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Association of Iliotibial Band Tightness with Lumbopelvic Pain and Hip Joint Outcome

Naveed Ahmad[1], Sana Shabbir[2], Sadia Raheem[3], Kainat Latif[4], Muneeba Liaqat[5], Muhammad Junaid Akram[6]

[1]Physical Therapist, Department of Physical Therapy, DHQ Hospital, Haripur
[2]Lecturer, Department of Rehabilitation Sciences, Shifa Tameer e Millat University, Islamabad
[3]Post graduate student, Liverpool Hope University, UK
[4]Physiotherapist, Shifa Tameer e Millat University, Islamabad
[5]Physiotherapist, Islamabad Physio-Cure Clinic, Islamabad
[6]PhD Scholar, Department of Neurology, Chongqing Medical University, Chongqing, China

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Address of Correspondence

Naveed Ahmad
naveed_dpt.ahs@stmu.edu.pk
ORCID: 0000-0003-4946-1468

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ABSTRACT

Background: Literature has illustrated many factors responsible for iliotibial band tightness affecting mostly athletes and professionals. Shortening of the iliotibial band influences scope of movement of the knee, restricting internal rotation. Hip and pelvis biomechanics can be changed due to the reduction in internal rotation at foot strike. This study was concentrated on iliotibial band tightness along with its association with low back pain and hip joint outcome.

Objective: The study was conducted to determine the frequency of Iliotibial (IT) band tightness and its association with low back pain and hip joint flexibility.

Methodology: A cross-sectional survey study was carried out among 257 undergraduate students, aged 18 to 25 years. The respondents were chosen by non-probability convenient sampling technique. Ober test was used to check relationship between Iliotibial band tightness and low back pain. Active straight leg raise (SLR) test was used to assess low back pain, compression test for Sacroiliac (SI) joint. Whereas, glides and Faber test were performed to check hip joint flexibility. Ranges of hip joint were measured through Goniometer. SPSS version 21 was used for data analysis.

Results: The mean age of the participants was 21.4 ± 1.84 years. The statistically significant correlation was found between iliotibial band tightness with lower back pain, sacroiliac joint and hip joint pain with p-value <0.001. Correlation of Ober test with active range of motions of hip including adduction, abduction, extension, flexion abduction, external rotation and internal rotation were significant with the p-value <0.05.

Conclusion: Our study concluded that a significant relationship exists between iliotibial band tightness and low back pain. Students may prone to develop lumbopelvic pain due to muscular stretch.

Keywords: Iliotibial Band, Lumbopelvic Pain, Low Back Pain, Sacroiliac Joint, Hip Joint

Introduction

The iliotibial band that passes from both of the knee and hip joints on parallel thigh, is a lengthy, non-elastic proteinic structure.(1 The iliotibial band is comprising of thick connective tissue that helps position steadiness and is opposes huge varus torques at the knee.[2] The lumbopelvic hip support has two significant vocalizations: the sacroiliac joint and the hip bone socket.[3] The hip is considered as a ball-and-socket joint that is encompassed by dominant and balanced muscles, enduring a wide range of movement in a different physical planes and displaying exceptional stability.[4] Since the IT band crosses over 2 joints, instability of the lower extremity kinematic chain can prompt irregular pelvic biomechanics. Shortening or fixing of the IT band influences scope of movement of knee, restricting internal rotation. Hip and pelvis biomechanics can be changed due to the reduction in internal rotation at foot strike. Low back pain and sacroiliac joint paint appeared to begin from a broken iliotibial band.[5]

An expansion in iliotibial band load, which can be filled in as a representative for an increment in tensor fascia lata and gluteus maximus quality, can essentially diminish the loading on the medial compartment of the tibiofemoral vocalization. Further decline in medial compartment loading, an expanded iliotibial band load additionally adjusts tibiofemoral kinematics.[6] Rubbing between the IT band and lateral femoral epicondyle can be raised by elements that cause extra impingements, for example, abrupt increments in speed and range. Rubbing can likewise be raised by variables such as increment of ITB tension, for example, hip abductor weakness and an absence of IT band elasticity.[7]

IT band tightness is common disorder in distance sprinters and cyclists that includes a few structures of the lower body structures.[8] Female sprinters with a history of IT band syndrome shows diminished trunk flexor perseverance quality compared to no IT band syndrome, combined with a progressively vertical trunk situation. It is additionally been proposed that IT band strain would be fundamentally higher in IT band syndrome sprinters, and that the dissimilarity would turn out to be more obvious with exhaustion.[9] In 2017 Mucha et al. demonstrated that hip abduction weakness may be associated with iliotibial band tightness in runners.[10] The IT band has been interpreted as awkward event of a "friction syndrome" in sprinters.[11] Iliotibial band disorder is the main cause of knee soreness laterally among sprinters, moreover, it records for 15% of misuse wounds in cyclists.[12]

Frontal plane kinematic contrasts show that the past IT band syndrome transfers upper body bulk away from stance limb. This move expands knee moment and adds to expanding the tractable strain on the iliotibial band.[13] Earl et al. conducted a study in 2018, they illustrated that patients with lower weight, more fragile hip anterior rotation, more grounded hip extension, more prominent trunk-extension and flexible IT band were assured to have betterment after knee strengthening.[14]

