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ASSOCIATION OF PIRIFORMIS SYNDROME WITH LONG SITTING HOURS AND ITS IMPACT ON DAILY FUNCTIONAL ACTIVITIES AMONG UNIVERSITY STUDENTS

Original Research

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ABSTRACT

Background: Piriformis Syndrome (PS) is a neuromuscular condition characterized by the compression of the sciatic nerve due to hypertrophy or tightness of the piriformis muscle. It commonly presents with gluteal pain radiating to the lower limb and is often misdiagnosed as lumbosacral radiculopathy. Contributing factors include prolonged sitting, sedentary lifestyle, and poor postural habits, particularly prevalent among university students engaged in extended academic activities.

Objective: To determine the association between sitting duration, pain intensity, and functional disability among university students diagnosed with Piriformis Syndrome.

Methods: This cross-sectional study was conducted on 80 university students aged 18–30 years in Faisalabad, Pakistan. Participants were selected using non-probability convenience sampling. Diagnosis of Piriformis Syndrome was made using clinical tests including the FAIR (Flexion, Adduction, Internal Rotation) and Lasegue tests. Pain intensity was measured using the Visual Analogue Scale (VAS), and functional disability was assessed using the Oswestry Disability Index (ODI). Pearson correlation was applied to evaluate relationships among variables, while multiple linear regression was used to predict pain based on sitting duration, age, BMI, clinical test outcomes, and physical activity.

Results: The mean age of participants was 23.19 ± 3.80 years, and mean BMI was 21.17 ± 2.86 kg/m². A significant positive correlation was found between sitting duration and pain intensity ($r = 0.65$, $p < 0.001$). Each additional hour of sitting was associated with a 1.36-point increase in VAS score ($B = 1.3557$, $p < 0.001$). Lifting activity also showed a significant association with pain ($\beta = 0.5028$, $p = 0.028$), whereas walking, standing, and sleeping did not show significant relationships ($p > 0.05$).

Conclusion: Prolonged sitting is a significant contributor to pain and functional limitations in students with Piriformis Syndrome. Preventive ergonomic strategies, physical activity promotion, and therapeutic interventions are recommended to alleviate symptoms and enhance quality of life in academic populations.

Keywords: Ergonomics, Functional Disability, Pain Measurement, Piriformis Syndrome, Posture, Sedentary Behavior, Students.

INTRODUCTION

Piriformis syndrome (PS) is a neuromuscular disorder characterized by the compression of the sciatic nerve by the piriformis muscle, often leading to buttock pain radiating into the lower limb (1). This condition, although frequently underdiagnosed, contributes significantly to cases of non-discogenic sciatica and chronic lower back pain. The piriformis muscle, situated deep in the gluteal region, plays a key role in external rotation and stabilization of the femur and is anatomically proximate to the sciatic nerve, making it a potential source of neurovascular compression (2,3). The clinical manifestation of PS can be aggravated by prolonged sitting, repetitive movements, or poor posture, which place continuous stress on the muscle, leading to tightness, inflammation, and resultant nerve irritation. Recent observational studies have identified a notably high prevalence of piriformis muscle tightness among individuals engaged in sedentary professions. Office workers and bankers, in particular, report high incidences of PS-related symptoms, with prevalence rates as high as 76% and 65.4% respectively (4,5). The persistent nature of sedentary tasks, especially those involving improper ergonomic setups—such as unsupportive chairs, lack of footrests, and insufficient lumbar support—exerts continuous mechanical strain on the lumbopelvic musculature (6). This occupational hazard is further compounded by extended working hours without adequate movement breaks, which has been shown to compromise circulation, reduce muscle flexibility, and increase the risk of nerve entrapment syndromes (6,7).

