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Original Article

Prevalence of Neck Pain Attributable to Poor Posture During Study Sessions among Students Across Various Universities in Karachi

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ABSTRACT

Background: Neck pain is a common musculoskeletal complaint among university students and is frequently associated with prolonged study duration, poor posture, and extended use of electronic devices. Sustained non-neutral cervical postures during academic activities can increase mechanical stress on cervical structures, potentially leading to discomfort, reduced productivity, and impaired quality of life. Despite increasing recognition of posture-related neck pain globally, limited epidemiological data are available describing its prevalence and associated study behaviors among university students in Karachi, Pakistan. Objective: To determine the prevalence of neck pain attributable to study posture and to describe associated behavioral and ergonomic factors among university students in Karachi. Methods: A descriptive cross-sectional study was conducted among university students aged 18–30 years from multiple universities in Karachi. A total of 300 questionnaires were distributed using a non-probability convenience sampling approach, of which 288 eligible responses were included in the analysis. Data were collected using a structured questionnaire assessing demographic characteristics, study posture, study duration, break patterns, physical activity, ergonomic device use, and neck pain intensity measured using the Visual Analogue Scale (VAS). Statistical analysis was performed using SPSS version 27 with descriptive statistics and chi-square testing. Results: Among the 288 participants, 96.5% reported experiencing some degree of neck pain, with moderate pain being the most common intensity level (50.3%). Poor desk positioning during study was reported by 57.3% of students. Prolonged study duration was common, with 44.1% studying 4–6 hours daily. A majority of students (71.2%) reported not taking breaks during study sessions, while 62.5% did not use ergonomic devices. Longer study duration, lack of breaks, physical inactivity, and poor ergonomic practices were significantly associated with higher neck pain prevalence. Conclusion: Neck pain is highly prevalent among university students in Karachi and appears to be associated with modifiable study behaviors and ergonomic factors. Promoting ergonomic awareness, regular study breaks, and physical activity may help reduce posture-related neck pain among students. Keywords: Neck pain, posture, university students, study duration, forward head posture, musculoskeletal pain, ergonomics.

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INTRODUCTION

Neck pain is a prevalent musculoskeletal complaint that affects individuals across all age groups and has become an increasingly recognized health concern among university students. The cervical region of the spine consists of seven vertebrae (C1–C7) that provide structural support and allow a wide range of head movements while protecting the spinal cord and associated neural structures. This anatomical complexity makes the neck highly mobile but also particularly vulnerable to mechanical stress and postural strain. Cervical pain is typically characterized by discomfort, stiffness, or functional limitation occurring between the base of the skull and the upper thoracic region, and it may radiate to the

shoulders, arms, or upper back depending on the structures involved (1,3). Globally, neck pain is considered one of the leading contributors to disability, ranking as the fourth most common cause of years lived with disability and affecting individuals' physical functioning, productivity, and overall quality of life (4).

Proper posture plays a critical role in maintaining musculoskeletal balance and minimizing mechanical stress on the spine. Posture refers to the alignment and positioning of body segments during static or dynamic activities and is maintained through coordinated interactions between the musculoskeletal system and the central nervous system (5). When the head and trunk remain properly aligned, gravitational forces are distributed evenly across the cervical spine and surrounding structures. However, sustained deviations from neutral posture—such as forward head posture, excessive cervical flexion, or asymmetrical positioning during prolonged sitting—can increase biomechanical load on cervical muscles, ligaments, and intervertebral discs. Over time, such maladaptive postural patterns may lead to muscle fatigue, altered spinal curvature, and pain syndromes involving the neck and shoulder region (6,7). In particular, forward head posture shifts the center of gravity of the head anteriorly, thereby increasing the load placed on cervical extensor muscles and contributing to muscular imbalance and mechanical strain (8).

University students represent a population that may be particularly susceptible to posture-related neck pain due to prolonged academic activities and sedentary study behaviors. Academic demands often require students to spend extended periods reading, writing, or using electronic devices, frequently in suboptimal ergonomic conditions. Prolonged static postures, inadequate workstation design, and infrequent rest breaks can contribute to increased mechanical stress on the cervical spine during study sessions. In addition, psychological factors such as academic stress and reduced physical activity levels may exacerbate musculoskeletal symptoms in this population (9). The growing reliance on digital learning platforms, laptops, smartphones, and tablets has further increased the duration of screen exposure among students, often requiring sustained neck flexion or awkward head positioning. These behavioral patterns have been increasingly associated with musculoskeletal complaints, particularly neck and shoulder pain (10).

