Prevalence of Iliotibial Band Tightness in Prolonged Sitting Subjects

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Abstract

Context: Musculoskeletal disorder are group of disorder that affect the musculoskeletal system involving nerve, tendon, muscle supporting structure. Muscle tightness leads to an imbalance in acting on the joint and in the long term can lead to pain and weakness and can cause several problems which can lead to have difficulties while walking and doing other activities. Flexibility is vital component of fitness for musculoskeletal functioning and maximizing the performance of physical activities And sedentary lifestyle can hamper the flexibility of the muscles. Tightness in muscles also reduces the range of motion .So there is need to aware people about the risk factors for poor health due to sedentary lifestyle. Hence the aim was to find the muscle tightness due to sitting for minimum 7 to 8 hrs at one place.

Method: In this consecutive study, 60 subjects were taken with working for 7 hours or more per day between age group 20-60 yrs, were included which consisted of 42% of females and 58% of males respectively. Thus tests such as ober's test, sit and reach test and straight leg raise test were performed.

Result: The tests which were correlated with the duration of working hours of sitting for more than 6-7 hours and the results showed that the ober's test was positive in 47% subjects. According to straight leg raise test the test was positive in 42% subjects and 53% subjects have fair flexibility according to sit and reach test.

Conclusion: By this study, it was found that there was 47% of prevalence of iliotibial band tightness in subjects who were being sedentary for more than 7 hours per day with p value of <0.0001.

Keywords: *Iliotibial band, lower Extremity, Tightness, Flexibility.*

Introduction

The vital component required for most advisable musculoskeletal functioning and increasing the performance of physical activities is flexibility. Flexibility dysfunction is a widespread problem which is faced by common people. Hamstring tightness is not only one factor for decreased range of motion but can leads to other orthopedic problems.[1]

Anatomy: The iliotibial band is a non-elastic collagen, long structure which crosses both the hip and knee joints on the lateral thigh. The fascia originates proximally from the iliac crest. It blends into one structure after converging from the tensor fascia lata muscle anteriolaterally and gluteus maximus posteriorally.[2]

Biomechanics: The pull of the iliotibial band in a static standing position is easily described. Proximally the combined pulls of the tensor fascia lata and gluteus

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maximus muscle with the lineaaspira attachment helps maintaining the band's position over. The biomechanics of band's pull is more complicated when locomotion is involved.[2]

The study has shown that the high rate of muscle tightness is among the people who are having prolonged sitting hours and their sedentary lifestyle. Being sedentary or not participating in sufficient physical activities leads to shorten and tighten muscles. Muscles becomes sore when tension occurs in under used muscles which results in muscle shortening. Elongation of muscles by providing oxygenated blood to them can alleviate the tightness.[4]

Mechanism: Physical activity leads in the working of circulatory system to provide oxygen rich blood through out the whole body to the muscles. When sedentary the muscles can go into tightness due to lack of oxygen. When sitting for long periods of time, person may round the shoulders involuntarily. And this position can cause shallow breathing which will result in lacking of oxygen supply to the muscle tissues.[4]

Cause: A reduction in ability of muscle to deform which leads to a lower range of motion is the main reason for muscular tightness. One of the main cause for postural abnormalities in modern society is due to sedentary style of living. The prolonged sitting hours required in educational setup,jobs can affect flexibility of the soft tissues. The tightness of muscle is very common problem in students, working people, having prolonged sitting hours. Exposure to high levels of sedentary time in office environment, office workers has to becomeon where they spend between two third and third quarter of their Working hour sitting with high proportion is prolonged, unbroken bouts[3]. Sedentary for 30 mins or more. Limited flexibility causes neuro-musculoskeletal symptoms leads to decrease in strength, endurance and stability.

Ideal prolonged sitting time is 30 bouts or more than that.

Ergonomics: Ergonomics can be described as the fit between people and the elements of the physical environment with which they interact. Sitting is involved in any work situation the chair represents the primary support system which puts the users in contact with the workstation. Erect posture is a situation in which the head, trunk and lower legs are vertical and upper leg and arm are horizontal. Prolonged muscle contraction along with maintaining in awkward up supported sitting posture may result in reduced blood flow and consequent local dysfunction of muscle tissue. Electrical activity in muscle has been shown to decrease when the trunk thigh. When the trunk thigh angle is less than 90 degree, pressure on the internal organs of the body is increased. Pressure on the thighs, buttocks and the lower legs are to steep which result in impaired blood flow to these region. This effects is increased if the seatpan is too high or too low.[5]

Aims: To find the prevalence of the iliotibial band tightness in prolonged sitting subjects.

Objectives: To determine the prevalence of the tightness of iliotibial band in prolonged subjects.

Material

It was an observational study comprised over a period of 24 weeks. consecutive method was used for calculating sample size. As per sample size calculation, 59 was the actual sample size, 60 subjects were included using random sampling method for data collection. We had selected only those subjects who have 7 to 8 hr of sitting. Subjects with any recent trauma history, recent fractures, any pain due to pathology in lower limb, decreased range of motion due to stiffness in knee and ankle and soft tissue injury of lower limb were excluded from the study.

Methodology: After receiving clearance from the institutional human research ethical committee of Krishna institute of medical sciences 'deemed to be' university for this study, Informed written consent was taken from all the subjects. Fifty nine subjects fulfilling the inclusion criteria i.e subjects who are sedentary for minimum 7 to 8 hrs in a day and people who spend most of the time sitting on the chair. were included. After taking consent and necessary demographic data including name, age, sex, weight, height, sitting hours per day, type of toilet used were inquired. All the subjects were assessed using three tests: Angle of straight leg raise was measured using a universal goniometer. Sit and reach test was performed based on grades and ober's test was also performed.

