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Original Research Article

Prevalence of iliotibial band tightness in software professionals in North West Pune: cross-sectional observational study

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ABSTRACT

Background: Flexibility is an essential component for musculoskeletal functioning and physical activity. Software professionals are at increased risk of developing iliotibial band (ITB) tightness due to prolonged sedentary work hours.
Methods: A cross-sectional observational study was conducted at Smt. Kashibai Navale College of Physiotherapy, Pune, from January 2024 to June 2024. A total of 99 software professionals aged 25-55 years, with a minimum of 2 years of experience and working in a sedentary position for more than 7 hours per day, were included. Ober's test was used to assess ITB tightness. Demographic data and daily sitting hours were recorded. Statistical analysis was done using SPSS version 16, with Pearson's correlation to assess the relationship between sedentary hours and severity of tightness.
Results: Out of 99 participants, 70 (70%) showed a positive Ober's test. Among them, 44 (62.85%) had mild tightness and 26 (37.14%) had severe tightness. A significant small positive correlation (r=0.2791, p=0.0051) was observed between hours of sitting and severity of ITB tightness.
Conclusions: The study revealed a 70% prevalence of ITB tightness among software professionals. Increased sitting hours showed a statistically significant positive relationship with the severity of ITB tightness.

Keywords: Flexibility, ITB, Sedentary lifestyle, Software professionals

INTRODUCTION

Flexibility is key element for musculoskeletal functioning and the performance of physical activities. However, flexibility dysfunction is a widespread problem that many people deal with. Inadequate participation in physical activities and a sedentary lifestyle can lead to shortening and tightness of muscles. Flexibility is vital component for an individual's ability to move smoothly and safely. It enhances both physical activity, general well-being, and musculoskeletal health of individual. Limited flexibility can lead to a decrease in strength, endurance, and stability.[1]

This is especially true for office workers, whose sedentary lifestyle includes sitting for a long duration contributes to muscle shortening and tightening due to insufficient physical activity. They have been reported to spend between two-thirds and three-quarters of their working hours sitting with a high proportion accrued in prolonged, unbroken bouts of 30 minutes or more. Sedentary lifestyle is a known risk factor for poor overall health, premature mortality, and several types of disease, including musculoskeletal issues.[2,3] Sitting for more than half of the workday, in incorrect or fixed posture has been found to be associated with the development of musculoskeletal problems in the neck, upper extremity, and low back.[4]

Another study had concluded, long-duration sitting can be a contributory factor in hamstring tightness. It was seen that there is a tendency of increase in hamstring tightness with increase in the sitting hours.[5]

Slouching in a chair increases stress in sitting. As an individual begin to get up hip flexors pull person forward because of muscle tightness. Muscular tightness is primarily caused by a decrease in the muscle's capacity to deform, which results in a reduced range of motion. Excessive sitting results in hyperflexion of the knee, leading the kneecap to glide posteriorly and stretching the Iliotibial tract, resulting in pain and inflammation on the lateral side of the knee. During knee flexion, a tight ITB pushes the patella laterally and externally rotates the tibia, which may increase the valgus vector at the knee, compounding the excessive lateral tracking of the patella. Another study highlighted that in patellofemoral dysfunction patients presenting with decreased iliotibial band flexibility and medial patellar glide, the author suggests incorporating stretching of these structures into a comprehensive treatment and home regimen.[5-7]

Lateral structural tightness can increase translatory force, cause incorrect lateral tracking of the patella, and increase patellofemoral joint compression.[8]

The correlation between extended periods of sitting and discomfort in the musculoskeletal system may be explained by multiple mechanisms. These include muscular fatigue from continuous activation of postural support muscles.[9]

Postural malalignment and/or movement dysfunction may result from an additional potential cause that causes adaptive changes in passive tissue stiffness or osseous limitation. When seated, the hip flexor muscles are in a slack state because the hip is bent to around 90°. Therefore, prolonged hours of sitting may result in osseous changes or an increase in passive muscle stiffness, which will restrict passive hip extension by causing a hip extension deficit. Anterior pelvic tilt may rise as a result of this alteration.[10]

The typical pattern of tightness in striated muscles is responsible for the postural function. The tight muscle is kept strong while the phasic antagonist weakens, this result is an imbalance around the joints due to tightness. The ITB's primary function is to assist stabilize the hip and knee, but it also facilitates hip and knee motions via the gluteus maximus and tensor fasciae latae muscles. It performs these movements in conjunction with other muscles around the hip and pelvis, thus a weakening or imbalance in these muscles can overload the ITB, causing pain and dysfunction.[11]

ITB shortening has been linked to low back pain. A study concluded that iliotibial band tightness is substantially associated with postural low back pain. As a result, iliotibial band tightness evaluation should always be included in the assessment format of low back pain.[12,13] Another study stated that, it seems that the relationship between hip abductor muscle weakness and ITB tightness in patients with chronic LBP and warrants further research.[14]

The Ober test is most commonly used to assess tightness of the iliotibial band.[15] Clinical assessment of ITB length remains under debate. However, clinicians have traditionally used the Ober test to evaluate hip adduction as an indirect measure of ITB length.[16,17]

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. 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.