Digital learning environments have further intensified sedentary behaviors, particularly among students. Extended screen time, minimal physical activity, and prolonged static postures have been implicated in the development of musculoskeletal issues, including PS (8,9). These health concerns not only impair physical functioning but also carry psychological consequences such as anxiety, depression, and reduced academic productivity. Students experiencing musculoskeletal discomfort may face difficulties in attending classes, participating in physical activities, and maintaining consistent academic performance, highlighting the multifactorial burden of untreated PS on both physical and mental well-being (10). Despite the growing awareness of occupational and lifestyle contributors to piriformis syndrome, literature exploring its prevalence and impact among student populations remains limited. This gap in knowledge underscores the importance of examining the relationship between sedentary behaviors, ergonomic risk factors, and piriformis muscle dysfunction in academic settings. The objective of this study is to investigate the association between sedentary digital learning environments and the prevalence of piriformis syndrome among students, aiming to identify modifiable risk factors and promote early preventive interventions.

METHODS

A cross-sectional study design was employed to investigate the association between sedentary behavior and piriformis syndrome among university students in Faisalabad, Pakistan. A total of 80 participants were recruited through non-probability convenience sampling from both public and private universities. The inclusion criteria encompassed male and female students aged between 18 and 30 years, while individuals with a history of lumbar spine disorders, prior hip surgeries, or neurological conditions affecting gait or posture were excluded to minimize confounding variables. Ethical approval was obtained from the relevant Institutional Review Board (IRB), and written informed consent was secured from all participants prior to data collection, ensuring adherence to ethical standards for human subject research. The diagnosis of piriformis syndrome was established based on clinical assessment, incorporating a combination of validated physical examination tests. These included the FAIR (Flexion, Adduction, and Internal Rotation) test (9), the Beatty maneuver (10), and the Lasegue (Straight Leg Raise) test. Additionally, a modified League test was performed, in which the participant was positioned in a side-lying posture with the affected hip flexed to 60° and the knee flexed. The examiner applied downward pressure on the flexed knee while the participant resisted, with the presence of gluteal pain or discomfort indicating a positive result suggestive of piriformis syndrome. The combination of these tests enhanced diagnostic specificity for sciatic nerve involvement due to piriformis muscle irritation.

Pain intensity was measured using the Visual Analogue Scale (VAS), a reliable and widely used subjective pain assessment tool. Functional disability was evaluated using the Oswestry Low Back Pain Disability Index (ODI), a validated questionnaire designed to quantify the degree of disability and functional limitation associated with lower back pain. These instruments allowed for a comprehensive understanding of the symptom severity and impact on daily functioning. Statistical analysis was conducted using

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Pearson's correlation to assess relationships between sitting duration, pain intensity (VAS), and the results of physical examination tests, including the FAIR and Lasegue tests. Correlation coefficients and p-values were reported to determine the strength and significance of these associations. Furthermore, multiple linear regression analysis was performed to explore the predictive influence of variables such as age, body mass index (BMI), sitting duration, FAIR test outcomes, Lasegue test results, and levels of physical activity on pain intensity. The regression model provided coefficients, standard errors, t-values, p-values, and 95% confidence intervals, with statistical significance set at $p < 0.05$.

RESULTS

The sample consisted of 80 participants with an age range between 19 and 30 years (mean = 23.19, SD = 3.806). Body mass index (BMI) values ranged from 16.00 to 26.40, with a mean of 21.17 (SD = 2.863). Pain intensity, as measured on the Visual Analogue Scale (VAS), ranged from 0 to 8, with a mean score of 3.34 (SD = 1.771). Among the participants, 41 (51.2%) were male and 39 (48.8%) were female. Regarding sedentary behavior, 59 participants (73.8%) reported sitting for 2–4 hours daily, 7 (8.8%) for 4–6 hours, and 14 (17.5%) for 6–8 hours. Correlational analysis revealed a strong and statistically significant positive relationship between sitting duration and VAS scores ($r = 0.65$, $p < 0.001$), suggesting that longer sitting duration was associated with increased pain intensity. All other correlations—including those with FAIR test, Lasegue test, and pain intensity—were weak and not statistically significant ($p > 0.05$). Multiple linear regression analysis further demonstrated that sitting duration significantly predicted pain intensity, with each unit increase in sitting duration resulting in a 1.36-point increase in VAS score ($B = 1.3557$, $p < 0.001$, 95% CI: 0.950 to 1.761). Among other predictors, only lifting activity showed a statistically significant association with pain ($B = 0.5028$, $p = 0.028$, 95% CI: -0.949 to -0.057). Age ($p = 0.692$), BMI ($p = 0.548$), Lasegue test ($p = 0.609$), FAIR test ($p = 0.386$), and other functional activities such as walking, standing, sitting posture, and sleeping habits showed no significant effect on pain levels ($p > 0.05$). The regression model accounted for 50.2% of the variance in VAS pain scores ($R^2 = 0.502$), indicating a moderate to strong predictive value of the selected variables, particularly sitting duration.

