

PREVALENCE OF PIRIFORMIS TIGHTNESS AMONG MADRASSA STUDENTS OF GUJRANWALA DIVISION

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Abstract

Background: Piriformis muscle tightness is a musculoskeletal condition associated with increased tension of the piriformis muscle, which may contribute to sciatic nerve irritation and lower extremity discomfort. Prolonged sitting and poor postural habits may increase the risk of piriformis-related symptoms among students involved in extended study activities.

Objective: To determine the prevalence of piriformis muscle tightness among female madrasa students of the Gujranwala Division.

Methods: A cross-sectional study was conducted over six months among 377 female madrasa students aged 18–25 years. The sample size was calculated using the Epitools software and through non-probability convenience sampling data was collected. Students with a daily sitting duration of 5–8 hours were included. Data were collected using a self-structured questionnaire, Flexion-Abduction-External Rotation (FAIR) test, and Numeric Pain Rating Scale (NPRS). Ethical approval was obtained from concerned madrasa administrations, and informed consent was taken from all participants. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0.

Results: Piriformis muscle tightness was identified in 52.8% of participants, while 46.2% showed no evidence of tightness. A positive FAIR test was observed in 199 students. Moderate pain was reported by 55.4% of participants, mild pain by 34.0%, and severe pain by 10.6%. The buttock region was the most common site of pain (52.0%), followed by the posterior thigh region (40.6%). Most participants reported sitting on thin mats (67.6%), and symptoms commonly developed after 20–40 minutes of sitting (44.3%).

Conclusion: Piriformis muscle tightness was prevalent among female madrasa students engaged in prolonged sitting activities. Awareness regarding ergonomic sitting practices and preventive physiotherapy interventions may help reduce piriformis-related musculoskeletal symptoms.

Background

Piriformis muscle tightness is a musculoskeletal condition that may contribute to gluteal pain, low back discomfort, and radiating symptoms in the lower extremity. (Mandiroglu et al., 2026) The piriformis muscle is a small, pear-shaped muscle located in the deep gluteal region and is considered one of the primary external rotators of the hip joint. It originates from the anterior surface of the sacrum and inserts into the greater trochanter of the femur. The muscle is innervated by the sacral plexus (L5-S2) and plays an important role in hip stabilization, external rotation, and abduction of the hip, especially when the hip is flexed. (Sharma et al., 2023) Due to its anatomical relationship with the sciatic nerve, increased tension or reduced flexibility of the piriformis muscle may cause irritation of the sciatic nerve, resulting in symptoms associated with piriformis syndrome. (Goidescu et al., 2022) Piriformis muscle tightness is considered a challenging condition in physiotherapy practice because its clinical presentation often overlaps with other causes of low back pain and sciatica. (Adiyatma et al., 2022)

Patients may experience localized buttock pain, tenderness over the piriformis region, pain radiating toward the posterior thigh, paresthesia, and difficulty performing functional activities such as sitting, walking, and bending. Due to the similarity of symptoms with lumbar spine disorders, sacroiliac joint dysfunction, and other musculoskeletal conditions, accurate clinical assessment is essential for proper diagnosis and management. (Batoool et al., 2025b) Several factors contribute to the development of piriformis muscle tightness, including prolonged sitting, poor posture, decreased physical activity, muscle imbalance, and repetitive mechanical stress. Maintaining a static sitting posture for extended periods may result in shortening and increased tension of the hip musculature, altered pelvic biomechanics, and reduced flexibility of the piriformis muscle. Sitting on hard surfaces and adopting improper postural positions may further increase stress on the gluteal muscles and

contribute to musculoskeletal discomfort. (Khan et al., 2023)

Students are considered a vulnerable population due to their prolonged academic sitting habits. Activities such as reading, writing, memorization, and digital learning require students to maintain sitting positions for several hours, which may increase the risk of postural dysfunction and musculoskeletal problems (Haleem et al., 2021) Increased sedentary behavior, reduced physical activity, and prolonged static postures have been associated with higher prevalence of musculoskeletal complaints among young individuals. (Barzak et al., 2023) Madrassa students represent a specific group with unique sitting patterns, as they commonly spend long durations studying while sitting on floor-based surfaces, often in cross-legged positions. These prolonged sitting postures may place continuous load on the hip and gluteal muscles, resulting in muscle tightness, reduced flexibility, and discomfort. Hard seating surfaces, limited postural variation, and inadequate ergonomic awareness may further increase the risk of piriformis-related symptoms among these students (Kainat et al., 2026)

