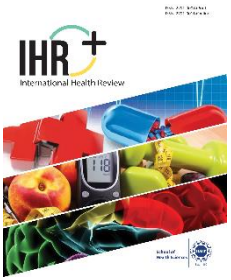
International Health Review (IHR)
Volume 3 Issue 2, 2023
ISSN$_{(P)}$: 2791-0008, ISSN$_{(E)}$: 2791-0016
Homepage: https://journals.umt.edu.pk/index.php/ihr

Article QR



Title: **A Cross-Sectional Study Concerning Piriformis Tightness: Identifying Predisposing Factors and its Association with Low Back Pain in Office Workers**

Author (s): Rabia Shaheen Khan[1], Zufa Shafiq[1], Rukash Mehar[2], Arfa Akhtar[3], Usama Bin Sabir[4], Muhammad Ammar[5], Zainia Tariq[6], Junaid Saleem[7]

Affiliation (s):
[1]Shalamar Hospital, Lahore, Pakistan
[2]Riphah International University, Lahore, Pakistan
[3]Johar Institute of Professional Studies, Lahore, Pakistan
[4]Al Kareem Medical Complex, Multan, Pakistan
[5]Pakistan Railway Hospital, Rawalpindi, Pakistan
[6]Abu Bakar Hospital, Lahore, Pakistan
[7]Gulab Devi Educational Complex, Lahore, Pakistan

DOI: http://doi.org/10.32350/ihr.32.02

History: Received: August 10, 2023, Revised: November 22, 2023, Accepted: November 24, 2023, Published: December 15, 2023

Citation: Khan RS, Shafiq Z, Mehar R, et al. A cross-sectional study concerning piriformis tightness: identifying predisposing factors and its association with low back pain in office workers. *Int Health Rev.* 2023;3(2):19–31. http://doi.org/10.32350/ihr.32.02

Conflict of Interest: Author(s) declared no conflict of interest

A publication of
The School of Science
University of Management and Technology, Lahore, Pakistan

A Cross-Sectional Study Concerning Piriformis Tightness: Identifying Predisposing Factors and its Association with Low Back Pain in Office Workers

Rabia Shaheen Khan[1], Zufa Shafiq[1], Rukash Mehar[2], Arfa Akhtar[3], Usama Bin Sabir[4*], Muhammad Ammar[5], Zainia Tariq[6], and Junaid Saleem[7]

[1]Shalamar Hospital, Lahore, Pakistan
[2]Riphah International University, Lahore, Pakistan
[3]Johar Institute of Professional Studies, Lahore, Pakistan
[4]Al Kareem Medical Complex, Multan, Pakistan
[5]Pakistan Railway Hospital, Rawalpindi, Pakistan
[6] Abu Bakar Hospital, Lahore, Pakistan
[7]Gulab Devi Educational Complex, Lahore, Pakistan

ABSTRACT

To identify the predisposing factors of piriformis tightness and its association with lower back pain in office workers due to prolonged working hours. In this cross-sectional study, a convenient sampling technique was used to collect data from the study participants. The study setting was private office setups in Faisalabad, Pakistan. A sample size of 250 office workers was selected through defined inclusion criteria after the screening of almost 400 workers. The selection criteria were individuals aged 26-50 years having a minimum of 2 years of work experience. The study period was from October 2021 to March 2022. Seated piriformis test was used to check the presence of piriformis muscle tightness. The visual analogue scale was used for pain assessment and a structured questionnaire was used to check the predisposing factors. Piriformis tightness was found in 76% of the office workers. Chi-square test resulted in a significant association of piriformis tightness with lower back pain ($p<0.05$). Conclusively, it was observed that piriformis tightness was frequent in office workers due to prolonged working hours. Furthermore, it was highlighted that predisposing factors, included prolonged working hours, uncomfortable chairs without appropriate foot support, poor posture, and work-related pain.