Statistics:

1. Working Duration in Sitting:

Duration in Hours	
7 Hr	23%
8 Hr	75%
9 Hr	2%

2. Type of Toilet

Type of Toilet	
Indian	88%
Western	12%

3. Straight Leg Raise Test

Positive	42%
Negative	58%

Working Hours in Sitting	SLR Test		Total
	Positive	Negative	
7	8	6	14
8	18	28	46
Significance	Chi square value- 1.036,	p-value -0.03087	60

Interpretation:

p value = 0.03087 the straight leg raise test in relation to working hours of sitting is not significant.

4. Ober's Test

Positive	47%
Negative	53%

Working hrs	Ober's Test		Total
	Positive	Negative	
7	5	9	14
8	25	21	46
Significance	Chi square test- 4.602	p value- 0.0319	60

Interpretation:

p value= 0.0319 the ober's test in relation to working hours of sitting is not significant.

5. Sit and Reach Test:

SIT and Reach Test	
Poor	15%
Fair	53%
Average	32%

Working hrs in sitting	Sit and reach test				Total
	Poor	Fair	Avg	Good	
7	1	8	5	0	14
8	7	25	11	2	45
9	1	0	0	0	1
Significance	Chi square test- 25.930	p value -0.0011			60

Interpretation:

p value= 0.0011 the sit and reach test in relation to working hours of sitting is not significant.

Inclusion Criteria:

1. Subjects who are sedentary for minimum 7 to 8 hrs in a day.
2. People who spend most of the time sitting on the chair.

Exclusion Criteria:

1. Recent Fractures of lower limb.
2. Any pain due to pathology in lower limb.
3. Decrease range of motion due to stiffness in knee and ankle.
4. Soft tissue injury of lower limb.

Limitations:

1. Only one muscle was considered for the study.
2. Simple size was less.

Suggestions:

1. Other muscle groups can be assessed.
2. Various professions can be taken for the study.

Result

The tests which were correlated with the duration of working hours of sitting for more than 7-8 hours and the results showed that the ober;s test was positive in 47% subjects. According to straight leg raise test the tests was positive in 42% subjects and 53% subjects have fair flexibility according to sit and reach test, which showed not significant (p= 0.0319) for ober's test in subjects (n=10), straight leg raise test showed not significant (p = 0.03087), sit and reach showed not significant (p= 0.0011).

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Conflicts of Interest: There are no conflicts of interest.

Ethical Clearance: An ethical clearance certificate was obtained from the Institutional Committee Krishna Institute of Medical Sciences Deemed to be University, Karad.

Discussion

The vital component required for most advisable musculoskeletal functioning and increasing the performance of physical activities is flexibility. Flexibility dysfunction is a widespread problem which is faced by common people. Muscle tightness is not only one factor for decreased range of motion but can leads to other orthopedic problems. Being sedentary or not participating in sufficient physical activities leads to shorten and tighten muscles. Muscles becomes sore when tension occurs in underused muscles which results in muscle shortening. Elongation of muscles by providing oxygenated blood to them can alleviate the tightness.[1]

The study shows that how much the effect is caused due to prolonged sitting. The study is one of its kind providing basic information regarding impact of iliotibial band tightness due to prolonged sitting. To our knowledge no such study is conducting to observe the impact of prolonged sitting on iliotibial band.

Few tests were carried out such as straight leg raise test, sit and reach test and ober's test which were conducted among 60 subjects. It was studied in the population including bankers, IT professional workers and other people working for more than 6-7 hours. They were also examined according to the type of toilet they used in their daily lives. And how much time they spend by sitting. The results were achieved by correlating the working hours of sitting with the tests.

The SLR test was performed using a universal goniometer. All the tests were performed following the procedures. The mean value of SLR test was observed to be 0.4166 which falls below the border line. (p- value = 0.03087, Chi square value- 1.036) and it was found that in 42% subjects the test was positive and in 53% the test was negative. Further sit and reach test was conducted(p value = 0.0011, Chi square test- 25.930) for assessing the flexibility and was found that 15% subjects have poor flexibility, 53% have fair flexibility and 32% subjects have average flexibility according to the grades. Also Ober's test was performed which is the important factor to know iliotibial band tightness. (P value = 0.0319, Chi square test- 4.602) the results were that in 45% subjects the tests came positive and in 53% subjects the tests came negative. an inverse correlation was found between the tests and chair sitting hours.

In another study " extended sitting can cause hamstring tightness" which was studied by FATIMA G and QAMAR .M conducted among students, 200 students were examined for hamstring tightness and hamstring tightness was a very common complaint among this population too. The mean value of SLR was found to be 60.97 ±10.21. 164 (82%), had tightness according to SLR test. There was a statistically significant difference between the popliteal angle and chair sitting hours (P= 0.010) and an inverse correlation was found between SLR angle and chair sitting hours (r= -0.56, P =0.010) and it was concluded that tightness of hamstrings is observed in a majority of the students. Long duration sitting can be contributory factor in hamstring tightness.

The study claimed that maximum flexibility is found in mid 20's to 40's and the main reason for this is prolonged sitting hours and sedentary lifestyle.[1]

In the current study, it was seen that there is a tendency of increase in iliotibial band tightness with the increase in the number of sitting hours.Many other etiological

factors can be responsible for reduced flexibility. Further research with more vigorous methodology is required to established a cause-effect relationship between sitting hours and iliotibial band tightness . however further studies are required with a large sample size to get a deep insight about the cause effect relationship.

Conclusion

By this study, it was found that there was 47% of prevalence of iliotibial band tightness in subjects who were being sedentary for more than 7 hours per day with p value of <0.0001.

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