Although piriformis muscle tightness has been investigated among different sedentary populations, limited research is available regarding its prevalence among madrassa students, particularly female students in Pakistan. Identification of prevalence and associated factors can help physiotherapists develop preventive strategies, ergonomic education programs, and early intervention approaches. Therefore, this study aimed to determine the prevalence of piriformis muscle tightness among young female madrassa students of the Gujranwala Division.

Materials and Methods

The sample size was estimated using the single-population proportion formula for a cross-sectional study. For illustrative purposes, an expected prevalence of 50%, a 95% confidence level, and a margin of error of 5% yield a minimum sample size of approximately 384 participants. However, the present study included

377 female madrassa students aged 18–25 years from selected madrassas in Gujranwala Division, Pakistan. Participants were recruited through a non-probability convenience sampling technique. (Nazir et al., 2022) The study was conducted over a period of six months after approval of the research synopsis. Participants were recruited from different madrassas of the Gujranwala Division, including Jamia Farooqia, Jamia Sadiqia Lil Banat, Faizan-e-Madina, and Jamia-tul-Lil-Binat. A non-probability convenient sampling technique was used for participant recruitment.

The inclusion criteria comprised female young adults aged 18–25 years, students enrolled in madrassas, individuals with prolonged sitting habits (approximately 5–8 hours daily), and participants willing to provide informed consent. Participants were excluded if they were pregnant, had a history of recent back or hip surgery, diabetes mellitus, systemic diseases, or recent fractures affecting the lower back or lower extremities. Before participation, all participants were informed about the purpose, procedures, potential benefits, and confidentiality measures of the study. Written informed consent was obtained from each participant, and ethical principles were followed throughout the data collection process.

Procedure

Data were collected through a self-structured questionnaire designed to obtain demographic information and sitting-related characteristics, including age, duration of sitting, type of sitting surface, onset of pain after sitting, and location of discomfort. The FAIR maneuver involves flexion, adduction, and internal rotation of the hip, which is commonly used as a clinical assessment tool for identifying piriformis-related symptoms. The

FAIR test was performed by placing the participant in a supine position with the hip flexed, abducted, and externally rotated. Reproduction of pain or discomfort in the piriformis region during the test was considered indicative of a positive finding. (Dhillon et al., 2025) Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS), a commonly used physiotherapy outcome measure ranging from 0 to 10, where 0 represents no pain and 10 represents the worst imaginable pain. Participants were categorized according to their reported pain severity. (Modarresi et al., 2022)

All participants were provided with a brief explanation of the assessment procedures before evaluation. Data collection was performed manually while maintaining participant privacy and confidentiality. The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics were applied to summarize demographic characteristics, prevalence of piriformis muscle tightness, pain intensity, and associated clinical findings. Statistical analysis

Results:

The findings showed that out of 377 participants, 138 (36.6%) belonged to age group 1, while 239 (63.4%) belonged to age group 2, indicating that the majority of participants were in group 2. Regarding seating surface, 255 (67.6%) participants reported sitting on a thin mat, 63 (16.7%) used cushions, and 59 (15.6%) sat directly on the floor. In terms of years spent in madrassa, 116 (30.8%) participants had attended for four years, 100 (26.5%) for three years, 89 (23.6%) for five years, and 72 (19.1%) for two years. This indicates that four years was the most common duration of madrassa attendance.

