Prevalence of Piriformis Syndrome and its Association with Body Mass Index among Bankers in Lahore

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ABSTRACT:

BACKGROUND: Piriformis syndrome is a neuromuscular condition that is thought to be triggered by compression of the sciatic nerve just at the level of the piriformis muscle. Pain and tenderness in the buttock area and the back of the upper leg, either with or without radiating the leg, are the risk factors for developing Piriformis syndrome.

OBJECTIVE: To determine the prevalence of piriformis syndrome and its association with Body Mass Index among bankers in Lahore.

METHODOLOGY: A cross-sectional study design was used. Data was collected from all banks in Lahore. Non- Probability convenient sampling was used. The sample size was 377. A demographic questionnaire was used to collect data. Piriformis syndrome was assessed by a piriformis stretch test in sitting. The data was analyzed using SPSS version 25.

RESULTS: The prevalence of Piriformis syndrome in bankers was 30.8%. Out of 377 (M: 287, F: 90), 116 (30.8%) bankers had piriformis syndrome, 45(11.9%) had the right side involved, 58 (15.4%) had the left side involved and 13 (3.4%) had bilateral involvement. Prevalence was more in bankers with BMI between 25 to 29 (overweight category).

CONCLUSIONS: On the basis of the result, it was concluded that the prevalence of piriformis syndrome among bankers in Lahore was 30.8%. There was an increase in risk of getting piriformis syndrome with an increase in BMI, and age. So, it concluded that the occurrence of Piriformis Syndrome was more prevalent in bankers who were overweight.

KEYWORDS: Body Mass Index, Demographic Variables, Piriformis Stretch Test, Piriformis Syndrome, Visual Analog Scale.

INTRODUCTION:

Piriformis syndrome (PS) is a musculoskeletal condition. It occurs when the piriformis muscle compresses the sciatic nerve (1). Piriformis syndrome was initially identified by Yeoman in 1928 as he was researching the origins of low back pain (2). The name "Piriformis Syndrome" was introduced by Robinson in 1947 and refers to the tightness of the Piriformis muscle, which is typically brought on by trauma (3).

In the buttock, Piriformis is the muscle that is positioned beneath and at the same level as the Gluteus Medius. This muscle's main function is to rotate the hip outward, which helps the flexed hip joint move into abduction (4). The sciatic nerve is the nerve of the lower limb that innervates the piriformis muscle (5). Piriformis syndrome, also known as entrapment neuropathy, occurs when the piriformis muscle compresses against it or disturbs the sciatic nerve. Most of the risk

factors for developing Piriformis syndrome are low back pain (LBP) and buttock anomalies (6). The terms "wallet sciatica" or "fat pocket syndrome" are frequently used to describe piriformis syndrome. When seated, carrying a bulky wallet on the affected side's back might either cause or worsen piriformis syndrome (7).

Deep gluteal syndrome, described as Piriformis Syndrome, is a clinical condition. Although it can affect men, it is more common in women. Its estimated prevalence ranged from 6 to 36% (8). Sciatic nerve irritation, piriformis muscle spasm, or possibly both can cause the signs and symptoms of piriformis syndrome. Prolonged sitting and resting on the affected side exacerbate the symptoms of Piriformis syndrome (9).

Muscle tightness attributed to a sedentary lifestyle, piriformis syndrome may lead to symptoms of buttock pain and hip joint immobility and may affect the quality of life (10). Age, gender, and repeated use of the piriformis muscle while jogging or walking are other contributing factors of piriformis syndrome (11). Patients may find it difficult to walk or perform other activities of daily living because they experience buttock pain that radiates into the back of the thigh and proximal lower limb pain that worsens while sit or squat (12). A study found that prolonged sitting in class may overwork the piriformis muscle. Students who sit for extended periods of time are more prone to experience piriformis muscle strain (13). The prevalence of Piriformis muscle tension in sedentary individuals was 79.5% (14).

Piriformis syndrome often affects people in their fourth to fifth decades of life, with a 6:1 female-to-male ratio. Piriformis syndrome is seen in approximately 6% of people who report having low back pain, despite the fact that its frequency is unclear and probably ranges from 5 to 36% (11). Repetitive injury or excessive use of the piriformis over the nerve can cause piriformis syndrome (15). "Primary piriformis syndrome" describes conditions that affect the piriformis muscle as a result of a triggering event, such as a traumatic incident. This includes myositis ossificans and myofascial pain (16).