Tension on delicate tissues, for example, the gastrocnemius, quadriceps, hamstring muscles and IT band /Tensor Fascia lata, has additionally been recommended to impact patellofemoral pain syndrome.[15] Ireland et al. conducted a cross sectional survey and concluded that patellofemoral pain due to IT band tightness caused 26% reduction in hip abduction strength and 36% in hip external rotation strength than similar age-matched controls.[16] Puniello et al. concluded that tightness of iliotibial band and decreased medial glide of the patella has strong relationship.[17]

Extending the iliotibial band has been supported in the different studies to treat patellofemoral dysfunction. Ober's Test can be performed to test elasticity of the iliotibial band.[17] A study done by Duane Scotti in 2017 showed that the Ober test is better at recognizing a patellofemoral pain syndrome group and a control group than the modified Thomas test.[18]

Goniometry is used to measure range of motion of the musculoskeletal system of the human body by measuring the angle formed at a joint by the adjacent bones of the body.[20]

Ober's test is used to observe the IT band tightness and low back pain and sciatica. For examining Ober's test, patient adopts to side-lying position, while the extremity that is being tested faces upward. The knee to be tested is flexed to 90 degree by the examiner. The same hip is then abducted and extended so that the hip lies in line with trunk. The examiner allows the extremity to adduct as far as possible under the influence of force of gravity. This test is used both for examining the length of IT band in low back pain patients and its flexibility in all individuals.[21]

In the event that appeared to have a dysfunctional iliotibial band can lead to low back and sacroiliac pain It is essential to view iliotibial band snugness as a conceivable reason for sacroiliac and lower back torment and that appropriate administration is required for extending the iliotibial band alongside trigger point management and chiropractic manipulations.[8]

As per previous studies conducted related to this topic illustrated many factors responsible for IT band tightness in which runners were most common and studies were mostly done on athlete and professionals whereas this study comprised students yet studies related to low back pain and hip joint outcome and its relation to IT band were also not so focused. So this study concentrated on IT band tightness along with its association with low back pain and hip joint outcome.

Methodology

It was a cross-sectional survey study that was carried out from October 2020 to March 2021 at Dar-ul-Shifa campus, Shifa Tameer-e-Millat University, Islamabad. The ethical approval of the stud was taken from Institutional Review Board and Ethical Committee (IRB &EC), Shifa International Hospital. Sample size was calculated through Rao Software, which was 384 with confidence interval of 95% and population size of 200,000. Some of the students didn't fill the questionnaires properly, the forms were lacking of important information for the study analysis. Thus the data of those participants was excluded from the study, and statistical analysis was performed on included 257 participants. Sampling technique selected was non-probability convenient sampling. Participants who were suffering from the low back pain for more than 6 weeks, or if the participants had the intermittent 3 episodes of pain that lasted

more than one week during the last one year, within the age range of 18-25 years were included whereas, those with radicular pain in lower extremity, systemic disease including tuberculosis, arthritis etc., leg length discrepancy, spinal or pelvic fracture and deformity were excluded. After taking informed consent from participant, data was collected through self-structured questionnaire which was designed to assess pain and hip joint range of motion through goniometer (in lying and sitting position). Visual Analog Scale (VAS) was used to measure pain. VAS is highly sensitive and valid regarding the changes in patient's perception of pain. It is a 100-mm straight line, having words of "no pain" at the left-most corner and "worst imaginable pain" at the right-most corner. It has quick utility and comparatively easy to understand for most of the patients.[19]

Active SLR test was performed with the patient positioned in supine , having a straight leg raise with the feet 20cm apart.[22] Active SLR test is scored 0 to above 90 degree if positive; 0-30 degree indicates disc pathology, 30-70 degree indicates nerve root irritation, 70-90 degree indicates joint involvement, above 90 degree indicates muscular involvement.[23]

Compression test for iliotibial band syndrome was used, during which patient was moved to side lying position, and the examiner placed his hands over the iliac crest upper part, pushing toward the floor. This movement places pressure on the sacrum in the forward direction. The feelings of an increased pressure in the sacroiliac joints is a sign of a possible sacroiliac trauma and /or of the posterior sacroiliac ligaments sprain. Pain or the replication of the patient's symptoms is considered as a positive test.[24]

In order to detect the hip or sacroiliac joint pathology we used FABER test. During the test, patient lies supine. And according to the acronym patients one leg is flexed, abducted and externally rotated (FABER), and its causes the heel to rests on the opposite knee. The test is considered positive if patients feels pain in the sacroiliac joints or in the groin region.[25]

Anterior (prone lying position), Posterior (in supine lying position) and inferior (in prone lying position) glides of hip joint were performed to mobilize joint and relieve pain. Glide tests can be used for capsular stretching, mobilization and to increase the range of motion in different joint of body.[26]

The data analysis was done using IBM SPSS 21. Chi–square was applied to find out association of Ober test with faber test, active SLR, and sacral compression test. P value of less than 0.05 was taken as statistically significant.

