Association of Low Back Pain with Piriformis Muscle Tightness in University Students

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Highlights:

- Oswestry LBP disability index was used to evaluate disability level of LBP.
- Piriformis muscle tightness was diagnosed among LBP patients using FAIR (flexion, abduction, internal rotation) and freibrrg's test.
- No association was found between LBP and piriformis muscle tightness

Abstract

Pain in the Lower Back Region is a common concern, influencing up to 90% of population eventually in their lifetime, up to 50% have more than one episode. This condition causes more disability worldwide than any other ailment. Piriformis Syndrome (PS) is the leading cause of Low Back Pain that results from tightness of piriformis muscle. Prolonged sitting position is the foremost cause of piriformis tightness in sedentary population that may eventually leads to PS and LBP.

Objective:

To find the association of low back pain with piriformis muscle tightness among university students.

Methodology:

A total of 45 students (male and female) with LBP were included in this study from University of Lahore. Oswestry Low Back Disability Index (OLBDI) was used to evaluate the disability level of low back. Piriformis muscle tightness was diagnosed among LBP patients using FAIR (Flexion, Abduction, and Internal Rotation) and Freiberg's Test. All data was entertained and analyzed using SPSS version 21. Fisher's Exact Test was used to find association of LBP with piriformis muscle tightness.

Results:

According to OLBDI minimal disability was reported in 40(88.89%) students followed by 5(11.11%) students who reported moderate disability. FAIR (Flexion, Abduction, and Internal Rotation) test and Freiberg's test were applied to check piriformis muscle tightness. FAIR test was positive in 18.8% males and in 23.1% females. Freiburg's test was positive in 31.3% males and in 15.4% females.

Conclusions:

No association was found between low back pain and piriformis muscle tightness in university students.

Key Words:

Low back pain, Piriformis muscle tightness, University students

Introduction:

Low Back Pain (LBP) is enormously common and has adverse influence on functional status and working ability in the young and adult people. This condition causes more disability worldwide than any other ailment. LBP is described as discomfort in the area of lumber side of the body at the lower border of the twelfth ribs to the lower gluteal area with or without pain referred into one or both lower extremities that remains at least one day.[1] Piriformis syndrome (PS) is the leading cause of LBP that results from tightness of piriformis muscle. Piriformis syndrome is bunch of signs and symptoms of pain that originates from piriformis muscle, with or without sciatic nerve impingement.[2] Piriformis muscle dysfunction is an often unrecognized and misdiagnosed cause of deep-seated buttock and LBP. The elusive nature of the diagnosis of piriformis syndrome stems from its frequent association with other disorders of the hip, sacroiliac joint and LBP.[2,3] PS is usually accentuated in differential diagnosis of low back, buttock, and chronic hip pain and it is

normally unidentified or misdiagnosed in clinical settings, incidence of piriformis syndrome vary from 5% to 36% in LBP patients.[4] Furthermore the general population is usually affected by PS in the age of forty to fifty years, irrespective of their level of activity and occupation.[5] The piriformis muscle is a flat, pyramidal-shaped that emerges over the anterior part of the sacrum adjacent to the second through the fourth anterior sacral foramen. Depending on the size of the muscle, this origin may also extend over the capsule of the sacroiliac joint and the sacro tuberous and/or sacrospinous ligament. The piriformis is usually supplied by both the first and second sacral nerves as they exit from the anterior foramen. The superior gluteal nerve passes between the upper fibers of the piriformis and the superior portion of the greater sciatic notch before innervating the gluteus medius. As the muscle traverses the greater sciatic foramen, the piriformis comes into direct contact with both the sciatic and pudendal nerves. After passing through the greater sciatic-foramen, the piriformis narrows to form its tendinous insertion into the superior-posterior portion of the greater trochanter. The prime motor function of the piriformis is external rotation of the hip. Because of its superior insertion into the trochanter, however, the piriformis also assists in abduction of the thigh, particularly when the hip is in flexion. Piriformis acts as external rotator in the erect position and, as abductor in the recumbent, though it is a frail hip flexor amid strolling.[6] External rotation of hip is performed by piriformis muscle when angle at hip is 60º flexion or less and function is altered when angle is more than 60º flexion and its function is changed as internal rotator of hip.[7] Hence, it may be stated that piriformis muscle remains active during any type of seated position whether it is high sitting or cross sitting although its function alter in different styles of seated positions. The students usually because of sedentary life style regularly complaints of LBP because of muscular imbalance which if stay unchecked may end up chronic LBP. Keating *et al.*,[8] suggested that almost forty to fifty percent of students are physically inactive. When the piriformis becomes tight due to prolonged sitting it exert compression on the sciatic nerve leading to discomfort and irritation that may lead to the back of the leg (sciatica).[7] Stationary way of life is related with corpulence, which in turn is connected to incessant medical issues.[9] Present day living expands the inclination to have a more stationary way of life that includes sitting.[10] From a biomechanical point of view, sitting is a simple and more steady stance with low-vitality utilization[11], lower Center of Mass and wider base of support weakened back lumbar structures[12, 13] and diminished metabolic trade.[14] Previous researches recommended that delayed sitting could be a hazard factor for producing LBP.[13] Delayed examination of piriformis disorder may prompt chronic states of the sciatic nerve, chronic malfunction of muscle and compensatory changes and it might cause discomfort, numbness and atrophy of muscle. The purpose of study was to find out the association of LBP with piriformis muscle tightness among university students due to prolonged sitting and less physical activity and their sedentary life style so that appropriate preventive and corrective measures may be taken in time which may reduce the rate of development of LBP because of piriformis tightness.