Muscle stiffness, direct trauma to the buttock, piriformis muscle inflammation and hypertrophy are the typical causes of piriformis syndrome (17). People spending a lot of time seated down, such as IT professionals, call center workers, government employees, and others, are more likely to develop Piriformis tightness. According to a previous study, sitting in a chair for longer than eight hours may induce joint pain and back muscular stiffness since the muscles are always under mild tension to maintain the sitting position (18).

Patients with piriformis syndrome commonly reported symptoms like pain in the buttock region, tenderness over the greater sciatic notch, pain that worsens with sitting and increases piriformis muscle tension, and loss of range of motion when raising a straight leg (19). Piriformis stretching is a common physiotherapy practice for Piriformis syndrome. Stretching aims to lengthen the piriformis muscle, which had contracted the sciatic nerve due to a shortening of the muscle. The piriformis muscle stretch demands complicated movements including knee and hip flexion while standing or lying flat (20).

The Body mass index (BMI kg/m2) is described as "dividing a person's weight by the square of height" (21). A BMI of 18.5 or less is considered underweight, 18.5-24.9 is considered normal, 25.0 to 29.9 is labeled overweight, and 30 or more is termed obese (22). The use of high-energy foods, a lack of exercise, immobility, and various forms of transportation, all contribute to an increase in overweight and obesity. According to reports, bankers are more likely than other high-risk occupational groups to be obese and overweight (23).

According to results of another study on drivers, professionals who drove for longer than two hours suffered from Piriformis syndrome (6). Regular cross-legged sitting lengthened the piriformis

muscle (24). Sitting within the forward flexion stance of the sagittal plane for approximately 6 to 7 hours causes muscular imbalance. A direct correlation exists between piriformis tightness and BMI. The possibility of developing piriformis tightness increases with BMI (25). While serving customers or using the computer, bank staff members sit for a long duration raising the risk of musculoskeletal disorders (26). Burnout has been associated with back pain among Pakistani bank employees (27).

Overweight and obesity are more likely to occur in the banking and medical professions than in the general population, according to research. Due to the nature of their work, they spend a lot of time sitting down, and depending on their social and economic situation, they might lead a less active lifestyle (23). They worked for 8 hours each day, six days a week (22).

The aim of the current study was to provide a medical understanding and awareness of buttock pain due to piriformis muscle syndrome and its association with the body mass index (BMI) among bankers in Lahore. The current study explained the participants important information related to the mechanism of piriformis muscle, risk factors associated with the prevalence of piriformis syndrome, diagnosis, and available therapeutic options.

MATERIAL AND METHODS:

A cross-sectional study design was used to collect data. Data was collected from all banks in Lahore. In this study, a non-probability convenient sampling technique was used. The study was completed within 4 months after the approval of the synopsis. The sample size was collected from Rao soft, with a 5% of margin error and 95% confidence interval, population level was unknown so it was kept at 20000. The recommended sample size was 377. The targeted population was all bankers in Lahore. Bankers aged from 25 to 45 years, male and female both genders were included in this study, having a total duration of job experience in any bank of more than 6 months and at least 6 hours of sitting duration. The study will not include bankers who have a history of trauma causing buttock and back pain, have recently undergone surgery, postural deformity or pathology, have previously been diagnosed with diabetic neuropathy, have spinal issues like radiculopathy, currently suffering from chronic low back pain, or who are pregnant or menstruating. Data was collected from all banks in Lahore, Pakistan. The study comprised participants who were willing to participate and met the inclusion criteria. Everyone who participated provided their written consent. Then, in a sitting position, the piriformis muscle was stretched on both legs. If the participant experienced discomfort, the test was considered positive, and the intensity of pain was assessed using a VAS (Visual Analogue Scale). The BMI was also determined. To determine whether piriformis syndrome was associated with bankers' height and weight, measurements were taken using inches tape and a digital weight machine. All data were gathered in accordance with the questionnaire. The SPSS version 25 was used for statistical analysis. Data collection tools were the Piriformis muscle stretch test, the Visual Analogue Scale for assessment of pain intensity, and a self-made questionnaire that was used for demographic data. The data were analyzed by using the SPSS version 25.0 statistical software. Frequency and percentage tables and bar charts and pie charts were used for demographic and descriptive data. Association between age, gender, and BMI were measured using the Chi-square test, and a p-value <0.05 was considered significant. The correlation between chair type, chair height, footsteps, and back support cushion was also measured.