In addition to the regression and correlation analyses, the results were further examined to determine the prevalence of piriformis syndrome based on clinical diagnostic tests. Among the 80 participants, 21 individuals (26.3%) tested positive on the FAIR test, while 24 individuals (30.0%) were positive on the Lasegue test. A total of 18 participants (22.5%) were found to be positive on both the FAIR and Lasegue tests, which is a clinically relevant indication of potential sciatic nerve involvement due to piriformis muscle tightness. These findings suggest that nearly one-quarter of the sample may be experiencing piriformis-related symptoms, reinforcing the significance of identifying musculoskeletal dysfunctions in sedentary student populations. Despite weak statistical correlations between these test results and pain or sitting duration, the clinical positivity rates emphasize a tangible burden of piriformis syndrome, warranting further diagnostic awareness and ergonomic intervention in digitally-driven academic environments.

Table 1: Descriptive Statistics of Participant Age, Body Mass Index, and Pain Intensity Scores (VAS)

Variables	N	Minimum	Maximum	Mean	SD
Age of participant	80	19	30	23.19	3.806
BMI	80	16.00	26.40	21.17	2.863
Visual Analogue Scale	80	0	8	3.34	1.771

Table 2: Pearson Correlation Matrix Among Sitting Duration, Pain Intensity, and Clinical Test Outcomes in University Students with Piriformis Syndrome

Variable	Sitting duration	VAS	FAIR Test	Lasegue test	Pain Intensity
Sitting duration	1.00	0.65 (p=0.000)	-0.12 (p=0.303)	0.12 (p=0.299)	0.13 (p=0.269)
VAS	0.65 (p=0.000)	1.00	-0.15 (p=0.181)	0.14 (p=0.216)	-0.02 (p=0.833)
FAIR Test	-0.12 (p=0.303)	-0.15 (p=0.181)	1.00	-0.15 (p=0.177)	0.01 (p=0.926)
Lasegue test	0.12 (p=0.299)	0.14 (p=0.216)	-0.15 (p=0.177)	1.00	0.06 (p=0.580)
Pain Intensity	0.13 (p=0.269)	-0.02 (p=0.833)	0.01 (p=0.926)	0.06 (p=0.580)	1.00

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Table 3: Multiple Linear Regression Analysis Predicting Pain Intensity Based on Sitting Duration, Demographic Factors, and Functional Activities among University Students with Piriformis Syndrome

Predictor	Coefficient (B)	Std. Error	t-value	p-value	95% Confidence Interval
Constant	3.4432	2.036	1.691	0.095	(-0.619, 7.506)
Sitting Duration	1.3557	0.203	6.67	<0.001	(0.950, 1.761)
Age	0.0166	0.042	0.398	0.692	(-0.066, 0.100)
BMI	-0.0354	0.059	-0.604	0.548	(-0.152, 0.081)
Lasegue Test	0.1618	0.315	0.513	0.609	(-0.467, 0.791)
FAIR Test	-0.8615	0.988	-0.872	0.386	(-2.833, 1.110)
Walking	0.0256	0.172	0.149	0.882	(-0.317, 0.368)
Sitting	0.0333	0.239	0.139	0.89	(-0.444, 0.511)
Standing	-0.4127	0.249	-1.659	0.102	(-0.909, 0.083)
Lifting	0.5028	0.224	2.248	0.028	(-0.949, -0.057)
Sleeping	-0.1633	0.295	-0.554	0.581	(-0.751, 0.425)