Keywords: chronic back pain, lower-back pain, office workers, piriformis tightness, SPSS

[*] Corresponding Author: usamabinsabir665@gmail.com

1. INTRODUCTION

Piriformis tightness restricts the range of motion and decreases flexibility [1]. It interferes with the physical and social functioning of people and leads to piriformis syndrome if not diagnosed at the initial stages [2]. It is frequently misdiagnosed because its symptoms resemble closely to intervertebral disc herniation, radiculopathy, sacroiliac joint dysfunction, or Sacrolitis [3]. However, most of the patients with lower back pain also exhibit piriformis tightness [4]. One of the most well-known causes of low back pain is piriformis muscle stiffness [5]. The frequency range for piriformis conditions is between 5% and 36% [2]. Piriformis disorders are more common in women than males [2]. The most common signs and symptoms related to piriformis muscle syndrome include painful sitting, tenderness of muscle, tightened muscle, muscle spasms, and pain during rectal examination. The delayed diagnosis of the priformis disorder leads to pain, paresthesia, hyperparesthesia, and muscle weakness. When muscles are subjected to abnormal stress, type 1 filaments of the piriformis muscle may tighten, putting strain on the sciatic nerve, which affects almost 80% of people [6]. Previous literature reported that sitting for eight hours or more can aggravate pain in the joints and make it more uncomfortable, especially if you adopt a bad contracted position while sitting [6]. Sciatic pain begins in the middle or lower buttocks and is acute, dull, or radiating in nature. Anterior pain is experienced when the S1 nerve is compressed. Pain is felt on the dorsolateral side if the L5 nerve is compressed [7]. The link between the piriformis muscle and sciatica has long been known. Piriformis syndrome (PS) may result in sciatica-related LBP and buttock discomfort. If the pain is radiating from the back to the leg region, piriformis syndrome should also be considered in differential diagnosis [8].

With the purpose of determining the prevalence and risk factors of Piriformis syndrome in motorcycle taxis in Denpasar, Ni Made Wira Tania Astarini et al. conducted a study in 2020. According to the findings, 44.8% of respondents with less than 8 hours of work per week had Piriformis syndrome, compared to 55.2% of respondents with more than 8 hours. About 37.9% of study participant reported placing their wallets in their back pocket, which is also a contributing factor to piriformis tightness [9]. A descriptive study by YM. Tua Siahaan et al. in 2019 investigated the predisposing factors of piriformis syndrome. Results revealed that most of the participants had a history of microtrauma like sitting on hard surfaces

(36.9%), sitting cross-legged (10.8%), and walking or running long distances (18.5%) [10]. A study was conducted by Pradip et al. [11] to assess and screen 120 middle-aged male desk jobs for tightness of muscles around the hip joint. Furthermore, the study concluded that the majority of professionals having desk jobs might experience tightness in their hip muscles, including hamstrings, iliopsoas, and piriformis, making them more susceptible to low back pain or other hips- or back-related symptoms.

Piriformis tightness is a very common problem in individuals, but less has been reached on the existing gap. Office workers spend a significant amount of time while sitting in a constant position. Previous studies have frequently overlooked this specific population. The study's goal was to investigate the predisposing factors for piriformis tightness and its association with low back pain in office workers. The findings of the study will assist healthcare professionals in developing preventive strategies for pirifomis tightness in this specific profession.

2. MATERIALS AND METHODS

A cross-sectional study was conducted on 250 office workers who were selected through a convenient sampling technique from various cities of Pakistan, including Multan, Faisalabad, and Lahore. The sample size was calculated through Open epitool software. The study population was office workers, who were selected through defined inclusion and exclusion criteria. The duration of the study was about six months. The inclusion criteria of the study were office workers of both genders, between the ages of 26 to 50 years. Participants who had been working for at least two years were included in the study. Exclusion criteria included the workers with a history of any previous spinal or leg surgery, any known metabolic disease, history of trauma or fractures, participants with known psychological disorders, and those workers who refused to sign the consent form.

After selecting participants using a convenient sampling technique, the purpose and procedure of the study were explained to them. All participants signed an informed consent form before data collection. The seated piriformis test was used to determine piriformis tightness. Manual palpation was used to assess the tenderness of the piriformis muscle. The pain intensity in the back and buttocks was assessed using a visual analogue scale. To identify the risk factors for piriformis tightness in office workers, a structured questionnaire was used. The questionnaire utilized in this study

underwent institutional review and approval, aligning with established research principles. That self-reported questionnaire was distributed to the study participants after the entire procedure was guided. The researchers assisted them in filling out the questionnaires, after which they were evaluated for piriformis tightness and tenderness.

