

Association of Prolonged Cross-Legged Sitting with Iliotibial Band Tightness Among University Students

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¹ Substantial contributions to the conception or design of the work for the acquisition, analysis or interpretation of data for the work, ² Drafting the work or reviewing it critically for important intellectual content, ³ Final approval of the version to be published, ¹ Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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A B S T R A C T

Background: The human erect posture has been linked to the iliotibial band, also known as Maissiat's band. The ITB is a fibrous and tough fascial tissue that extends from the iliac crest to the lateral proximal tibia. Increased tension or stiffness in the iliotibial band is referred to as ITB tightness. Flexibility is a critical element needed for optimal musculoskeletal function.

Objective: To investigate the association between prolonged cross-legged sitting with IT band tightness among university students.

Methodology: It was a cross-sectional study. Total 266 university students from The University of Lahore, aged 20-27 who regularly cross-legged were included through convenient sampling. The prolonged cross-legged sitting duration was set for about 1 hr. - 5 hrs. a day. After getting ethical clearance from the University of Lahore's research and ethics council. A self-designed questionnaire, NRPS and Ober's test was utilized to find out ITB tightness and related pain and discomfort. Data was analyzed using SPSS version 26.

Results: The results revealed that out of all participants, 16.9 % spend 1-2 hours, 26.7% spend 2-3 hours and 27.1% spend 3-4 hours, while 29.3% spend 4-5 hours seated cross-legged in a day. The Chi-square p-value of 0.077 indicates that there is no statistically significant association between the number of hours spent sitting cross-legged in university and the results of Ober's test.

Conclusion: In conclusion, the study shows that increasing iliotibial band tightness is not caused by prolonged periods of cross-legged sitting in university students.

Keywords: Cross-legged sitting, ITB, long sitting hours, university students, tightness.

Introduction

Man's evolution encouraged him to sit for extended periods of time, which changed the body's biomechanics and physiology. Sitting posture can lead to musculoskeletal issues and physical discomfort that may or may not be related to learning in an educational context. Adults and adolescents sit for 7.7 hours a day on average.¹ Higher education environments' contextual elements may encourage extended sitting times. University students frequently engage in activities that require extended periods of sitting, such as attending class,

studying, and using screens.² University students often adopt the cross-legged-sitting (CLS) posture, which is described as "sitting with one leg over another" It takes flexion and adduction of the hips to keep one's legs crossed during sitting on chair.³

A 2023 study by Alsirhani H, et al. found that ten minutes of upright cross-legged sitting can have negative side effects including disruption of pressure in the Gluteus Maximus, Medius and Minimus, and an imbalance in the pelvis's horizontal and inlet planes.⁴ Naveed Ahmad, et al. found that low back discomfort and tightness in iliotibial band was significantly correlated. Due to muscular strain, students maybe

more likely to have lumbopelvic pain.⁵ Abhijeet Arun's 2020 study found that children who sat on cross legs showed greater lumbar flexibility.⁶ Byung Joon Lee's 2016 study showed that, sitting with legs-crossed caused right trunk-length to decrease and the right pelvis to rotate more posteriorly than the left side.⁷ Yongnam Park, PT, et al. in 2014 found postural abnormalities in adults who cross their legs when sitting.⁸ Prolonged sitting contributes to the prevalence of musculoskeletal illness in Pakistan. University students, who often balance academic expectations with sedentary study habits, may be more susceptible to musculoskeletal problems like IT band tightness.

The objective of this research was to ascertain whether extended sitting with crossed legs and tightness in the IT band are related among. Exploring the association can provide insights into the impact of cross-leg sitting on Musculo-skeletal health in young population. Research findings can also inform the development of student-focused fitness program. Also, it will educate students whether sitting with crossed-legs for prolong duration will affect negatively on their MSK health or not.

