

## Determining the Prevalence and Association of Iliotibial Band Tightness with daily sitting hours and type of sitting surface among Bankers of Sargodha, Pakistan.

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### **ABSTRACT**

**Objective:** To determine prevalence of iliotibial band tightness among bankers of Sargodha and to check its association with daily sitting hours and type of sitting surfaces.

**Methods:** In this descriptive cross-sectional study, 382 bankers were selected from various setups of Sargodha through convenient sampling technique from May to August 2022. A self-designed questionnaire, NPRS and Ober's test were used to estimate the prevalence and associated risk factors of ITB tightness. Data was analyzed by using SPSS version 21.

**Results:** Findings revealed that prevalence of ITB tightness was 43.72%. About 46.07% bankers were sitting for more than 6 hours daily and 67.80% were using office chair. Both legs were involved in 51.31% cases. Ober's test was positive in 43.68% individuals. Crossed legs sitting position was reported as a major aggravating factor (49%) and rest as a relieving factor (57%). NPRS scoring indicated no pain (10.7%), mild (25.7%), moderate (28.5%) and severe (35.1%) pain. Significant association of iliotibial band tightness was found with daily sitting hours and type of sitting surfaces having p-values of 0.003 and 0.001 respectively.

**Conclusion:** Iliotibial band tightness is a common condition experienced by bankers. Duration and type of sitting surface significantly influences its occurrence. Sitting for more than 6 hours daily on an office chair greatly increases the risk of developing ITB tightness among bankers. Inducing short breaks during sitting hours and modifying the sitting surface will be helpful to improve working ability of bankers.

**Index Terms-** Iliotibial band tightness, pain, knee flexion.

### **I- INTRODUCTION**

The Iliotibial tract, often known as the "IT band," is a long, fibrous band of flexible fascia that connects the lower leg to the hip.<sup>(1)</sup> Iliotibial band friction syndrome was the name given to this condition because it was thought that activities involving repeated knee flexion, such as sitting, caused the Iliotibial band to rub against the lateral femoral condyle, irritating the ITB.<sup>(2)</sup>

Iliotibial band friction syndrome is the most common lower extremity overuse injury among elite rowers. Around 15% of all knee overuse injuries are caused by ITBFS.<sup>(3)</sup> It can develop in athletes who engage in repetitive knee motions, such as runners, bikers, cyclists, field hockey players, skiers, and rowers.<sup>(1)</sup> ITBFS is more prone to develop in runners if they run a large distance every day on a downhill or uneven surface, in scuffed-up sneakers or go for a vigorous walk in the frigid weather. Lateral knee discomfort is caused by Iliotibial band inflammation. An agonizing, searing sensation can occasionally be felt in the leg, extending to the hip area. While jogging, stabbing soreness may also occur in calf muscles.<sup>(4)</sup>

The patient's medical history and physical examination are typically used to make a diagnosis; however, MRIs may be necessary to rule out a different condition in the area. On physical examination, there is finding of local soreness on the lateral side of the knee, superior to the joint line and inferior to the epicondyle.<sup>(1)</sup> IT Band was described as a knee stabilizer. Various tests such as Noble, Obers, modified Thomas and Trendelenburg has frequently been used in previous studies to assess IT band tightness.<sup>(5)</sup>

The role of tightness in the start of the illness has its detrimental effects.<sup>(6)</sup> ITBFS therapy plans frequently include stretching of the Iliotibial band, lateral fascia, and

gluteus Medius<sup>(7)</sup> Ice, oral NSAIDs, or corticosteroids administered through phonophoresis, or injection are routinely used to treat pain and inflammation during the acute phase of treatment.<sup>(8)</sup> It is typically advised to strengthen the hip abductors as a therapy for ITBFS. The therapeutic exercise, together with soft tissue manipulation and electrical stimulation, is effective for treating a wide range of musculoskeletal issues.<sup>(6)</sup>