RESULTS:

Table 1: Demographic Variables

Categories		Frequency (n)	Percentage (%)
Age (Years)	(25-35)	186	49.3
	(35-45)	191	50.7
Gender	Male	287	76.1
	Female	90	23.9
BMI=Weight in Kg/height in meter2 (kg/m2)	<18.5(underweight)	0	0
	18.5-24.9(Normal)	165	43.8
	25-29.9(overweight)	180	47.7
	>30(Obese)	32	8.5
Total		377	100.0

The above table described demographic variables such as age, gender, and BMI. The frequency of first age group 25-35 years was 186 (49.3%) and second age group 35-45 years was 191 (50.7%). Out of 377 bankers, 287 (76.1%) were males and 90 (23.9%) were females. No bankers were under-weight (<18.5), 165 (43.8%) were normal, 180 (47.7%) were overweight and 32 (8.5%) were obese.

Table 2 (A): Piriformis Stretch Test

Pain involving side		Piriformis Stretch Test	
		Frequency (n)	Percentage (%)
Negative Test (261)	No pain	261	69.2
Positive Test (116)	Left	58	15.4
	Right	45	11.9
	Both	13	3.4
Total		**377**	**100**

The above table described the frequency of pain involving side in both positive and negative piriformis stretch test. Out of total 377, there were 261 bankers with negative tests who had no pain and 116 positive tests, in which 58 (15.4%) were left sided positive, 45 (11.9%) were right sided positive and 13 (3.4%) were both sided positive.

Table 2 (B): Types of Pain according to Piriformis Stretch Test

Type of Pain		Piriformis Stretch Test	
		Frequency (n)	Percentage (%)
Negative Test (261)	None	261	69.2
Positive Test (116)	Localized	64	17.0
	Radiating	52	13.8
Total		377	100

This table described the frequency of type of pain (none, localized and radiating). Out of total 377, there were 261 bankers with negative tests who had no pain, whereas 116 positive subjects in which 64 (17.0%) had localized pain and 52 (13.8%) had radiating pain.

Table 3: Piriformis Stretch Test according to pain with different Factors

Pain with different factors	Positive Piriformis Stretch test		Negative piriformis Stretch test	Total
Pain Intensity (VAS)	No pain (0)	0(0%)	261(69.2%)	261(69.2%)
	Mild (1-3)	2(0.53%)	0(0%)	2(0.53%)
	Moderate (4-6)	48(12.73%)	0(0%)	48(12.73%)
	Severe (7-10)	66(17.50%)	0(0%)	6617.50%)
Pain while sitting on a hard surface	No pain	0(0%)	261(69.2%)	261(69.2%)
	Mild	2(0.53%)	0(0%)	2(0.53%)
	Moderate	49(12.99%)	0(0%)	49(12.99%)
	Severe	65(17.24%)	0(0%)	65(17.24%)
Pain while sleeping	No pain	1(0.26%)	261(69.2%)	262(69.49%)
	Mild	49(12.99%)	0(0%)	49(12.99%)
	Moderate	25(6.63%)	0(0%)	25(6.63%)
	Severe	41(10.87%)	0(0%)	41(10.87%)
Total	**377(100%)**			

The above table described the responses of positive and negative piriformis stretch test according to pain in three variables; pain intensity (VAS), pain while sitting on a hard surface and pain while

sleeping. Out of total 377 participants, there were 116 subjects reported positive piriformis test and pain intensity (VAS) with positive piriformis stretch test was; no subjects were in no pain category,2 (0.53%) subjects reported mild pain, 48 (12.73%) were in moderate and 66 (17.50%) were in severe category. There were 261 (69.2%) subjects reported negative piriformis stretch test and pain intensity with negative piriformis stretch test was; 261 participants reported no pain and no participant was found in mild moderate and severe category. The other variable assessed was pain while sitting on a hard surface in positive piriformis stretch test. No subject reported in no pain category, 2 (0.53%) reported mild pain, 49 (12.99%) reported moderate and 65 (17.24%) reported severe pain. In negative piriformis stretch test; 261 (69.2%) reported no pain, and no participant was found in mild, moderate and severe category. Other variable assessed was pain while sleeping in positive piriformis stretch test. There was only 1 (0.26%) participant who reported no pain, 49 (12.99%) reported mild, 25 (6.63%) reported moderate pain and 41 (10.87%) reported severe pain. In negative piriformis stretch test; 261 (69.2%) reported no pain, and no participant was found in mild, moderate and severe category.

