they are slow to recover and create severe health problems.<sup>14</sup> There is possible relation between LBP and HMS tightness. When HMS get tightened the performance of muscle reduces due to associated pain. HMS tightness affect the low back region and can cause LBP.<sup>15</sup> HMS tightness increases with increasing age. As the age increases there is decline occurs in muscle mass and functional capacity.<sup>16</sup> Muscle mass decreases because the number of individual muscle fiber decreases Administration profession is that profession in which the chances of HMS tightness are more because of more

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**Limitations:** Present study had number of limitations like small sample size, financial constrains and limited resources.

## CONCLUSION

This study concluded that there is 55.5% prevalence of HMS tightness due to prolonged sitting among administration staff. This study also concluded that as the age advances the chances of HMS also increases.

**Author's contribution:** MJ&TA: Overall supervision, write up and literature review. AM & FZ: Statistics application analysis literature review, help in write up. WL & TL: Literature review help in write-up.

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