Literature indicates that ITBFS and other lower extremity injuries are more common in athletes who pronate excessively. Larger landing forces, higher knee internal rotation, insufficient hamstring strength in comparison to quadriceps strength on the same side, and genu recurvatum are additional biomechanical characteristics of Iliotibial band friction syndrome.<sup>(6)</sup> Some research suggests that muscle weakness may be the root cause of Intersegmental variability in the lower extremities during extended sitting. Muscle imbalances could play a part in variability of joint and segment coordination among runners with ITBS or a history of ITBS when compared to healthy controls.<sup>(9)</sup>

Friction syndrome is brought on when the ITB rubs up against (or "rolls over") the lateral femoral epicondyle.<sup>(10)</sup> The body is put under a considerable degree of physical strain by prolonged sitting.<sup>(11)</sup> The iliotibial band is thought to press against the epicondyle repeatedly during knee flexion and extension, causing ITBS. The iliotibial band may become inflamed in this case because of recurrent or acute inflammation of the bursa above the lateral femoral epicondyle.<sup>(12)</sup> Overuse damage may develop from an increase in tension and pressure on the soft tissues because of a decrease in diversity.<sup>(13)</sup> Excessive sitting causes the hyper flexion of knee that leads the kneecap to glide posteriorly and stretching the Iliotibial tract, resulting in pain and inflammation around lateral side of knee.<sup>(14)</sup> Outside knee discomfort is a symptom of IT band syndrome. Individuals with prolong sitting and sedentary lifestyle have high rate of muscular tightness. Insufficient activity increase level of tension due to which muscles become sore and shorten. Elongation of muscles can relieve the symptoms.<sup>(1)</sup>

Many studies have been conducted relative to the prevalence of IT Band tightness among cyclist, runners, athletes mostly basketball players but very few have focused on IT band tightness among prolonged sitting subjects such as bankers. So, our main focused to determine the prevalence of IT Band tightness and risk factors associated with it.

## II- MATERIAL & METHODS

Cross sectional study design was used to determine the prevalence of Iliotibial band tightness among bankers of Sargodha. Data was collected from bankers working in various private banks of Sargodha. Study was conducted from May to August 2022. Non-probability convenient sampling technique was used to recruit the individuals for study and sample size of 382 participants was calculated by

using 47% prevalence of Iliotibial band tightness from previous study<sup>(1)</sup> through formula:  $n = Z^2 P (1-P) / d^2$ .<sup>(15)</sup> Both male and female bankers, age group 25-60 years, sitting 5-6 hours daily<sup>(1)</sup> were included. Individuals with diabetes, hip arthroplasty, pressure sores and recent fracture of lower limb were excluded from study.<sup>(1)</sup> Informed consent was taken in both English and Urdu. Self-designed questionnaire and Ober's test<sup>(16)</sup> were used to determine the prevalence of Iliotibial band tightness among bankers. NPRS was used to estimate the intensity of pain.<sup>(17)</sup> SPSS 21.0 was used for the data analysis. Descriptive analysis of data was computed by using pie charts, bar graphs and frequency tables. Pearson Chi-square test was used to analyze the association of iliotibial band tightness with sitting hours and type of sitting surfaces.

## III- RESULTS

In this cross-sectional observational study 382 bankers working in various banks of Sargodha were assessed for ITB tightness. Mean age of participants was 44.01±8.93. There were 59.42% females and 40.58% males. Results showed that 43.52% bankers were suffering from ITB tightness. Majority of the participants (57.1%) have been working as bankers for more than 5 years with more than 6 consecutive hours of daily sitting in 46.1% individuals. Ober's test was positive among 43.68% bankers while 56.32% showed negative result. 67.8% participants use office chair for their sitting during working hours, 17.8% use sofa and 14.4% use plain chair. Medical history was insignificant in 72% cases (Table 1)

**Table 1: Descriptive statistics of age, gender, Ober's test, daily sitting hours, type of sitting surface and previous medical history.**

<b>Age</b>	N=382 mean±S.D (44.01±8.93)
<b>Gender</b>	males=155(40.58%) females=227(59.42%)
<b>Ober's Test</b>	Positive-43.68% Negative-56.32%
<b>Daily Sitting hours</b>	5 hours-11% 6 hours-42.9% More than 6 hours-46.1%
<b>Type of Sitting surface</b>	Plain chair-14.4% Sofa-17.8% Office chair-67.8%