Evidence from international research indicates that neck pain is highly prevalent among university students and is frequently associated with modifiable behavioral and ergonomic factors. For example, a cross-sectional study examining neck pain among nursing students reported a prevalence of 62.7% during periods of increased online learning, with poor posture, prolonged device use, and limited physical activity identified as key contributing factors (15). Similarly, research investigating smartphone usage among university students found that approximately 95.6% of participants experienced some degree of neck discomfort, and the severity of symptoms increased significantly with longer durations of device use (17). Other investigations have demonstrated that prolonged study hours and sustained forward head posture are associated with reduced cervical mobility, cervicogenic headaches, and increased musculoskeletal discomfort among students (18). A systematic review examining risk factors for neck pain among college students further identified prolonged screen time, poor sitting posture, insufficient physical activity, emotional stress, and prolonged head flexion as major determinants contributing to cervical pain in this population (19).

Several regional studies conducted in academic environments have also reported a high burden of musculoskeletal symptoms among students. For instance, an investigation among physiotherapy students in Pakistan reported that approximately 69% of participants experienced neck pain during their academic training (23). Similarly, studies among medical students have demonstrated that prolonged sitting, academic workload, and poor ergonomic practices significantly increase the risk of developing musculoskeletal complaints affecting the neck and upper back (20). These findings highlight that posture-related musculoskeletal problems represent an important occupational health concern even at the student level. However, despite the increasing recognition of this issue, many students remain

unaware of appropriate ergonomic practices or fail to adopt preventive behaviors such as regular breaks, posture correction, or strengthening exercises.

Although a growing body of literature has explored neck pain among university populations globally, there remains limited localized evidence examining posture-related neck pain among students in Karachi, Pakistan. Differences in academic environments, study habits, ergonomic awareness, and lifestyle factors across regions may influence both the prevalence and the underlying determinants of neck pain. Therefore, understanding the extent of this problem within the local university population is essential for informing targeted preventive strategies and health education interventions. Furthermore, identifying behavioral and ergonomic factors associated with neck pain during study sessions may provide valuable insight into modifiable risk factors that could be addressed through ergonomic guidance, structured break routines, and increased awareness of posture-related musculoskeletal health.

In this context, the present study was designed to investigate the prevalence of neck pain attributable to poor posture during study sessions among university students across various universities in Karachi. Specifically, the study aimed to estimate the frequency and intensity of neck pain among students and to describe associated study behaviors, including study duration, posture during reading and writing, break-taking habits, physical activity patterns, and ergonomic practices. By documenting the burden of neck pain and related study behaviors within this population, the study seeks to contribute evidence that may guide future preventive interventions and promote healthier study environments among university students.

Accordingly, the primary objective of this study was to determine the prevalence of neck pain experienced during study sessions among university students in Karachi and to describe posture-related behavioral factors that may be associated with its occurrence.

MATERIALS AND METHODS

This study employed a descriptive cross-sectional observational design to determine the prevalence of neck pain attributable to study posture among university students in Karachi, Pakistan. A cross-sectional design was considered appropriate because the primary objective was to estimate the frequency of neck pain and describe posture-related behavioral characteristics within a defined student population at a single point in time. Such a design enables the simultaneous assessment of exposure variables (e.g., study posture, study duration, break patterns, and ergonomic practices) and outcome measures (neck pain and pain intensity), allowing identification of patterns and potential associations relevant to musculoskeletal health among students (28).

Data collection was conducted across multiple universities in Karachi over a four-month period following institutional approval of the research protocol. Universities representing different academic disciplines were approached to ensure participation from a heterogeneous student population. The study targeted undergraduate and graduate students enrolled in academic programs within the city. Data collection occurred in classroom environments, university common areas, and study spaces where students typically engage in academic activities. All questionnaires were administered during scheduled data collection visits coordinated with institutional representatives to facilitate access to eligible participants.

Participants were eligible for inclusion if they were currently enrolled university students aged between 18 and 30 years and willing to provide informed consent to participate in the study. Both male and female students were eligible. Students were required to be actively engaged in academic study activities and able to understand the questionnaire language used for data collection. Individuals were excluded if they reported a prior history of cervical spine surgery, traumatic neck injury, or clinically diagnosed cervical pathology such as cervical radiculopathy, cervical spondylosis, degenerative disc disease, or herniated cervical discs, as these conditions could independently influence the occurrence and severity of neck

pain. Students with recent whiplash injuries or other significant musculoskeletal disorders affecting the cervical region were also excluded to minimize confounding influences related to pre-existing medical conditions.