Objective

There is dearth of literature regarding ITB tightness in software professionals. Hence the study aimed to find the prevalence of ITB tightness and its correlation with hours of sitting in software professionals.

METHODS

It was a cross-sectional observational study comprised over a period of 6 months starting from 10th October 2022 till 11th April 2023. As per sample size calculation, 99 software professionals were included in this study using convenience sampling method for data collection based on prevalence percentage of previous study.[1]

Ethical approval was obtained from the ethics committee of Smt. Kashibai Navale College of Physiotherapy Pune. All participants gave written consent to participate.

Participants 99 were recruited from the location of north west Pune IT companies, participants recruited were in the age group of 25 to 55 years old, software professionals >2 years of experience and who were sedentary for >7 hours in a day.

Recent lower limb fractures and a recent history of trauma-related hip or ankle pain. Any severe deformity of the hip, knee, or ankle; active inflammatory conditions of the hip, knee, or ankle were excluded from the study.

Necessary demographic data age, working experience and duration of sedentary hours was taken. Iliotibial band tightness was assessed for mild or severe tightness using Ober's test.

For Ober's test participant was instructed to lie in side lying. Bottom knee and hip were flexed to flatten the

lumbar curve. Standing behind the patient and firmly stabilize the pelvis to prevent movement in any direction. Grasping the distal end of the patient's leg and flex the leg to a right angle at the knee.

Extend and abduct the hip joint. Slowly lower the leg toward the table adduct hip until motion is restricted. Ensure that the hip does not internally rotate and flex during the test. Additionally, the pelvis was stabilized.

If the ITB was normal, the leg was abducted with the thigh dropping down slightly below the horizontal and the patient will not experience any pain; in this case, the test was called negative.

If the ITB was tight, the leg would remain in the abducted position, in this case, the test was called positive.

If the leg fell in internal rotation, it was considered normal, if the leg touched the midline, it was mild tight. If the leg did not touch the midline, then it was severe. Subjects working hours was compared with the severity of iliotibial band tightness.[18-20]

The collected data were compiled and analyzed using SPSS version 16. Mean and standard deviation were used for quantitative variables such as age and work experience. Frequencies and percentages were used for categorical variables such as gender and ITB tightness. The Pearson's correlation test was applied to determine the relationship between the number of sedentary hours and severity of ITB tightness. A p value less than 0.05 was considered statistically significant.

RESULTS

All data were presented and evaluated using SPSS version 16. Mean and standard deviation was used for presenting quantitative data. Percentages and frequency tables were used for qualitative data. Pearson's correlation analysis was used to see the correlation between sitting hours and tightness of Iliotibial band.

Statistical analysis

Following data collection of all 99 participants over the period of six months.

The participants included 38 males and 61 females, aged between 25 and 55 years. Each participant's daily sitting time and ITB tightness were recorded.

Table1: Demographic data of software professionals.

Variables	Mean±SD	Minimum	Maximum
Aage (years)	30±5.7	25	55
Work experience (years)	6±5.9	2.3	32

The demographic characteristics of the participants are summarized in Table 1. The average age of the participants was 30±5.7 years, and the average work experience was 6±5.9 years.

Gender

There were 38 males and 61 females in the sample.

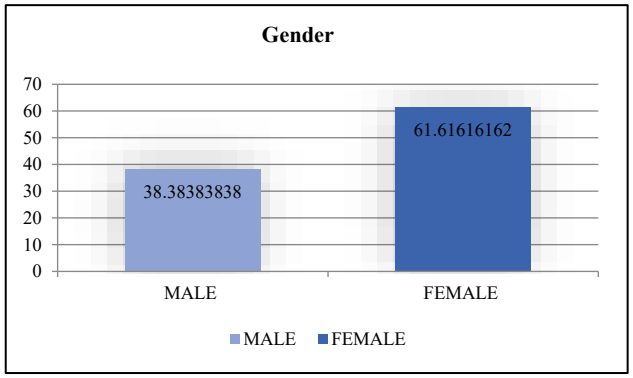

Figure 1: Gender distribution.