The seated piriformis stretch test had a sensitivity of 0.52 and a specificity of 0.90 [12]. The test was carried out with the participants seated in the chair, their backs straight, and their feet flat on the floor. The affected leg was then crossed. The ankle of the affected leg was placed on the unaffected knee, performing a passive flexion, adduction, and internal rotation. The researcher placed one hand at the ankle to support it and the other on the lateral side of the knee to feel the deep gluteal area. The therapist then asks the patient to bend forward or may pull the patient's knee up to their chest. The majority of the participants' complained regarding pain in the buttock area that were linked to pirifomis tightness [13]. The visual analogue scale is one of the valid and reliable tools for measuring pain. It is used to track patients' pain progression or intensity of pain. It is a 0 to 10 cm scale with 0 meaning no pain and 10 cm meaning worst pain ever experienced [14]. The VAS had an inter-method reliability of 0.86 and the estimated intra-method reliability was 0.86 with a 95% confidence interval of 0.81 to 0.90, indicating good reliability [15].

SPSS version 22 was used to enter and analyze all of the collected data. Frequency and percentages were used to display descriptive statistics. The Pearson chi-square test was used to examine the association between piriformis tightness and low back pain.

All ethical concerns were taken into account. A permission letter signed by the head of the department was used to get permission and collect data from specific settings. The study received ethical approval from "Government College University Faisalabad". An informed consent form was signed by all study participants before the data collection. The privacy and safety of the participants were prioritized.

3. RESULTS

Demographic statistics revealed that out of 250 participants, 130(52%) were females and 120(48%) were males. Most of the people, approximately 116(46.4%) were between the age limit of 31 to 35 years and 22.8% were between the age of 26 and 30 years. Furthermore, 121(48.2%) participants

had been working for 2-4 years, 69(27.6) had a job duration of 4-6 years, 44(17.6%) had been working in an office job for 6 to 8 years with prolonged working hours, and 16(6.4%) was working more than 8 years (see Table 1).

Table 1. Demographic Statistics (*n*=250)

Variables		*f*(%)
Gender	Females	130(52)
	Males	120(48)
Age	26-30y	57(22.8)
	31-35y	116(46.4)
	36-40y	48(19.2)
	41-45y	19(7.6)
	46-50y	10(4)
Job duration/ experience	2-4y	121(48.2)
	4-6y	69(27.6)
	6-8y	44(17.6)
	>8y	16(6.4)

Piriformis seated test was found to be positive in almost 76% of participants. Piriformis tenderness was assessed by manually palpating the piriformis muscle and tenderness was present in almost 64% of the study participants (see Figure 1).