Table 4 (A): External Factors and Piriformis Syndrome

External Factors of Piriformis Syndrome	**Positive Piriformis Stretch Test (116)**		**Negative Piriformis Stretch Test (261)**	
	Yes Responses	**No Responses**	**Yes Responses**	**No Responses**
Pain in changing position (sit to stand)	116(30.8%)	0(0%)	0(0%)	261(69.2%)
Any tingling or numbness in the affected area	53(14.05%)	63(16.71%)	0(0%)	261(69.2%)
Using back support cushion (sitting on a chair?)	55(14.5%)	61(16.18%)	0(0%)	261(69.2%)
Normal chair or Computer Chair?	Computer Chair: 116(30.8%)	Normal Chair: 0(0%)	Computer Chair: 251(66.5%)	Normal Chair: 10(2.65%)
Chair-height adjustable	115(30.50%)	1(0.26%)	255(67.6%)	6(1.59%)
Footsteps to support feet	48(12.73%)	68(18.03%)	0(0%)	261(69.2%)
Total	**377(100%)**			

The above table showed the factors of Piriformis syndrome. Positive and negative responses were recorded in positive piriformis stretch test related to pain in changing position (sit to stand). Out of total 377 (100%) participants, 116 (30.8%) bankers reported pain while the rest of 261 (69.2%) participants reported no pain in positive piriformis test. However, 261 (69.2%) reported no pain in negative piriformis stretch test. Out of total 377 (100%) participants, there were 53 (14.05%) participants with yes responses in tingling or numbness in the affected area while 63 (16.71%) with no responses in positive piriformis stretch test. Positive responses might be due to irritation of sciatic nerve provoking symptoms. However, 261 (69.2%) participants reported no pain in

negative piriformis stretch test. Out of total 377 (100%) participants 55 (14.5%) participants used back support cushion while sitting and 61 (16.18%) did not used back support cushion in positive piriformis stretch test. However, there were 261 (69.2%) negative piriformis stretch test responses. Out of 377 participants, 116 (30.8%) participants used computer chair in positive piriformis stretch test while no positive participant used normal chair. Out of total 261 (69.2%) participants, 251 (66.5%) participants used computer chair while 10 (2.65%) participants used normal chair in negative piriformis stretch test. Chair height was adjustable according to the height of 115 (30.50%) bankers and 1 (0.26%) banker's height was not adjusted according to his chair. Out of total negative piriformis stretch test responses, chair height was adjustable according 255 (67.65) bankers while 6 (1.59%) bankers height was not adjusted according to the chair. Out of total 116 (30.85%) positive piriformis stretch test responses, 48 (12.73%) bankers used footsteps to support their feet while68 (18.03%) bankers did not used footsteps. There were total 261 (69.2%) no responses in negative piriformis stretch test who did not used footsteps.

Table 4 (B): Correlation between external factors and Piriformis Syndrome

Correlation		
External Factors of piriformis syndrome	**Piriformis stretch test in sitting**	
Using back support cushion while sitting on a chair	Pearson Correlation (r)	.620
	Sig (2 tailed)	.000
Normal chair or Computer chair	Pearson Correlation (r)	.110
	Sig (2 tailed)	.033
Chair height adjustable or not	Pearson Correlation (r)	.049
	Sig (2 tailed)	.341
Footsteps to support feet	Pearson Correlation (r)	.573
	Sig (2 tailed)	.000

The above table showed the correlation between piriformis stretch test in sitting with external factors of piriformis syndrome. Out of all four external factors assessed, three factors were significant with p value <0.05 and one factor was not significant with p value >0.05. There was a strong uphill positive relationship of piriformis stretch test and either the bankers were using a back support cushion or not with a Pearson correlation of .620 and a p value of .000 which was highly significant. There was positive but weak uphill relationship of piriformis stretch test and normal chair or computer chair with the Pearson correlation of.110 and a p value of 0.03 which was significant. The weakest uphill positive linear relationship was of piriformis stretch test and whether chair height was adjustable or not with a Pearson correlation of .049 and a p value of .341 which was not significant. There was a moderate uphill positive relationship of piriformis stretch test and either the bankers used footsteps to support their feet with a Pearson correlation of .573 and a p value of .000 which was significant. All the external factors of piriformis syndrome showed positive Pearson correlation with piriformis stretch test with the strongest positive value of .620,

weak but positive value of .110, positive but weak value .049, positive but moderate value of .573 respectively.