The sample included 38 males (38.38%) and 61 females (61.62%), as shown in Figure 1.

Prevalence of ITB tightness.

According to Ober's test, out of 99 participants, 70 (70.7%) showed positive results, indicating ITB tightness (Table 2). Of these, 44 (62.85%) had mild tightness, and 26 (37.14%) had severe tightness, as shown in Figure 2.

Table 2: Number of positive subjects of ITB tightness.

Ober's test results	Number of subjects total: 99
Positive	70
Negative	29

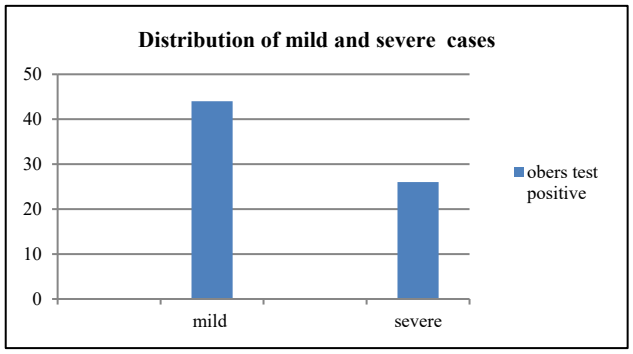

Figure 2: Results of Ober's test.

Population showing iliotibial band tightness

In above mentioned data, 44 (62.85%) samples showed mild tightness and 26 (37.14%) showed severe ITB tightness.

Correlation between sitting hours with severity of tightness

A significant small positive correlation (r=0.2791, p=0.0051) was found between daily sitting hours and severity of ITB tightness, as demonstrated in Figure 3. This suggests that as sitting hours increase, the severity of ITB tightness tends to increase as well.

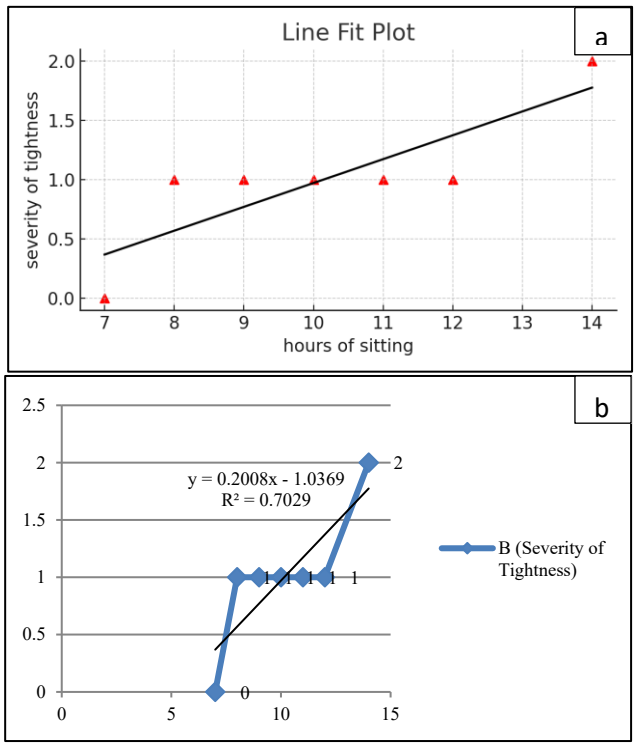

Figure 3 (a and b): Correlation between sitting hours with severity of tightness.

The Pearson's coefficient of correlation (r) is 0.2791. The p value is 0.0051.

DISCUSSION

This study documented prevalence of ITB tightness in Software professionals. 99 participants aged between 25-55 years with average age of 30 years, out of which 38 were male and 61 were female. The work experience of the professionals participated was more than 2 years with average of 6 years. The results were achieved by correlating the working hours of sitting with severity of ITB tightness.

The recent study showed that during the past few years the work from home job type has increased from 5% to 65% and working hours have shown significant rise.

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 a day. Muscular tension can lead to joint imbalance, resulting in pain, weakness, inflammation, and several other problems. A severe condition can render it difficult to walk and do other daily duties.[1]

In the current study out of 99 subjects 70 showed positive results, out of these 44 (62.85%) individuals showed mild tightness and 26 individuals (37.14 %) had severe tightness.

Prevalence of ITB tightness was found to be 70%. 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.

Results of Pearson's correlation indicated that there is a significant small positive relationship between hours of sitting and severity of tightness. The Pearson's coefficient of correlation (r) was 0.2791.