Methodology

The University of Lahore's research and ethics committee gave its ethical approval for this work, with reference number (REC-UOL-266/08/24). The cross-sectional study design was used. The sample size of 266 was calculated using the 47% prevalence of IT-band tightness from a former study.⁹ Participants were selected using non-probability convenient sampling technique from University of Lahore. Two variables were set prolonged cross-legged sitting and ITB tightness, the duration for prolonged crossed-legged sitting was set for about 1 hr. - 5 hrs. concerning a previous study that showed that sitting continuously for more than 6 hrs. have a high level of stress on the IT-band due to knee's hyperflexion, leading to pain and tightness in their knee area.¹⁰ Data collection was done by using a self-designed questionnaire, written informed permission was obtained from all the participants. 266 subjects meeting the requirements for inclusion i.e., subjects who are university-going and spend most of the time sitting with legs crossed on the chair. While subjects with any history of recent fracture of lower extremity or with pain due to pathology in the lower extremity and Non university going students were excluded. After obtaining consent, necessary demographic data including age, sex, sitting hours per day, type of cross-legged sitting posture, preferred leg for leg crossing and cross-legged sitting hours per day was inquired. All the subjects will be assessed using three tests: Ober's test will be performed on the leg, that is crossed when sitting, Numeric Pain Rating scale will be used to measure pain or discomfort, and functions of hip muscles attached to the IT band: Hip flexion, adduction,

abduction and lateral hip rotation will be measured using a universal goniometer.

Results

The results revealed that out of all participants, 16.9 % spend 1-2, 26.7% spend 2-3 hours, 27.1 % spend 3-4 hours, while 29.3% spend 4-5 hours seated cross-legged in a day The data of 266 participants was analyzed by using Chi-Square Test the p-value of 0.077 shows that there is no association that is statistically significant between the number of hours spent sitting crossed-legged in university and the results of Ober's test. The p-value is greater than 0.05, which suggests that any observed differences are likely due to random chance rather than a true association. The results indicate that there is no significant association between ITB tightness and prolonged cross-legged sitting this may be because the ITB is attached to the muscles of hip abductors and is somewhat stretched when placed in hip adduction while sitting in knee-on-knee cross-legged position. However, there was significant pain and discomfort found among the subjects in hip and thigh region with reduced ranges of hip muscles indicating muscular imbalances. (Table I-III)

Table I: Descriptive statistics of Age, gender, academic level, gym, preferred leg to cross, crossed leg duration, Ober's test.

Age	N=266 Mean $\pm$ S. D = (23.56 $\pm$ 2.126)
Gender	Males= 106 (39.8%) Females= 160 (60.2%)
Academic Level	Post-Graduate= 43 (16.2 %) Undergraduate= 223 (83.8 %)
Gym	Daily= 61 (22.2%) Weekly= 41 (15.4%) Once in a month= 12 (4.5%) Never= 152 (57.1%)
Preferred leg to cross	Right leg=193 (72.6%) Left leg= 51 (19.2%) Both=22 (8.3 %)
Crossed leg sitting duration	1-2 hours= 45 (16.9%) 2-3 hours= 71 (26.7%) 3-4 hours= 72 (27.1%) 4-5 hours= 78 (29.3%)
Ober's Test	Positive= 80 (30.1 %) Negative= 186 (69.9%)

Discussion

Understanding the connection between iliotibial tightness and prolonged cross-legged sitting in university students is crucial for ergonomics and musculoskeletal purposes. The iliotibial band, a dense band of connective tissue, runs along the lateral side of the thigh from the hip region to the knee region and becomes tightened or shortened due to prolonged sitting, it was thought that a similar mechanism may be at play in a prolonged crossed-legged sitting.