Table 1. Basic Demographic Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Age group	Age 18 to 21	138	36.6
	Age 22 to 25	239	63.4
Seating surface	Floor	59	15.6
	Thin mat	255	67.6
	Cushion	63	16.7

Years in madrassa	2 years	72	19.1
	3 years	100	26.5
	4 years	116	30.8
	5 years	89	23.6
Time until pain onset	Less than 10 minutes	14	3.7
	10-20 minutes	138	36.6
	20-40 minutes	167	44.3
	More than 40 minutes	58	15.4
Pain location	Buttock region	196	52.0
	Back of thigh	153	40.6
	Leg or calf	28	7.4
Side of pain	Right	145	38.5
	Left	232	61.5
Total participants		377	100.0

Regarding the onset of sitting-related pain, 167 (44.3%) participants reported experiencing pain after 20-40 minutes of sitting, followed by 138 (36.6%) who experienced pain after 10-20 minutes. A total of 58 (15.4%) participants reported pain after more than 40 minutes, while 14 (3.7%) experienced pain within less than 10 minutes. In terms of pain location, 196 (52.0%) participants reported pain in the buttock region, 153 (40.6%) in the back of the thigh, and 28

(7.4%) in the leg or calf. Regarding the side of pain, 232 (61.5%) participants reported left-sided pain, whereas 145 (38.5%) reported right-sided pain. Overall, the findings indicate that thin-mat sitting was the most common seating practice, pain most frequently began after 20-40 minutes of sitting, and the buttock region was the most commonly reported pain location as shown in table 1

Table 2. FAIR Test Results and Numeric Pain Rating Scale (NPRS)

Variable	Category	Frequency (n)	Percentage (%)
FAIR test	Positive	199	52.8
	Negative	178	47.2
Numeric Pain Rating Scale (NPRS)	Mild pain (1-3)	128	34.0
	Moderate pain (4-6)	209	55.4
	Severe pain (7-10)	40	10.6
Total participants		377	100.0

Note: FAIR = Flexion, Adduction, and Internal Rotation test; NPRS = Numeric Pain Rating Scale.

The findings in table 2 showed that out of 377 participants, 199 (52.8%) had a positive FAIR test, while 178 (47.2%) had a negative FAIR test, indicating that slightly more than half of the participants had a positive test result. Regarding pain intensity measured using the Numeric Pain Rating Scale (NPRS), 209 (55.4%) participants reported moderate pain (scores of 4-6), 128 (34.0%) reported mild pain (scores of 1-3), and 40 (10.6%) reported severe pain (scores of 7-10).

These findings demonstrate that moderate pain was the most common pain-intensity category among the participants, followed by mild pain, while severe pain was reported by the smallest proportion. Overall, the results indicate that a positive FAIR test and moderate pain were the most frequently observed findings in the study population.

Discussion:

The purpose of the present study was to assess the prevalence of Piriformis tightness among madrassa students of Gujranwala division. The results showed that the participants experienced tightness in the piriformis and experienced some level of pain and discomfort, notably in the buttock and posterior thigh area muscles. The findings suggest that sitting for a long period of time, sitting surface, and the maintenance of a postural position may be factors affecting musculoskeletal outcomes in madrassa students. The results can be compared to previous research done with university students, office workers, health care workers and other groups of prolonged sitter subjects. In the present study, 53.8% of 377 female students had piriformis tightness and 47% of students were reported to have no tightness. This prevalence shows that over 50% of the respondents were affected. Similar results were obtained by Desai et al., (2020) who observed piriformis tightness in 51.92% of 260 bankers in Karad taluka. (Desai & Anand, 2020) Likewise, Shahzad et al. (2023) reported the prevalence of 51.1% in pregnant women and Muhammad et al. (2022) found piriformis tightness in 41.7% of allied health students. (Shahzad et al., 2023) (Muhammad et al., 2022) Such differences could be due to participant differences, daily activity differences, sitting behaviors, and assessment differences. Tabassum et al. (2025) reported a higher prevalence of 67.8% for tightness in female physiotherapy students when using the piriformis stretch test. (Tabassum et al., 2025) Similarly, Dahiya et al. (2022) found that the prevalence was 68 % among information technology professionals. Overall, the results indicate that there are instances of tightness in the piriformis in various populations, but direct comparisons need to be done with caution due to the differences in study settings and assessment methods. (Dahiya et al., 2022) As far as sitting habits, the present study revealed that, 67.6% of the participants sat on thin mats. Sitting on poorly cushioned surfaces can lead to some discomfort and pressure around the buttocks area. However, it is not possible to determine the relationship between sitting

