

EFFECT OF PROLONGED SITTING ON **SCOLIOSIS** AMONG
UNDERGRADUATE STUDENTS OF SARHAD INSTITUTE OF ALLIED
HEALTH SCIENCES PESHAWAR

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ABSTRACT

Background and objective: Prolonged sitting is a common behavior among university students and may be associated with changes in spinal alignment and posture. This study aimed to determine the association between average daily sitting time and **scoliosis** among undergraduate students of Sarhad University of Science and Information Technology, Peshawar.

Methodology: An observational cross-sectional study was conducted among 385 students aged 18–30 years using a non-probability convenience sampling technique. Data regarding demographic characteristics and sitting habits were collected through a self administered questionnaire, while spinal alignment was assessed using a plumb line, inclinometer, and New York Posture Rating chart.

Result: The results showed that 31.7% of participants reported sitting for 5–7 hours per day, while 20.8% reported 7–9 hours and 13.0% reported more than 9 hours. Normal spinal alignment was observed in 64.9% of participants, mild asymmetry in 26.5%, and suspected scoliosis in 8.6%. Pearson correlation analysis revealed a weak positive and statistically significant association between average daily sitting time and scoliosis ($r = 0.173$, $p = 0.001$).

Conclusion: These findings indicate that greater daily sitting time was associated with a slightly higher likelihood of spinal asymmetry; however, the weak correlation suggests that sitting duration alone has a limited relationship with spinal alignment. The study highlights the importance of postural awareness, ergonomic practices, regular movement breaks, and preventive physiotherapy strategies to promote spinal health among university students.

INTRODUCTION

In modern academic environments, prolonged sitting has become increasingly common among university students due to academic workload,

digital learning, and sedentary lifestyles. Students often spend extended periods attending lectures, studying, and using computers, resulting in reduced physical

activity and increased risk of musculoskeletal problems, particularly spinal alignment disorders and back pain (1,2)

Prolonged sitting refers to maintaining a seated posture for extended periods with insufficient movement or breaks. Sustained and improper sitting can alter the natural curvatures of the spine, including cervical lordosis, thoracic kyphosis, and lumbar lordosis, while also affecting pelvic alignment and spinal loading (3). Students who sit for more than seven hours daily have been reported to demonstrate reduced thoracic mobility, while prolonged static and slouched postures may contribute to muscle fatigue, discomfort, and low back pain (1,4).

Poor ergonomics, including inadequate lumbar support, inappropriate desk or chair height, and prolonged use of laptops and smartphones, can further promote forward head posture, slouched sitting, and spinal misalignment (5,6). Furthermore, physical inactivity and muscle imbalances, particularly tight hip flexors and reduced trunk muscle activity, may negatively affect pelvic and spinal posture (7).

Regular physical activity, appropriate ergonomics, and frequent movement breaks may help reduce the adverse effects of prolonged sitting and maintain spinal mobility and posture (8). Therefore, understanding the relationship between prolonged sitting and scoliosis among university students is important for developing effective preventive and posture-awareness strategies.

Prolonged sitting is common among university students because of academic and digital activities. However, limited evidence is available regarding its association with spinal alignment and suspected scoliosis in this population. Therefore, this study was conducted to determine whether increased sitting duration is associated with spinal asymmetry among undergraduate students.

Methodology

This study used an Observational, cross-sectional study to assess the effect of prolonged sitting on scoliosis. Data were collected over six months, from April 2026 to September 2026. The research was conducted at single sites, Sarhad University of sciences and

information technology Peshawar. Ethical approval was obtained from the Institutional Research Committee (IRC), and informed consent was secured from all participants prior to data collection. Only face-to-face interactions were used to reach participants.

A non-probability convenience sampling technique was adopted, selecting individuals who were readily available and willing to participate. The minimum sample size was calculated using RaoSoft, Inc., with a 5% margin of error, 95% confidence level, and 50% response distribution, resulting in a recommended sample of at least 385 participants. Inclusion criteria included healthy individual, students sitting < 4 hours/day, Both genders (males and females, age ranging from 18 to 30 years and those who willingly participates in our study. Exclusion criteria included history of spinal surgery, congenital spinal deformities and recent spinal trauma

For data collection, Organized and self-administered questionnaire was used to collect demographic data and to access sitting habits, including duration of sitting, study hours and posture during academic activities. Postural analysis was conducted to evaluate the spinal alignment. Participants were to stand in relaxed and natural position while assessment. A plumb line was used as a vertical reference to identify postural deviation and inclinometer was utilized to measure spinal angle and detects any abnormality in alignment using New York Posture Rating (NYPR) chart. All data were recorded on a pre-designed data collection sheet and the assessment was performed in a controlled environment to ensure accuracy and consistency. Data were analyzed using SPSS software, with frequency tables generated to present results clearly and professionally. Ethical considerations included ensuring participant confidentiality, informing respondents of study outcomes.