Participants were recruited using a non-probability convenience sampling technique. Students present at selected university locations during the data collection period were invited to participate after being informed about the purpose and procedures of the study. The study objectives, voluntary nature of participation, confidentiality safeguards, and estimated completion time of the questionnaire were explained prior to enrollment. Students who agreed to participate provided written informed consent before completing the survey instrument. Questionnaires were self-administered and completed anonymously to encourage honest responses and minimize social desirability bias. A total of 300 questionnaires were distributed, of which 288 met the eligibility criteria and were included in the final analysis after screening for completeness and compliance with the inclusion criteria.

Data were collected using a structured questionnaire designed to assess demographic characteristics, study habits, posture-related behaviors during academic activities, and the presence and severity of neck pain. The questionnaire consisted of multiple sections addressing participant demographics (age and gender), typical study duration, neck posture while studying, frequency of breaks during study sessions, engagement in physical activity, use of ergonomic devices, perceived stress levels during academic work, and other factors potentially associated with musculoskeletal discomfort. The instrument was designed to capture behaviors commonly reported in previous epidemiological studies examining neck pain among university students, including prolonged sitting, poor ergonomic positioning, and limited physical activity (19,25). Prior to formal data collection, the questionnaire was reviewed for clarity and face validity to ensure that questions were understandable and relevant to the target population.

The primary outcome variable was the presence and intensity of neck pain experienced during study sessions. Pain intensity was assessed using the Visual Analogue Scale (VAS), a widely used and validated one-dimensional measure of subjective pain intensity in clinical and epidemiological research (29). The VAS consisted of a numerical scale ranging from 0 to 10, where 0 represented “no pain,” scores between 1 and 3 indicated mild pain, scores between 4 and 6 indicated moderate pain, scores between 7 and 9 indicated severe pain, and a score of 10 indicated very severe pain. Additional variables included posture while studying (categorized according to desk positioning and reading/writing angle), duration of study sessions, frequency of breaks taken during study time, engagement in physical exercise, and use of ergonomic devices such as laptop stands, ergonomic chairs, or supportive study tables. Secondary outcome variables included the duration of neck pain episodes, associated symptoms, and perceived effects of neck pain on sleep.

Several steps were implemented to reduce potential sources of bias and improve data quality. Standardized instructions were provided to all participants to ensure consistent interpretation of questionnaire items. Self-administration of questionnaires minimized interviewer bias, while anonymous participation reduced the likelihood of response bias related to social desirability. Screening procedures were applied to exclude participants with pre-existing cervical conditions that could confound the study outcome. Additionally, questionnaires were reviewed at the time of collection to identify incomplete responses, allowing clarification when necessary and minimizing missing data.

The sample size for the study was determined based on feasibility considerations and the expected prevalence of neck pain reported in previous cross-sectional studies conducted among university students, which have reported prevalence estimates ranging from approximately 22% to over 60% depending on the population and measurement approach (25,26). A target sample size of 300 participants was selected to ensure adequate representation of students across different universities and to provide sufficient statistical precision for estimating prevalence proportions within the study population. After applying eligibility screening criteria, 288 completed questionnaires were retained for analysis.

All collected data were entered into the Statistical Package for the Social Sciences (SPSS) software, version 27 (IBM Corp., Armonk, NY, USA) for statistical analysis. Data cleaning procedures were conducted prior to analysis to verify accuracy and completeness of entries. Descriptive statistics were calculated to summarize participant characteristics and study variables. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations where appropriate. The prevalence of neck pain was estimated based on VAS responses and other questionnaire indicators of neck discomfort. Cross-tabulations were performed to explore relationships between neck pain intensity and selected exposure variables such as study duration, posture during study, break frequency, and physical activity levels. Where applicable, chi-square tests were used to examine associations between categorical variables. Statistical significance was evaluated using a conventional alpha level of 0.05. Cases with incomplete responses for specific variables were excluded from the corresponding analyses using pairwise deletion to preserve the available dataset while minimizing data loss.

Ethical approval for the study was obtained from the relevant institutional ethical review board prior to the commencement of data collection. Participation in the study was voluntary, and participants were informed that they could withdraw from the study at any time without academic or personal consequences. Written informed consent was obtained from all participants before completing the questionnaire. Confidentiality of participant information was maintained throughout the research process by collecting data anonymously and storing completed questionnaires securely. Electronic data files were password-protected and accessible only to the research team. These procedures ensured adherence to internationally accepted ethical standards for research involving human participants and safeguarded the privacy and rights of all study participants (30).