surfaces and piriformis tightness based on the reported descriptive findings. Interestingly, a lack of association between piriformis tightness and dimensions of the chair and the support of the cushion was found by Desai et al. (2020), suggesting that the duration of sitting, characteristics and other postural factors may also be relevant. (Desai & Anand, 2020) Batool et al. (2025) found in another population, that 88% of office workers had slouched posture and 78% did not use foot support, and there was a strong relationship between piriformis tightness and LBP. The results of this study indicate that there is a need for more research on sitting ergonomics for students of the madrassa. (Batool et al., 2025a) Another important background piece of information for the students' exposure to prolonged sitting is the length of madrassa teaching. In the current study, 30.8% of the respondents said that they had been attending Madrassa for four years. Maintaining static postures over a prolonged period can be a cause for muscle discomfort and a decrease in postural variation. For allied health students, a significant age association with piriformis tightness was reported ($p = 0.036$) with no significant association with gender or year of study reported by Muhammad et al (2022). Additionally, Tabassum et al. (2025) noted that the students with a study time of 6 hours or more per day were more likely to experience muscular tightness ($OR = 2.97$, $p = 0.005$). The results show that the amount of time spent sitting daily is more important than the number of years spent in school. (Tabassum et al., 2025). In terms of onset of symptoms, 44.3% reported pain after 20–40 minutes and 36.6% reported pain after 10–20 minutes of sitting. The pattern indicates that a significant number felt discomfort during relatively brief periods of continuous sitting. Additionally, 55.4% experienced moderate pain, 34.0% mild pain and 10.6% severe pain on the Numeric Pain Rating Scale. Moderate discomfort was also observed in 37.4% of undergraduate students, with a mean daily sitting time of 10.79 ± 3.12 hours, in a similar study conducted by Fatima et al. (2025). Lower back pain, gluteal pain, and

sitting discomfort were also reported by Tabassum et al. (2025) in the physiotherapy students. (Fatima et al., 2025) Combined, these findings suggest that musculoskeletal symptoms can impact students' comfort during extended school activities. (Tabassum et al., 2025) The distribution of pain location in the present study further showed that 52.0% participants experienced buttock pain, 40.6% experienced posterior thigh pain and 7.4% experienced pain in the leg or calf. This distribution is clinically significant because symptoms from the piriformis can also involve the buttock and spread down the posterior thigh. Gulzar et al. (2022) reported piriformis tightness in 72.1% of the patients who presented with sciatica in Gujranwala (Gulzar et al., 2022), and Othman et al. (2023) found piriformis syndrome in 18.3% of patients with lower back pain. (Othman et al., 2023) However, pain distribution does not necessarily indicate the involvement of the sciatic nerve and piriformis tightness is not synonymous with piriformis syndrome. In general, the results indicated that tightness of piriformis muscle is a significant musculoskeletal issue among the students of madrassa in Gujranwala division. The study had several limitations, including the lack of assessment of potential contributing factors such as BMI and the limited geographic area, which may restrict the generalizability of the findings. Additionally, the use of the FAIR test without advanced imaging techniques may have limited diagnostic confirmation. Despite these limitations, the findings highlight the need for preventive measures. Students should use cushioned seating, take breaks every 20-30 minutes, perform regular piriformis and hip stretching exercises, and attend awareness sessions on proper sitting posture. Future studies should include larger and more diverse populations and investigate the association of piriformis tightness with BMI, sitting duration, physical activity, and posture to improve prevention and physiotherapy management.

Conclusion

According to this study, piriformis tightness is a common muscle condition among madrassa students in the Gujranwala division (52.8%) Students often experience mild soreness in the buttocks, mainly due to sitting for long periods on hard or thin mattresses. The impact of staying in one position is evident, as pain typically begins 20 to 40 minutes after sitting continuously. There is also a link between a longer madrassa education and a higher risk of this issue. To prevent problems and improve students' physical health, the findings emphasize the need to address lifestyle and seating habits.

Conflict of Interest

No conflict of interest declared by the authors.

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