Methodology:

There were a total of forty five students (male and female) included in this study from University of Lahore after obtaining signed consent form. All students who presented nonspecific LBP were included on the basis of inclusion and exclusion criteria. Demographic data of the students were taken. OLBDI was used to evaluate the disability level of LBP. Piriformis muscle tightness was diagnosed among LBP patients using FAIR and Freiberg's test. In side lying position with 60º flexion at the hip

and 90° flexion at the knee joint, FAIR test was performed on the subject. Hip joint was stabilized by the examiner and internal rotation and abduction of hip was performed by applying downward pressure onto the knee. Freiberg's test was performed on the patient with thigh extended in the supine lying position. Examiner passively internally rotates the leg and thigh. The test will be positive if pain aggravates. All collected data was entertained and analyzed using SPSS version 21. Fisher's Exact Test was used to find association of LBP with piriformis muscle tightness.

Results:

Mean age of the subjects was 23.0667±2.84 years, 32(71.1%) were male and 13(28.9%) were females. OLBDI was used to evaluate the disability level in students; minimal disability was reported in 40(88.89%) students followed by 5(11.11%) students who reported moderate disability. FAIR test was positive in 18.8% males and in 23.1% females. Freiburg's test was positive in 31.3% males and in 15.4% females. Fisher's Exact Test was used to find association of LBP with piriformis muscle tightness. According to Table 1 there was no association in Freiberg's test and gender (p-value 0.460).

Freiberg's Test			Total
Gender	Positive	Negative	
Male	10(31.30%)	22(68.80%)	32(100.00%)
Female	2(15.40%)	11(84.60%)	13(100.00%)
Total	12(26.70%)	33(73.30%)	45(100.00%)

Table 1: Comparison of Gender regarding Freiberg's Test

According to Table 2 there was no association between FAIR test and gender (p-value 1.000).

FAIR Test			Total
Gender	Positive	Negative	
Male	6 (18.80%)	26(81.30%)	32(100.00%)
Female	3 (23.10%)	10(76.90%)	13(100.00%)
Total	9 (20.00%)	36(80.00%)	45(100.00%)

Table 2: Comparison of Gender regarding FAIR Test

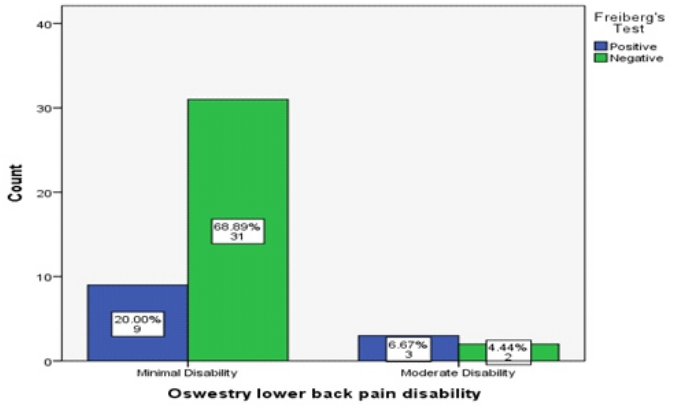

Figure 1: Comparison of Oswestry lower back pain disability and Freiberg's Test

According to figure 1 there was no association between Freiberg's test and low back pain disability (p-value 1.09).