Result

DEMOGRAPHICS

The study included 385 students (N=2600) recruited from Sarhad University Peshawar. Participants with an age range of 18 to 30 years (M = 21.00, SD = 2.04), with 56.9% (219)

males and 43.1% (166) females out of 385.(TABLE 1)

Table1: DEMOGRAPHICS OF PARTICIPANTS

Age of participants		Gender of participants	
Median	21.00 years	Male	219
Mean	20.99		
Std. deviation	2.04	Female	166
N			119
			0

Out of 385 participants, most participants reported sitting for 5-7 hours daily (31.7%), followed by 3-5 hours (24.4%) and 7-9 hours (20.8%), while fewer participants reported sitting for less than 3 hours or more than 9

hours per day. Regarding spinal alignment status among 385 participants, normal alignment was observed in 64.9% of participants, while 26.5% had mild asymmetry and 8.6% had suspected scoliosis

Table 2: Average sitting per day and Scoliosis present

Average sitting per day		Frequency
Valid	Less than 3 hrs.	39
	3-5 hrs.	94
	5-7hrs	122
	7-9hrs	80
	More than 9 hrs.	50
Scoliosis present		
Valid	normal spine alignment	250
	mild asymmetry	102
	suspected scoliosis	33
	Total	385

The correlation between average daily sitting time and scoliosis status among 385 study participants. Pearson's correlation analysis

revealed a weak positive correlation between the two variables ($r = 0.173$), with statistical

Correlations			
		Average sitting per day	Scoliosis present
Average sitting per day	Pearson Correlation	1	.173**
	Sig. (2-tailed)		.001
	N	385	385
Scoliosis present	Pearson Correlation	.173**	1
	Sig. (2-tailed)	.001	
	N	385	385

Discussion

The present study was conducted to investigate the association between prolonged sitting behavior and scoliosis among university students. A total of 385 participants were included to examine sitting duration, sitting habits, spinal health, and spinal alignment. The findings demonstrated a statistically significant positive association between average sitting duration and scoliosis ($r = 0.173$, $p = 0.001$). Although the correlation was weak, it indicates that prolonged sitting may be associated with an increased likelihood of spinal asymmetry among university students.

The findings of the present study are interpreted in light of the existing literature. Overall, the results suggest that prolonged sitting may play a role in the development of postural changes and spinal asymmetry; however, scoliosis is a multifactorial condition influenced by several biological, environmental, and lifestyle factors. The following discussion compares the present findings with previous national and international studies, highlighting areas of agreement and disagreement and exploring possible explanations for the observed similarities and differences.

The findings of the present study are supported by a study conducted by Akçay et al. (2023), which found that different sitting and standing postures significantly affected trunk rotation and spinal alignment in individuals with adolescent idiopathic scoliosis. Their findings showed that habitual posture can affect the position and movement of the spine. This supports our results by showing that prolonged and improper postures may be associated with changes in spinal alignment (9). Similarly, a study by Cho et al. (2023) found that different sitting postures can affect the biomechanics of the lumbar spine. Their findings showed that prolonged sitting in non-neutral postures can increase stress on the spine. This supports our results, which showed a significant positive association between prolonged sitting duration and scoliosis ($r = 0.173$, $p = 0.001$), suggesting that prolonged sitting may contribute to postural changes and spinal asymmetry (10).

However, some studies contrast with these results. For example, de Assis et al. (2021) found no significant association between

postural habits, including sitting posture, and scoliosis among schoolchildren, while our study found a significant positive association between prolonged sitting duration and scoliosis ($r = 0.173$, $p = 0.001$). This difference may be due to differences in age groups, study populations, and assessment methods (11). Similarly, Montgomery et al. (2024) reported that sedentary behavior was not a significant risk factor for spinal pain among children and adolescents. In contrast, our study focused on spinal alignment and suspected scoliosis rather than spinal pain. Therefore, the relationship between prolonged sitting and spinal health may differ depending on the specific spinal problem being studied (12).

Overall, the findings suggest that prolonged sitting may be associated with scoliosis and changes in spinal alignment, but it should be considered a possible contributing factor rather than a direct cause because scoliosis can be influenced by several genetic, developmental, and environmental factors.

Conclusion

The present study provides valuable insight into the relationship between prolonged sitting behavior and scoliosis among university students. The findings demonstrated a statistically significant positive association between average sitting duration and scoliosis ($r = 0.173$, $p = 0.001$), indicating that increased sitting exposure was associated with greater spinal asymmetry. Although the correlation strength was weak, the significant relationship highlights prolonged sitting as a potential contributing factor influencing postural alignment.

The study further identified a high prevalence of sedentary behaviors, extended sitting periods, and associated spinal discomfort among participants, emphasizing the growing impact of inactive lifestyles on musculoskeletal health in young adults. However, scoliosis is a complex and multifactorial condition, and prolonged sitting should be considered as one possible modifiable risk factor rather than an independent cause. These findings underscore the importance of integrating preventive strategies within university settings, including ergonomic education, postural awareness,

regular movement intervals, and physiotherapy-based interventions to minimize the adverse effects of prolonged sitting. Early identification of postural deviations and promotion of healthy sitting habits may play a significant role in preserving spinal health and preventing future musculoskeletal complications.

Further longitudinal studies using objective posture assessment tools and incorporating additional contributing factors are recommended to establish clearer causal relationships and develop effective preventive approaches.

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