Table 5: Association between Piriformis Stretch Test and Gender, Age and BMI

Piriformis stretch Test Applied in Sitting						
Variables		**Negative**	**Positive**	**Total**	**df**	**p-Value**
Gender	**Male**	202(53.58%)	85(22.55%)	287(76.12%)	1	.387
	Female	59(15.65%)	31(8.22%)	90(23.87%)		
	Total	**261(69.2%)**	**116(30.76%)**	**377(100%)**		
Age (years)	**25-35**	147(38.99%)	39(10.34%)	186(49.33%)	1	.000
	35-45	114(30.23%)	77(20.42%)	191(50.66)		
	Total	**261(69.2%)**	**116(30.76%)**	**377(100%)**		
BMI (kg/m2)	**<18.5(Underweight)**	0(0%)	0(0%)	0(0%)	1	.000
	18.5-24.9(Normal)	147(38.99%)	18(4.77%)	165(43.76%)		
	25-29.9(Overweight)	110(29.18%)	70(18.57%)	180(47.74%)		
	>30(Obese)	4(1.06%)	28(7.43%)	32(8.48%)		
	Total	**261(69.2%)**	**116(30.76%)**	**377(100%)**		

The above table described the association between piriformis stretch test applied in sitting and gender. Out 287 (76.12%) male subjects, 202 (53.58%) had negative test and the rest 85 (22.55%) had positive test. Out of 90 (23.87%) female subjects, 59 (15.65%) had negative test and the rest 31 (8.22%) had positive test. Out of total 377 subjects (both male and female), 261 (69.2%) had negative tests and 116 (30.76%) had positive tests. The association was checked through Pearson Chi-square test which was found to be >0.0001 which was not significant. Out of total 377 bank employees, 186 (49.33%) subjects were in the age group of 25-35 years, in which 39 (10.34%) participants had positive piriformis test and 147 (38.99%) had negative piriformis test. 191(50.66%) subjects were in the age group from 35 to 45 years, in which 77 (20.42%) participants had positive piriformis test and 114 (30.23%) had negative piriformis test. Association between these two variables was calculated by the Pearson Chi-square test with a p-value of <0.0001 which was highly significant and means that there was a direct relationship between age and piriformis syndrome. Maximum positive cases of piriformis stretch test were shown in ages ranging from 35 to 45 years, which signified that as the age increases, there was a significant risk of having piriformis syndrome, the reason for this might be more amount of time spent in sitting position. The table above also described the association between piriformis stretch test and BMI. Out of total 377 (100%) bankers, 0 (0%) subjects were in underweight BMI category, 165 (43.76%) subjects were normal, in which 18 (4.77%) had positive piriformis test and 147 (38.99%) had negative piriformis test, 180 (47.74%) subjects were in overweight category, in which 70 (18.57%) had positive piriformis test and 110 (29.18%) had negative piriformis test. Out of total 32 (8.48%) subjects were in obese category, in which 28 (7.43%) had positive piriformis test and 4 (1.06%) had negative piriformis test. Maximum positive cases were found in overweight category. Association of piriformis stretch test and BMI was calculated by Chi-square test, which found out to be <0.0001, which was highly significant.

DISCUSSION:

A study was done in 2021 by Vaishnavi S Desai in 2021, in which the prevalence of piriformis muscle tightness in bankers was 51.2% and the prevalence was higher in those people who were pre-obese and fourth decade of life. In comparison, the previous study's result supported the current study. The findings of the current study showed that there was a 30.8% prevalence of piriformis syndrome. The study also concluded that there was an increase in the risk of getting piriformis syndrome with an increase in BMI who were overweight (25).

Atta M et al conducted a study in 2022 on the prevalence of piriformis muscle tightness among undergraduate medical students and results showed the prevalence was 48.3% and there was an association of piriformis syndrome, age, and cross-legged sitting. The previous study concluded that the risk of piriformis muscle tightness increases with age however the current study concluded that the risk of piriformis syndrome increases with an increase in age and BMI as well (14).

A study was completed by Soleman Warner et al in 2018 on the prevalence of piriformis syndrome among the University of Lahore male students which was 5%. The study showed the involvement of radiating buttock pain among the students who had prolonged sitting work. In contrast to the previous study, the results of the current study showed that the prevalence of piriformis syndrome and its association with BMI in bankers was found to be 30.8%. There was an increase in the risk of getting piriformis syndrome with an increase in BMI and, increase in age (28).

Faroq Islam et al conducted a study in 2022. It was found that the prevalence of piriformis syndrome among individuals with low back pain was 18.3%. Patients with low back pain had a high risk to get piriformis syndrome. In contrast to the previous study, bankers who had chronic low back pain were excluded from the study as the main focus was on BMI. The prevalence was found to be 30.08%. The results of the current study also concluded that prevalence was higher in people with a BMI of 25-29kg/m2 (overweight) (29).

CONCLUSION:

On the basis of the result of the study, it was concluded that the prevalence of piriformis syndrome among bankers in Lahore was 30.8%. The risk of getting piriformis syndrome increases with an increase in BMI and age.

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