Association between ITB tightness and duration of work hours was significant, ITB tightness was present commonly in 8-9 hours of sitting subjects and severity was present with increase in sitting duration.

Research states ITB involvement in a variety of problems including chondromalacia, sub luxating patella, greater trochanteric bursitis, snapping hip, and foot pains.[5]

A study done by Prateek, and Shrivastava reported, it was observed that as the number of working hours on computer or duration of work increased, the frequency of visual, musculoskeletal and stress complaints also increased simultaneously. IT professional workers and their commonest risk factor is low back pain due to prolonged sitting this will be in progress. The most prevalent body regions on which IT professionals reported MSD have been the back pain, neck pain, upper extremity pain and shoulder pain.[21,22]

Previously conducted research states that IT band tightness may be unilateral or bilateral but most often unilateral presentation is observed.[11] In this study it was seen that majority of software professionals had ITB Tightness on both the sides due to prolong sitting position. The increasing evidence base suggests there may be health risks from prolonged sitting. Further there may be an increased risk of musculoskeletal discomfort and cognitive decrement.[23] Another study reported that there exists a significant association of ITB tightness with low back, sacroiliac joint and hip pain.[24]

In another study surgeons utilize the ITB as an intra- or extracapsular supportive structure from the lateral thigh for supporting rotational moments at the knee. The tensile strength, anatomical, and biomechanical considerations make the ITB a prime candidate for assisting lateral knee stability.[14]

Tight lateral structures have been implicated in subjects presenting with patellofemoral pain syndrome (PFPS). It has been proposed that a tight ITB through its attachment

of the lateral retinaculum into the patella could cause lateral patella tracking, patella tilt and compression.[15-25]

This study did not exclude confounding factors which include runners, pronated foot, subjects with femoral nerve affecting hip joint, as Iliotibial band syndrome (ITBS) occurs in 5-14% of runners and is the leading cause of lateral knee pain and the second leading cause of overall knee pain in this population. Development of ITBS is thought to include extrinsic factors (e.g. training volume, shoe wear) as well as intrinsic factors (e.g. flexibility, strength, running mechanics, etc. Musculoskeletal pain varies over time and there is little evidence on the pain trajectory, which underscores the need for long-term pain assessment and monitoring.[26-28]

These findings underscore the importance of incorporating regular physical activity, stretching, and ergonomic practices to mitigate the risk of ITB tightness and related musculoskeletal issues in software professionals.

Even short periods of inactivity can cause local changes regarding biomechanical, physiological and neurological capability. It therefore appears reasonable that less dynamic sitting habits may result in discomfort and pain, especially in the lower back.[29] Risk factors contributing to development of ITB tightness must be investigated. Proper education of patient and directing them towards appropriate intervention will reduce risk of developing ITB tightness. A study done by Chellaiyan stated the musculoskeletal problems can decrease the efficiency of the Software engineers and thereby decrease the productivity. Frequent workshops highlighting the preventive strategies should be conducted by the organisations.[30] Offering workshops on posture correction, stretching techniques, and the importance of physical activity can empower employees to take proactive steps in managing their musculoskeletal health condition.

This study highlighted need to change lifestyle in software professionals to prevent occurrence of chain of problems caused due to ITB tightness. Encouraging regular breaks to stand, walk, or stretch can help alleviate muscle tension and promote circulation. Simple activities like walking meetings or scheduled stretching sessions can be beneficial. Implementing specific stretching routines that focus on the ITB, hip flexors, and other muscle groups that are prone to tightness due to prolonged sitting can help maintain flexibility and prevent tightness.

The study was limited to north west Pune location due to academic time bound research. Further future scope of this study includes conducting longitudinal studies to assess the long-term effects of sedentary behaviour on ITB tightness can provide valuable insights into the progression of musculoskeletal issues and inform intervention strategies.

Comparing the prevalence and severity of ITB tightness across different professions and activity levels can help identify specific risk factors and protective measures.

Study limitations are the duration of sitting hours included were not generalized, the sitting hours were recorded through self-reporting, which can introduce bias and inaccuracies.

The software professional's selection for the study was restricted to north west Pune due to time constraints. Addressing these limitations in future research could enhance the understanding of ITB tightness among software professionals and improve the development of targeted interventions

CONCLUSION

Prevalence of ITB tightness in software professionals is 70% sitting for long period of time plays a substantial role in development of ITB tightness as this study showed that there was significant small positive relationship between hours of sitting and severity of tightness.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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