<b>Previous Medical History</b>	Trauma-17% Systemic illness-11% Insignificant-72%
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Tightness of both sides were reported in 51.3% cases. Pain pattern was continuous among 27.7% and intermittent in 39.5% bankers causing limitation of daily activities in 58.6% individuals. Most of them reported stinging pain (46.1%) & aching pain (35.3%) type. 49.7% bankers reported crossed legs sitting position as a major aggravating factor for ITB tightness as compared with hyper flexion of knee (11.0%) and with hard or rough sitting surface (39.3%). Majority of the bankers reported pain relief with rest (57.6%), as compared to medication (35.6%) and physical therapy (6.8%). Pain intensity on NPRS scoring indicated no pain (10.7%), mild (25.7%), moderate (28.5%) and severe (35.1%) pain. (Table 2)

**Table 2: Descriptive statistics of affected side, location of muscular tightness, type of pain, intensity of pain, aggravating & relieving factors.**

<b>Affected side</b>	Right-13.1% Left- 35.6% Both-51.3%
<b>Location of muscular tightness</b>	Lower leg-28.3% Thigh-45.8% Feet-25.9%
<b>Type of pain</b>	Aching-35.3% Burning-18.6% Stinging-46.1%
<b>Intensity of pain</b>	Mild-25.7% Moderate-28.5% Severe-35.1%
<b>Aggravating factors</b>	Cross legs-49.7% Hard or rough sitting surface-39.3% Hyperflexion of knees-4.2%
<b>Relieving factors</b>	Rest-57.6% Medication-35.6% Physiotherapy-6.8%

Significant association of ITB tightness was found with daily sitting hours and type of sitting surfaces having p-values of 0.003 and 0.001 respectively. (Table 3)

**Table 3: Association of IT Band tightness with daily sitting hours and type of sitting surface.**

<b>Study Variable</b>	<b>N of valid cases=354</b>
Association b/w Iliotibial Band tightness & daily sitting hours	Pearson chi-square Value=133.759 df=2 Sig=0.000
Association b/w Iliotibial Band tightness & type of sitting surface	Pearson chi-square Value=12.138 df=2 Sig=0.002

#### IV- DISCUSSION

IT band is the anatomical structure that lies the lateral aspect of leg and crosses the hip and knee joint and upper leg. It is mostly present in musculoskeletal patients and characterized as a friction syndrome.<sup>(18)</sup> Current research clarified high prevalence (43%) of ITB tightness in bankers due to prolonged sitting. Investigations of a previous study revealed that incidence of this syndrome ranges from 1.6% to 52%. Persistent or intermittent pain on lateral side of knee was encountered in individuals involved in rigorous activity. Current study also indicated that intermittent pattern of pain was more often experienced as compared to continuous pain around knee area due to Iliotibial band tightness.<sup>(19)</sup>

Most of the bankers experienced stinging and aching types of pain radiating down the lower leg area. A previous study conducted about Iliotibial band tightness in runners which indicated 14% prevalence among those whose age was less than 18 years and aching type of pain was reported at knee joint due to long distance running.<sup>(20)</sup> Greater percentage of individuals in present study reported gradual onset of Iliotibial band tightness. Whereas sudden tightness of IT band was experienced by the subjects included in a previous study conducted about Iliotibial band tightness and Patellofemoral pain syndrome.<sup>(21)</sup>

One of the previous research projects was done about postural low back subjects suffering from IT Band tightness. Faulty postures are the origin of abnormal body functions and structure, and back pain is one of the main causes related to postural faults. It was found that males with low back pain experienced IT Band tightness more commonly as compared to females because of their working places like hospital wards, offices, restaurants etc. In comparison, current study showed that majority of female bankers were diagnosed with IT Band tightness in contrast to males.<sup>(22)</sup> A previously conducted research described that IT Band tightness may be unilateral or bilateral but most often unilateral presentation is observed.<sup>(23)</sup> While current study results depict that

majority of bankers involve IT Band tightness on both sides due to prolong sitting position which exerts excessive pressure on IT Band.