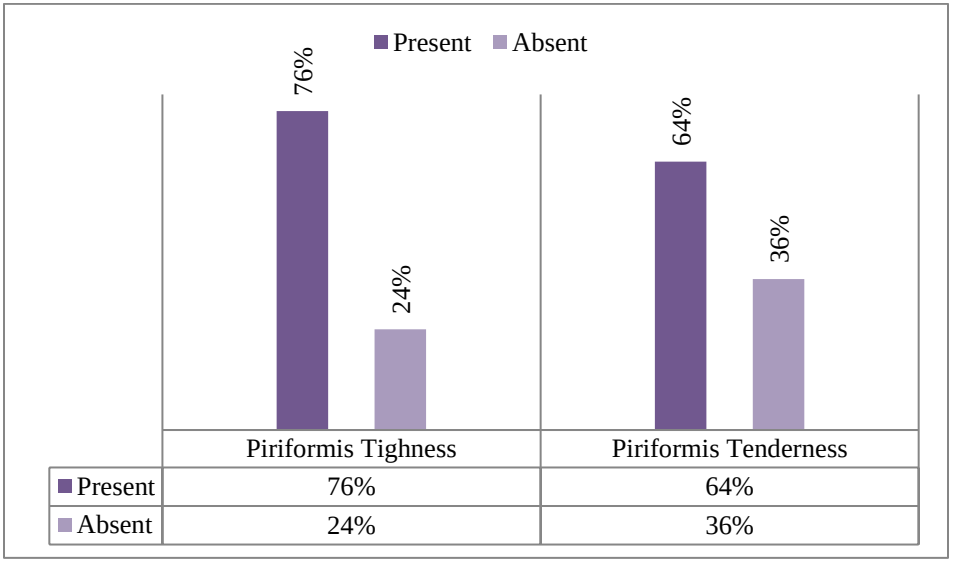


Figure 1. Piriformis Muscle Assessment

The majority of study participants 146(58.4%) had been sitting for 6 to 8 hours during their office working hours . Around 61(24.4%) were constantly sitting for 4 to 6 hours during their hectic office work. The types of chairs that office workers used included, hard seats with back support 65(26%), stools or chairs with no back support 40(16%), foam seats with back support 125(50%), and ergonomic chair 20(8%). Foot support was available to 55(22%) participants. Around 219(87.6%) adopted stoop posture during their prolonged sitting. Moreover, 205(82%) reported having a history of back pain in recent days intermittently upon inquiry. Furthermore, 144(57.6%) participants rarely took breaks from interrupted sitting during a busy office schedule. Nearly, 20(8%) had a history of trauma or accident, while only 49(19.6%) were engaged in physical activities, such as home exercises, yoga, or muscle stretching, (Table 2).

Table 2. Frequency and Percentages of Participant's Responses (*n*=250)

Predisposing factors		*f*(%)
Working hours	2 to 4h	24(9.6)
	4 to 6h	61(24.4)
	6 to 8h	146(58.4)
	> 8h	19(7.6)
Type of chair used	Hard seat with back support	65(26)
	Stool/chair with no back support	40(16)
	Foam seat with back support	125(50)
	Ergonomic chair	20(8)
Sitting posture	Stooped	219(87.6)
	Sitting upright	31(12.4)
Foot support	Yes	55(22)
	No	195(78)
Work-related pain in Back	Yes	205(82)
	No	45(18)
Frequency of breaks or interrupt prolonged sitting	Every 30 min	7(2.8)
	After 1 to 2 h	18(7.2)
	After 2 to 3 h	66(26.4)
	Rarely	144(57.6)
	Never	15(6)

Predisposing factors		*f*(%)
History of trauma/ accident	Yes	20(8)
	No	230(92)
Home exercises/ muscle stretching/ Yoga	Yes	49(19.6)
	No	201(80.4)

Buttock and back pain intensities on VAS are shown in Figure 2. In most of the participants, the pain intensity was mild in both the back (58%) and buttock (62%) regions. Around 18% of the subjects had moderate back pain and 14% had moderate buttock pain.

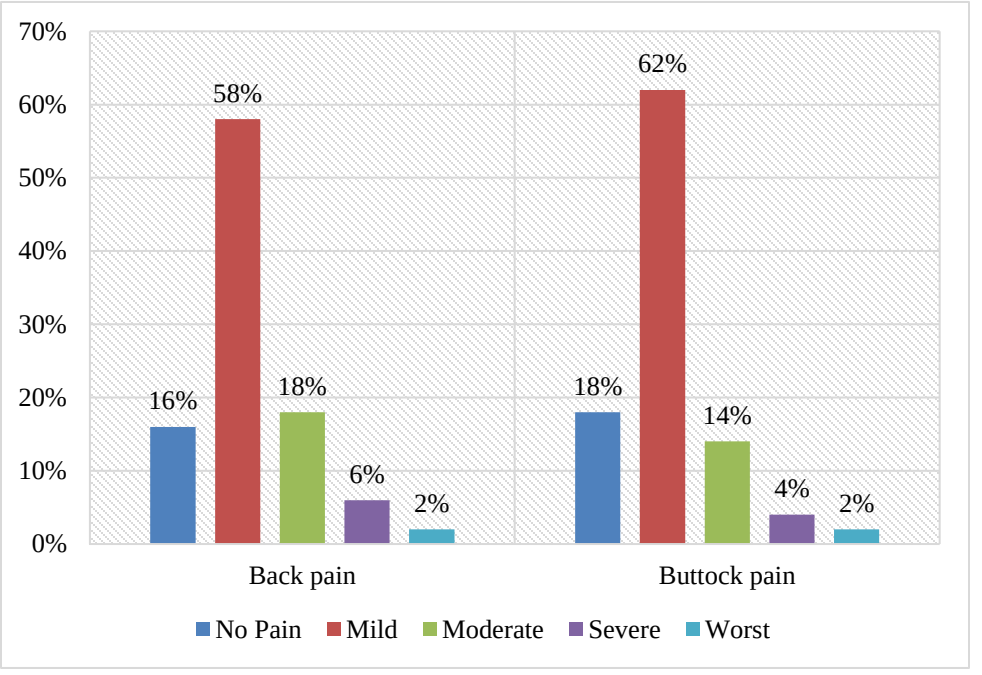


Figure 2. Pain Intensity on Visual Analogue Scale (VAS)

Table 3 shows that the test findings of Chi-Square tests and the association of piriformis tightness with lower back pain. The results showed a p-value of less than 0.05.