Table 4: Diagnostic test outcomes

Diagnostic Test Outcome	Frequency (n)	Percentage (%)
FAIR Test Positive	21	26.3%
Lasegue Test Positive	24	30.0%
Positive on Both Tests	18	22.5%
Negative on Both Tests	44	55.0%
Total Participants Assessed	80	100%

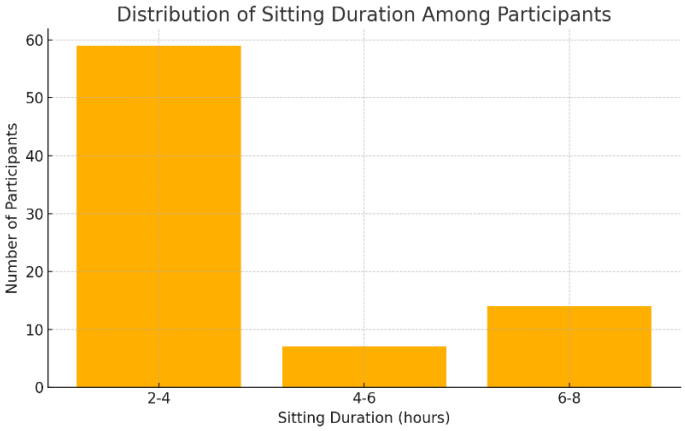

Figure 1 Distribution of Duration Among Participants

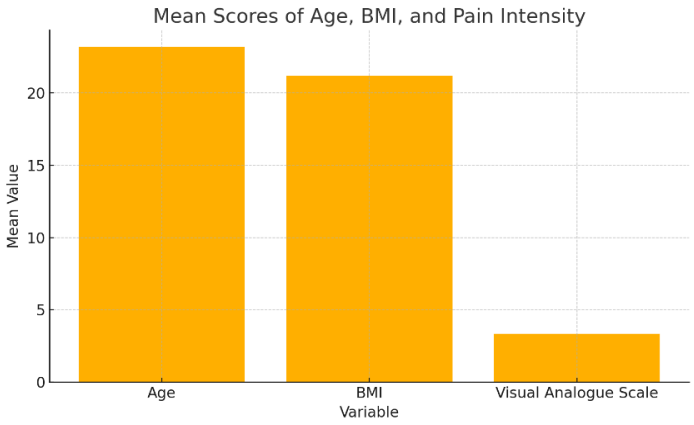

Figure 2 Mean Scores of Age, BMI, and Pain Intensity

DISCUSSION

The findings of the present study highlight a strong and statistically significant relationship between prolonged sitting duration and increased pain intensity among university students, as measured by the Visual Analogue Scale. The results indicated that each unit increase in sitting duration contributed to a 1.36-point rise in pain score ($r = 0.65$, $p < 0.001$), emphasizing the role of sedentary behavior as a key risk factor for piriformis syndrome (PS). This aligns with existing literature, which consistently associates prolonged static postures with musculoskeletal dysfunction, including PS and lower back pain. Prior studies have suggested that extended periods of sitting, particularly on hard surfaces or in non-ergonomic postures, result in increased tension within the piriformis muscle, contributing to hypertrophy and sciatic nerve compression (11,12). The current study supports this understanding, further reinforcing the relevance

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of ergonomic awareness and behavioral interventions in academic populations. The clinical evaluation revealed that a significant proportion of participants—approximately 26.3% on the FAIR test and 30.0% on the Lasegue test—demonstrated positive signs suggestive of PS, with 22.5% testing positive on both. These figures provide compelling evidence for the presence of piriformis-related symptoms in young, sedentary populations (13). Despite the relatively weak statistical correlation between diagnostic tests and pain measures, the positive test rates suggest a considerable clinical burden, highlighting the need for regular screening and early intervention, particularly in student environments where sedentary behavior is prevalent (14).