Table II: Cross- Tabulations of Numbers of hours spent sitting in university to Ober's test						
Time spent sitting cross-legged in a day						
		1-2 hrs.	2-3 hrs.	3-4 hrs.	4-5 hrs.	Total
Ober's Test	Positive Test	12	14	24	30	80
	Negative Test	33	57	48	48	186
	Total	45	71	72	78	266

Table III: Chi-Square test.				
Chi-square tests				
	Value	df	Asymptomatic significance (2-sided)	Exact Significance (2-sided)
Pearson Chi-square	6.842 ^a	3	.077	.077
Likelihood ratio	7.029	3	.071	.075
Fisher's exact test	6.886			.075
N of valid cases	266			

But when the IT Band of the upper crossed leg was measured with Ober's test in this study, it was found that there was no significant association between cross-legged sitting and IT band tightness.

Majority of our subjects 57.1% do not go to the gym or exercise, and only 22.7% people said that they do exercise or go to the gym on a regular basis, being a young university student demands one to engage in regular exercises and physical activity, to prevent musculoskeletal disorders in elderly age.

While our study emphasizes the impact that there is no association of cross-legged sitting on IT band Tightness, it contrasts with a study done by Pakeeza Seemal, in 2023, on the prevalence and association of Iliotibial-band tightness with sitting surface type and hours of daily sitting, indicates that both of these factors have a major impact on the condition's occurrence. Bankers who spend more than six hours a day in an office chair are far more likely to develop ITB tightness. This discrepancy may result from the fact that university students are the participants in this current study. ¹⁰ In an earlier study done by C. T. Paul Krediet, in 2006, to find out if in healthy patients, leg crossing increases orthostatic tolerance. The study showed that in healthy people, leg-crossing without any additional leg tensing enhances orthostatic tolerance. This gives us one of the benefits of crossing legs in healthy populations.¹¹

The Vertebral Angle, Chest Wall Mobility, Pulmonary Function, and Respiratory Muscle Activity Effects of Sitting in a Crossed Legs Posture revealed that there was no clinically significant impact of a crossed-leg posture on the pulmonary function of healthy individuals.

A study done by Ahn, Hee-Eun, et al. in 2019, on the effects of sitting in a Crossed-legs posture on the Vertebral angle, chest wall mobility, pulmonary function, and respiratory muscle activity showed that there was no clinically significant impact of a crossed-legged posture on the pulmonary function

of healthy individuals which is similar to our study that shows no association between ITB tightness and cross-legged sitting posture. ¹² According to another study done by Daoyuan Wang, et al, in 2023, on the possible risks of sitting cross-legged for adolescents with idiopathic scoliosis. The results of the study demonstrated that crossing legs promoted relaxation. Crossing legs is a common habit and it may provide a relaxation effect to the person, the results of this study are also align with ours which gives us no association between cross-legged sitting and IT band tightness. ¹³

For the results to be generalized, more research is needed to ascertain the relationship between IT-band tightness and crossed-legged sitting using a larger sample size. Due to ethical constraints, the current study's data collection comprised more female participants than male participants, making it impossible to determine the ratio between the two. Moreover, there is also an anatomical difference in Q angle between males and females so more comparative studies are required to investigate the difference of Q angle on type of cross-legged sitting in males and females and its effects on ITB. Future studies should include populations like teachers and other susceptible people to sit with cross legs. In order to determine whether or not men are more impacted than women, more men should be included in the study to determine the ratio of IT-band tightness in them. Moreover, the comparison between the level of physical activity and the incidence of IT band tightness should also be found. General awareness and introduction of a well-integrated physical activity or mobility programme specifically targeting university students should be introduced in the university hours, to make sure students remain active and counteract the commonly adopted sedentary lifestyle.

Conclusion

In conclusion, the study offers important new information about how sitting positions affect musculoskeletal health. The results show that there is no significant association of increasing iliotibial band tightness with prolonged periods of

crossed-legged sitting. Pain and discomfort while sitting crossed-legged imply that regular crossed-legged sitting, especially among university students who frequently assume this posture during extended study periods, may be linked to musculoskeletal imbalances and hip muscle tightness.

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