Table 3. Chi-Square Tests

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	197.917[a]	1	.000		
Continuity Correction[b]	192.743	1	.000		
Likelihood Ratio	196.134	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	197.125	1	.000		
N of Valid Cases	250				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.00. b. Computed only for a 2x2 table

4. DISCUSSION

Piriformis tightness causes a restricted range of motion and decreased flexibility [1]. The most common signs and symptoms related to piriformis muscle syndrome, include painful sitting, tenderness of muscle, tightened muscle, muscle spasms, and pain [6]. The study aimed to identify the predisposing factors that may cause piriformis tightness.

In this study, it was observed that 130(52%) were females, 120(48%) were males, and most of the study participants 116(46.4%) were between the ages of 31-35 years. Out of 250 participants piriformis tightness was found in 76% of individuals. In line with these results a study by H Adiyatma et al., in 2022 concluded that piriformis syndrome mostly occurs in the 4th and 5th decades of the person's life, and is more common in females [16].

In the recent study, factors that were found to be involved in piriformis tightness and associated with lower back pain were prolonged working hours or prolonged sitting duration, poor sitting posture 219(87.6%), uncomfortable chairs with no foot support 195(78%), insufficient breaks,

while working constantly for prolonged hours. A systematic review by Othman et al. [17] revealed that in 10 high-quality studies, the determined risk factor of Piriformis tightness was gender, increased BMI, history of back pain, and prolonged sitting, while working or driving. Other factors, included unhealthy lifestyles, strenuous physical activities, and psychological stress.

In a previous study by Desai et al. [18] piriformis tightness was found in 135(51.92%) bankers. While the study participants in the recent study were office workers and both occupations were related to prolonged sitting hours. In a recent study, piriformis tightness was present in 76% of the participants. In line with the recent study, another cross-sectional research revealed a frequency of piriformis tightness in 65.4% of bankers, and showed that prolonged sitting jobs are a major risk factor for piriformis muscle tightness [19]. A descriptive study by Pradip B et al. [11] showed that tightness in hip muscle was present in most of the individuals involved in prolonged desk jobs.

Research [9] found the risk factors of piriformis syndrome in online motor taxis. The study concluded that prolonged duration of working is one of the risk factors of piriformis syndrome. In a recent study, most of the study participants 146(58.4%) were working about 6 to 8 hours and 19(7.6%) were working more than 6 hours.

Mubashir et al. [20] checked the association of piriformis tightness with lower back pain. The findings of the study revealed that piriformis syndrome was the leading cause of LBP. The results of the recent study also indicated the association of piriformis muscle tightness and work- related lower back pain ($p<0.05$). In contrast to the current results, a study by Islam et al. [5] found that the frequency of piriformis muscle syndrome in people with LBP was only 18.3%, respectively.

4.1. Conclusion

Piriformis tightness was frequently noticed in office workers. Predisposing factors included prolonged working hours and prolonged sitting on uncomfortable chairs without appropriate foot support, poor posture, and work-related pain. The study also concluded the significant association between lower back pain and piriformis tightness.

4.2. Limitations

The study focused only on office workers so the results may not be generalized to other occupations, the study did not focus on the individual fitness level or other health issues of the participants.

4.3. Recommendation

Further studies are recommended with a larger sample size, including other professionals, and focused on objective assessment instead of self-reported data. Therefore, it is recommended that the companies should take ergonomic measures by providing their employees with comfortable chairs with foot support. Prolonged sitting can be avoided by taking frequent breaks, proper hydration, and muscle stretching with appropriate technique.