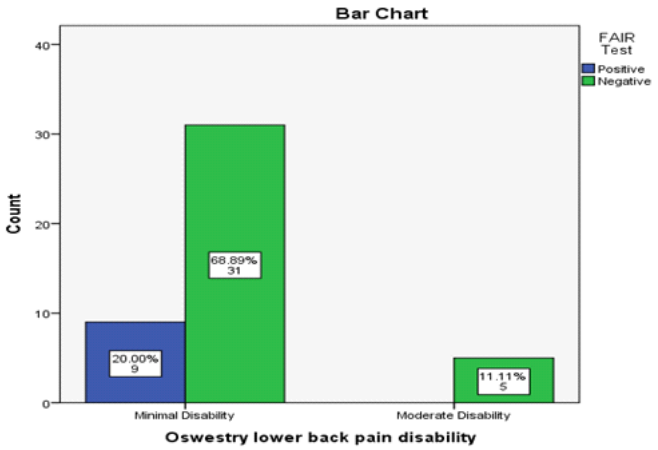

Figure 2: Comparison of Oswestry lower back pain disability and FAIR Test

There was no association between Freiberg's test and low back pain disability (p-value .566)

Discussion:

Piriformis Syndrome is the leading cause of LBP which results from tightness of piriformis muscle. The subjects who participated in the study were healthy adults from 18 to 30 years of age. In this age group subjects included were university students who spend most of their time in sitting position. In this study total 45 participants, 32(71.1%) were males and 13(28.9%) were females with mean age 23.066±2.84 years, recruited from University of Lahore. Prior literature revealed that seated

position on chair for more than 8 hours a day may develop tightness of back muscle and create strain on joints which remains constant, especially in order to sustain the sitting position the muscles are under constant low-grade contraction.[7,16] When the piriformis becomes tight due to prolonged sitting it exert compression on the sciatic nerve leading to discomfort and irritation that may refer down the back of the leg (sciatica). Boyajian-O'Neill *et al.,* also stated that microtrauma may result from direct compression as in sitting on hard surfaces ("wallet neuritis").[4,15] According to OLBPDI questionnaire minimal disability was reported in 40(88.89%) students followed by 5(11.11%) students who reported moderate disability. Chen and Nizar conducted study to find prevalence of piriformis syndrome in chronic LBP patients. A clinical diagnosis with modified FAIR test which states that OLBPDI among patients with piriformis syndrome was found to be moderate in 43.8% of patients (ODI 20 to 40), and severe disability was recorded in 50% of them (ODI > 40).[15,17] The principle issue with the clinical analysis of PS is absence of reliable target discoveries. Throughout the years, different distinctive maneuvers were introduced to diagnose PS. However, no single test or sign is reliable and consistent in all cases.[18] Different authors used different criteria for the diagnosis of piriformis syndrome. Fishman and Schaffer included FAIR test as one of their criteria for diagnosing piriformis syndrome. Fishman and Schaffer stated that at least one positive test along with a history of more pain in sitting than standing; a history of overuse, trauma or unusual body habitus (obesity or cachexia); or finding of tenderness in the mid-buttock must lead to a diagnosis of piriformis syndrome.[19,20] It was difficult to find the previous study directly showing the association of low back pain with piriformis tightness. FAIR and Freiburg's test were performed. According to statistical conclusion regarding gender comparison with FAIR test, FAIR test was positive in 18.8% and negative in 81.3% males. While, 23.1% positive in females whereas, negative in 76.9% females. There was no association found between FAIR test and gender. Freiburg's test was positive in 31.3% and negative in 68.8% whereas, 15.4%, 84.6% were positive and negative respectively in females. There was no association predicted with Freiberg's test across gender. Statistical analysis (Fisher's Exact Test) showed there was no association between piriformis muscle tightness and low back pain.

Conclusions:

According to Oswestry low back pain disability questionnaire minimal disability was reported in 40(88.89%) students followed by 5(11.11%) students who reported moderate disability. According to Fisher's Exact Test there was no association predicted between low back pain and piriformis muscle tightness among university students. Hence, it may be stated that piriformis muscle tightness is not the major cause of LBP. Other contributing factors like damage to the intervertebral discs, compression of nerve roots, and improper movement of the spinal joints might be the cause of LBP.

Recommendations:

Proper sitting posture must be guided to students of university so they can get rid of Low Back Pain.

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