In past, a study compared 35 females who had previously sustained IT Band syndrome with 35 healthy and distance runners' females. It showed that female who sit for 5 to 6 hours consistently per day suffer more frequently with tighter IT Band and pain on lateral aspect of knee.<sup>(7)</sup> This correlates with our study which showed that bankers sitting continuously for 6 to 7 hours have a high level of stress on IT band due to hyper flexion of knees which leads to pain and tightness on their knee area.

Biomechanics of the knee joint appear to have a bigger influence on the development of ITBS.<sup>(24)</sup> Repetitive knee flexion and tibial internal rotation can cause inflammation and irritation of the iliotibial band.<sup>(25)</sup> IT band would rub against the femoral epicondyle if the knee was bent and extended frequently. At around 30 degrees of knee flexion, iliotibial band fibers contract and may get squeezed across the femoral epicondyle.<sup>(26)</sup> Current study also showed that hyper flexion of knees caused by excessive adduction, crossing legs, and sitting on hard surface for prolong time aggravates the condition of IT band tightness. A previous study revealed the use of both conservative and surgical treatment options for reducing and treating the Iliotibial band tightness in athletes.<sup>(27)</sup> Current study also supports the use of painkillers and physical therapy measures along with rest for management of IT band tightness.

Sitting for prolong duration can increase the risk of developing IT band tightness. A previous study conducted on 60 subjects who were working for 7 hours per day between ages of 20 to 60. There was 47% prevalence of IT Band tightness in subjects with prolonged sitting who were sedentary for 7 hours and p value less than 0.001 was found. Muscular tightness can lead to imbalance at the joint area which can cause pain, weakness, and inflammation. Severe problem can impose difficulty while walking and doing other daily activities. Sedentary lifestyle reduces flexibility and leads towards development of tightness in the muscles.<sup>(1)</sup> This study correlates to present study which indicated significant association between IT Band tightness and prolong sitting hours in bankers.

One of the previous studies indicated that sitting on a soft car seat occurs with less activity of oblique abdominals when compared to sitting on hard surface of an office chair.<sup>(28)</sup> This correlates to present study indicating that type of sitting surface significantly influences the occurrence of IT Band tightness because more energy is expended due to increase in muscle activation of lower extremities when sitting on compliant surfaces as compared to sitting over a firm and stationary office chair.<sup>(29)</sup>

## V- CONCLUSION

This study concluded that Iliotibial band tightness is a common condition experienced by bankers. Duration and type of sitting surface significantly influences its occurrence. Sitting for more than 6hours daily on an office chair greatly increases the risk of developing ITB tightness among bankers. Inducing short breaks during sitting hours and modifying the sitting surface will be helpful to improve working ability of bankers.

### Conflict of Interest

All authors have declared no conflict of interest.

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### Data availability

Data will be provided on the demand by corresponding author.

### References:

1. Mane A, Yadav T. Prevalence of Iliotibial Band Tightness in Prolonged Sitting Subjects. EXECUTIVE EDITOR. 2020;11(05):544.
2. Jensen AE, Laird M, Jameson JT, Kelly KR. Prevalence of musculoskeletal injuries sustained during marine corps recruit training. Military medicine. 2019;184(Supplement\_1):511-20.
3. Tenforde AS, Sayres LC, McCurdy ML, Collado H, Sainani KL, Fredericson M. Overuse injuries in high school runners: lifetime prevalence and prevention strategies. Pm&r. 2011;3(2):125-31.
4. Charles D, Rodgers C. A literature review and clinical commentary on the development of Iliotibial Band Syndrome in runners. International Journal of Sports Physical Therapy. 2020;15(3):460.
5. Saikia S. Etiology, Treatment, and Prevention of Iliotibial Band Syndrome: A Literature Review. A senior research project submitted in partial requirement for the degree Doctor of Chiropractic. 2012;25.
6. Lavine R. Iliotibial band friction syndrome. Current reviews in musculoskeletal medicine. 2010;3(1):18-22.