The study also assessed functional limitations, with findings indicating that lifting ability had a notable association with pain intensity ($\beta = -0.50$, $p = 0.028$), while other activities such as walking, standing, and sleeping did not demonstrate statistically significant correlations. This is consistent with previous research reporting that activities requiring lower limb engagement and strength are particularly affected in individuals with PS (15). Improper lifting mechanics and reduced muscle flexibility due to prolonged sitting have been implicated in exacerbating sciatic nerve compression, further validating the current study's results. Functional disability scores based on the Oswestry Disability Index reflected mild to moderate limitations, underscoring the impact of PS on daily living and physical performance. Beyond physical discomfort, PS has been associated with broader psychosocial consequences. The study corroborates previous findings that chronic pain in students may impair academic productivity, mental health, and social engagement. Prolonged pain conditions have been linked to increased levels of stress, anxiety, and depression, which in turn may affect concentration, attendance, and overall academic success (16,17). In the present study, the relationship between PS and quality of life, though not directly measured, can be inferred from the functional limitations and pain levels reported by participants.

The findings present critical implications for preventive strategies within academic institutions. Given the identified role of sitting duration in pain intensity, implementing ergonomic modifications such as adjustable seating, foot support, and standing desks may offer substantial benefit. Encouraging regular breaks, posture education, and stretching routines can also help mitigate the musculoskeletal strain associated with prolonged sitting. Moreover, physical therapy approaches including piriformis release techniques and sciatic nerve mobilization have shown clinical efficacy in reducing PS-related symptoms and improving function (18,19). The integration of these therapeutic options into student wellness programs may serve as a proactive step toward addressing the condition at an early stage. A key strength of the study lies in its clinical approach to diagnosing PS through validated physical examination tests, supported by both subjective and objective measures of pain and disability (20). The combination of statistical modeling and functional assessment provides a multidimensional perspective on the risk factors and impacts of PS. However, the study's cross-sectional design limits the ability to infer causality between sitting duration and symptom development. Additionally, the relatively small sample size and non-probability sampling method may affect generalizability to broader populations. The absence of direct assessment of mental health and long-term academic outcomes also restricts the scope of conclusions regarding the psychosocial effects of PS.

Future research should consider longitudinal designs to better understand the temporal progression of PS and its relationship to behavioral risk factors. Expanding the sample to include diverse student populations and incorporating mental health metrics could offer a more comprehensive understanding of the syndrome's multifaceted burden. Furthermore, intervention-based studies assessing the effectiveness of ergonomic and therapeutic strategies would be valuable in guiding preventive and rehabilitative efforts. Overall, the study contributes to the growing body of evidence linking sedentary academic lifestyles to musculoskeletal conditions such as piriformis syndrome. It underscores the importance of early identification, ergonomic awareness, and functional rehabilitation in improving the health and quality of life of university students.

CONCLUSION

This study concluded that prolonged sitting plays a pivotal role in the development of piriformis syndrome and the resulting functional limitations among university students. The findings emphasize the importance of addressing sedentary behavior in academic environments, where extended hours of sitting have become the norm. By identifying sitting duration as a key contributor to musculoskeletal discomfort, the research highlights the need for preventive strategies such as ergonomic modifications, regular movement breaks, and access to rehabilitative care. Implementing these measures within university settings can significantly improve students' physical well-being, reduce the burden of pain-related limitations, and support their academic engagement and mental health.

Author Contribution

Author	Contribution
Muhammad Akmal Nawaz	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Husnain Mahmood	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muhammad Shayan Arshad	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Hafiza Javeria	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Zarish Younas	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sobia Hasan*	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Baseerat Iqbal	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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