REFERENCES

1. Tanveer F, Shahid S. Frequency of piriformis tightness in professionals middle aged women. *Rawal Med J*. 2018;43(4):685–687.
2. Probst D, Stout A, Hunt D. Piriformis syndrome: a narrative review of the anatomy, diagnosis, and treatment. *PM&R*. 2019;11:S54–S63. https://doi.org/10.1002/pmrj.12189
3. Barbosa AB, Santos PV, Targino VA, et al. Sciatic nerve and its variations: is it possible to associate them with piriformis syndrome? *Arq Neuro-Psiquiatr*. 2019;77:646–653. https://doi.org/10.1590/0004-282X20190093
4. Othman IK, Raj NB, Kuan CS, et al. Association of piriformis thickness, hip muscle strength, and low back pain patients with and without piriformis syndrome in Malaysia. *Life*. 2023;13(5):e1208. https://doi.org/10.3390/life13051208
5. Islam F, Mansha H, Gulzar K, Raza A, Raffique A, Haider S. Prevalence of piriformis muscle syndrome among individuals with low back pain: piriformis muscle syndrome among individuals with low back pain. Pakistan Journal of Health Sciences. 2022;3(4):48–52. https://doi.org/10.54393/pjhs.v3i04.98
6. Isu T, Kim K. *Entrapment Neuropathy of the Lumbar Spine and Lower Limbs*. Springer; 2021.

7. Ostelo RW. Physiotherapy management of sciatica. *J Physiother*. 2020;66(2):83–88. https://doi.org/10.1016/j.jphys.2020.03.005

8. Poutoglidou F, Piagkou M, Totlis T, Tzika M, Natsis K. Sciatic nerve variants and the piriformis muscle: a systematic review and meta-analysis. *Cureus*. 2020;12(11):e11531. https://doi.org/10.7759/cureus.11531

9. Astarini NMWT, Wahyuni N, Wibawa A, Indrayani AW, Widyadharma IPE. Prevalence and risk factor of piriformis syndrome among online motorcycle taxis in Denpasar, Bali. *Bali Anatomy J*. 2020;3(1):24–27.

10. Siahaan YMT, Ketaren RJ, Hartoyo V, Tiffani P. The predisposing factors of piriformis syndrome: Study in a referral hospital. *Malang Neurol J*. 2019;5(2):76–79.

11. Pradip B, Sudhir B, Nidhi B. Prevalence of tightness in hip muscles in middle aged Indian men engaging in prolonged desk jobs: A descriptive study. *Int J Phys Educ Sports Health*. 2018;5(2):15–21.

12. Martin HD, Kivlan BR, Palmer IJ, Martin RL. Diagnostic accuracy of clinical tests for sciatic nerve entrapment in the gluteal region. *Knee Surg Sports Traumatol Arthrosc*. 2014;22:882–888. https://doi.org/10.1007/s00167-013-2758-7

13. Chin A, Tse K, Chu P. Piriformis syndrome is a rare cause of insidious unilateral lower limb weakness and buttock pain: a case report. *Hong Kong J Radiol*. 2020;23(4):281–284.

14. Begum MR, Hossain MA. Validity and reliability of visual analogue scale (VAS) for pain measurement. *J Med Case Rep Rev*. 2019;2(11): 394–402.

15. Escalona-Marfil C, Coda A, Ruiz-Moreno J, Riu-Gispert LM, Gironès X. Validation of an electronic visual analog scale mHealth tool for acute pain assessment: prospective cross-sectional study. *J Med Internet Res*. 2020;22(2):e13468. https://doi.org/10.2196/13468

16. Adiyatma H, Kurniawan SN. Piriformis syndrome. *J Pain Headache Vert*. 2022;3(1):23–28. https://doi.org/10.21776/ub.jphv.2022.003.01.5

17. Othman IK, Mohamad N, Sidek S, Bhaskar RN, Kuan CS. Risk factors associated with piriformis syndrome: a systematic review. *Sci Eng Health Stud*. 2020:215–233. https://doi.org/10.14456/sehs.2020.20

18. Desai VS, Anand S. Prevalence of piriformis tightness with relevance of sitting duration in bankers. *Ind J Forens Med Toxicol*. 2020;14(3):e749. https://doi.org/10.37506/ijfmt.v14i3.10458

19. Mughal S, Ahmad M, bin Malik K. Prevalence of piriformis tightness due to long hours sitting among bankers of Faisalabad city. *Indepen J Allied Health Sci*. 2020;3(1):55–59.

20. Mubashir M, Arif MA, Chughtai AS, Noureen A. Association of low back pain with piriformis muscle tightness in university students. *Pak J Phys Ther*. 2018;1(2):24–28. https://doi.org/10.52229/pjpt.v1i2.451