7. Ferber R, Noehren B, Hamill J, Davis I. Competitive female runners with a history of iliotibial band syndrome demonstrate atypical hip and knee kinematics. *Journal of Orthopaedic & Sports Physical Therapy*. 2010;40(2):52-8.
8. Kinali M, Main M, Eliahoo J, Messina S, Knight R, Lehovsky J, et al. Predictive factors for the development of scoliosis in Duchenne muscular dystrophy. *European Journal of Paediatric Neurology*. 2007;11(3):160-6.
9. Villanueva M, Iborra Á, Sanz-Ruiz P, Noriega C. Ultrasound-guided release for iliotibial band syndrome: a novel ultraminimally invasive surgical procedure. *The Knee*. 2021;30:9-17.
10. May O. Iliotibial Band Release and Gluteus Maximus Tendon Release (Polesello). *Hip Preservation Surgery*: Springer; 2020. p. 225-7.
11. Sharda P, Vaghela M, Alshryda S, Shaheen M. Snapping hip syndrome: result of partial release and anterior transposition of iliotibial band. *Journal of Musculoskeletal Pain*. 2011;19(3):158-63.
12. Moeller BJ. Total Knee Arthroplasty and Iliotibial Band Syndrome: A Case Report. 2016.
13. Sugimoto D, Jackson SS, Howell DR, Meehan III WP, Stracciolini A. Association between training volume and lower extremity overuse injuries in young female athletes: implications for early sports specialization. *The Physician and Sportsmedicine*. 2019;47(2):199-204.
14. Winslow J, Yoder E. Patellofemoral pain in female ballet dancers: correlation with iliotibial band tightness and tibial external rotation. *Journal of Orthopaedic & Sports Physical Therapy*. 1995;22(1):18-21.
15. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. *Gastroenterology and Hepatology from bed to bench*. 2013;6(1):14.
16. Herrington L, Rivett N, Munro S. The relationship between patella position and length of the iliotibial band as assessed using Ober's test. *Manual Therapy*. 2006;11(3):182-6.
17. Dixon S, Poole CD, Odeyemi I, Retsa P, Chambers C, Currie CJ. Deriving health state utilities for the numerical pain rating scale. *Health and Quality of Life Outcomes*. 2011;9(1):1-9.
18. Gose JC, Schweizer P. Iliotibial band tightness. *Journal of Orthopaedic & Sports Physical Therapy*. 1989;10(10):399-407.
19. Kirk KL, Kuklo T, Klemme W. Iliotibial band friction syndrome. *Orthopedics*. 2000;23(11):1209-15.
20. Van der Worp MP, van der Horst N, de Wijer A, Backx FJ, Nijhuis-van der Sanden MW. Iliotibial band syndrome in runners. *Sports medicine*. 2012;42(11):969-92.
21. Hansen R, Phillips D, Tosh J. Effects of Graston technique on iliotibial band syndrome. *Logan College of Chiropractic*. 2012:1-8.
22. Bhura PA, Bhagat CA. A Study on Iliotibial Band Tightness in Postural Low Back Pain. *Indian Journal of Physiotherapy and Occupational Therapy*. 2014;8(2):74.
23. Arumugam M, Govindharaj P. Self-stretching in standing position to improve flexibility of ilio-tibial band tightness. *Int J Phys Educ Sports*. 2018;3(4):26-30.
24. Nath J. Effect of hip abductor strengthening among non-professional cyclists with iliotibial band friction syndrome. *Int J Physiother Res*. 2015;3(1):894-904.
25. Nannaparaju M, Mortada S, Wiik A, Khan W, Alam M. Posterolateral corner injuries: Epidemiology, anatomy, biomechanics and diagnosis. *Injury*. 2018;49(6):1024-31.
26. Harris KJ. The state of current knowledge regarding evidence-based conservative management of iliotibial band syndrome: A systematic review 2014.
27. Beals C, Flanigan D. A review of treatments for iliotibial band syndrome in the athletic population. *Journal of Sports Medicine*. 2013;2013.
28. Snijders C, Bakker M, Vleeming A, Stoeckart R, Stam H. Oblique abdominal muscle activity in standing and in sitting on hard and soft seats. *Clinical Biomechanics*. 1995;10(2):73-8.

29. Dickin DC, Surowiec RK, Wang H. Energy expenditure and muscular activation patterns through active sitting on compliant surfaces. Journal of sport and health science. 2017;6(2):207-12.