Results

A total of 257 students were enrolled after the survey. The mean age of student was 21.4 ± 1.84 years. Data revealed that, 115 (44.7%) students had lower back pain and 84 (32.7%) students had low back pain of mild intensity. 56 (21.8%), 113 (44%) and 128 (49.8%) students had mild intensity pain while lying, lifting weight and travelling respectively. Among 257 students, 189 (73.5%) students had positive SLR test, 193 (75.1%) had no hip pain, whereas 13 (5.1%) had associated knee pain of mild intensity. Data collected from students showed that 133 (51.8%) students had positive Faber test out of which 104 (40.5%) and 29 (11.3%) students had pain in groin and sacral region respectively. 238 (92.6%) students had negative compression test. Data showed that 212 (82.5%) students had normal anterior hip glide, 214 (83.3%) students had normal posterior hip glide and 220 (85.6%) students had normal inferior hip glide respectively. Mean and standard deviation range of motions of hip joint measured by goniometer as shown in Table I.

Table I: Goniometry

Goniometry of hip	**Mean ± SD**
Adduction of hip joint	29.31 ± 3.0
Abduction of hip joint	41.42 ± 8.31
Flexion of hip joint	109.39 ± 8.73
Extension of hip joint	15.06 ± 3.35
External rotation of hip	45.58 ± 7.66
Internal rotation of hip	38.12±4.67

Pearson correlation was used to find out correlation of Ober test with active range of motion of hip. P-value is significant for abduction, adduction, flexion, extension, internal and external rotation of hip and Pearson r value showed low or weak positive correlation for all the variables. (Table II)

Chi –square is applied to find out association of Ober test with other variables. Results showed that p-value is significant for Ober test if positive (p=.000), active SLR test (p=.000), compression test (p=.000) and Faber test and Faber test if positive (p=.000). (Table III)

Table II: Pearson correlation to find out correlation of Ober test with active range of motion of hip

	Variable	P-Value	**r- Value**
Ober Test	Flexion of hip joint	0.001	**0.407**
	Extension of hip joint	0.006	**0.171**
	Abduction of hip joint	0.001	**0.208**
	Adduction of hip joint	0.017	**0.149**
	Internal rotation of hip joint	0.035	**0.132**
	External rotation of hip joint	0.000	**0.299**

Table III: Chi-square to find out association of Ober test with qualitative variables						
	Ober test (if positive) (P-value)	Active SLR test (P-value)	Sacral compression test (P-value)	Faber test (P-value)	Faber test (if positive) (P-value)	Do you have pain in lower back? (P-value)
Ober test	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0 .092

Discussion

Our study elaborated that there exists a significant association of IT band tightness with low back, sacroiliac joint and hip pain. Reese et al. in 2003 in his study showed a significant greater range of hip adduction while using modified Ober test. Findings of Reese study are similar to the current study as results are significant for hip abduction, adduction, flexion, extension, internal and external rotation.[27]

Study done in 2010 by Amir and his colleagues showed that low back pain has no association with Iliotibial band tightness and hip abductor muscles weakness. These results of Amir's study are contrary to the current study. These differences may be due to ethnic background differences or due to the difference in the age ranges of the targeted population. However, most of the literature supports the current study by concluding that low back pain, pain while travelling, lying, lifting weight, associated knee pain, anterior, inferior and posterior glide, intensity of low back pain and knee pain has no association with iliotibial band tightness.[28]

Another study done by Park et al. in 2016 concluded that there was significant relationship between tibial rotation on flexibility of IT band and patellar position but the present study results are contradictory as present study checked associated knee pain with hip joint and it showed that there is no significant changes in knee in relation to hip joint. This difference is might be due to the fact that, current study consist of university students.[29]

The results of a study done in 1993 by Puniello demonstrated a strong relationship between iliotibial band tightness and decreased medial glide of the patella. The study doesn't support current study because we checked IT band tightness and hip joint outcome and associated knee pain. And we found that there is no associated knee pain. The reason might be that low back pain is due to some other underlying pathology and not because of IT band tightness.[17]

One study was done by Ireland et al, in 2003, and results demonstrated that subjects with patellofemoral pain due to IT band tightness caused 26% reduction in hip abduction strength and 36% in the strength of hip external rotation than similar age-matched controls. In comparison with the present didn't notice any associated knee pain with hip pain. But the significant change is noticed for hip joint outcome with IT band tightness.[16]

Further studies are required to determine the association of IT band tightness with lumbopelvic pain and hip joint outcome on a larger sample size for the generalization of the results. Current study data collection included females more than males due to less number of male students in university and some ethical barriers too because of which ratio between them couldn't be found. Future studies should include population like athletes and older adults. More males should be included in study in order to find out a ratio of IT band tightness in them to know if they are more affected than females or not. General awareness among public should be spread to prevent IT band tightness.

Conclusion

Our study concluded higher frequency of IT band tightness in young adults. There is association between IT band tightness and lumbopelvic pain. There is no significant relationship between IT band tightness and hip joint outcome. Students may prone to develop lumbopelvic pain is due to muscular stretch.

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