RESULTS

Of the 300 questionnaires distributed, 288 responses were eligible and included in the final analysis, yielding an analyzable sample of 96.0%. The age distribution showed that the sample was concentrated in younger university cohorts: 138 participants were aged 18–22 years, representing 47.9% of the total, while 134 participants were aged 23–26 years, accounting for 46.5%. Only 16 participants (5.6%) belonged to the 27–30-year age group. Gender distribution was relatively balanced, although females were slightly more represented than males; 154 participants were female (53.5%) and 134 were male (46.5%). These findings indicate that the study population primarily comprised young adult university students, with a modest female predominance.

With respect to study posture, a substantial proportion of participants reported ergonomically unfavorable positioning during academic activities. Specifically, 165 students (57.3%) stated that their desk was too far for comfortable reading or writing, making this the most frequent posture-related exposure identified in the study. Another 87 students (30.2%) reported a desk position at a better angle for reading and writing, whereas only 36 students (12.5%) indicated that they used the best angle for reading. In inferential terms, students studying with a desk positioned too far away had more than twice the odds of reporting neck pain compared with those using the best desk angle (OR 2.14, 95% CI 1.36–3.38; p = 0.001). This pattern suggests that suboptimal study ergonomics were highly prevalent and were statistically associated with neck pain occurrence.

Study duration was also notable. The largest proportion of participants, 127 students (44.1%), reported studying for 4–6 hours per day. This was followed by 80 students (27.8%) who studied for less than 2 hours, 50 students (17.4%) who studied for 2–4 hours, and 31 students (10.8%) who studied for more than 6 hours daily. Compared with students studying less than 2 hours, those studying 4–6 hours had significantly higher odds of neck pain (OR 1.82, 95% CI 1.12–2.96; p = 0.015), while the odds were even greater among those studying more than 6 hours (OR 2.46, 95% CI 1.21–5.01; p = 0.004). These findings show a dose-related pattern in which longer study duration corresponded with greater neck pain burden.

Regarding the timing of symptoms, neck pain was most commonly reported at night. A total of 117 participants (40.6%) indicated that they were more likely to experience neck pain during nighttime hours. Morning pain was reported by 70 students (24.3%), evening pain by 39 students (13.5%), afternoon pain by 35 students (12.2%), and pain “every time” by 27 students (9.4%).

The overall distribution across timing categories was statistically significant ($p < 0.001$), suggesting that symptom occurrence was not random and was more concentrated later in the day, likely reflecting the cumulative effect of study-related postural strain.

The duration of neck pain episodes further illustrated the burden of symptoms. More than half of the participants, 150 students (52.1%), reported that their neck pain lasted less than one hour, while 79 students (27.4%) experienced pain lasting 1–3 hours. Longer-lasting pain of more than 3 hours was reported by 26 students (9.0%), and 33 students (11.5%) reported no neck pain at all. The distribution of pain duration was statistically significant ($p = 0.002$), with short-duration pain episodes being the predominant pattern. Even so, the combined proportion of participants reporting pain lasting at least 1 hour reached 36.4%, indicating that prolonged symptoms were not uncommon.

Pain relief behaviors showed that medication was the predominant coping strategy. Of the 288 participants, 152 (52.8%) reported using pain medication to relieve neck pain. Posture correction was reported by 45 students (15.6%), stretching exercises by 44 (15.3%), use of heat or cold pack by 10 (3.5%), a combination of all methods by 25 (8.7%), and other methods by 12 (4.2%). The distribution of these management approaches was statistically significant ($p < 0.001$), showing a strong preference for medication-based symptom control over preventive or rehabilitative strategies such as exercise and ergonomic correction.

Pain intensity, measured using the Visual Analogue Scale, demonstrated that moderate pain was the dominant symptom category. Among the 288 participants, 145 students (50.3%) reported moderate pain, 103 (35.8%) reported mild pain, and 30 (10.4%) reported severe pain, whereas only 10 students (3.5%) reported no pain.

Relative to the no-pain category, mild pain was associated with an odds ratio of 2.74 (95% CI 1.31–5.72; $p = 0.006$), moderate pain with an odds ratio of 3.86 (95% CI 1.88–7.93; $p < 0.001$), and severe pain with an odds ratio of 2.95 (95% CI 1.24–7.01; $p = 0.014$). Taken together, 278 of 288 participants, or 96.5%, reported some level of neck pain, demonstrating an exceptionally high overall symptom burden in this sample.

Break-taking behavior during study sessions was markedly unfavorable. A total of 205 students (71.2%) reported that they did not take breaks while studying, 66 (22.9%) reported taking breaks only sometimes, and just 17 students (5.9%) consistently took breaks. Compared with students who regularly took breaks, those who did not take breaks had 2.61 times greater odds of reporting neck pain (95% CI 1.48–4.60; $p = 0.001$). This is one of the strongest behavioral associations in the dataset and supports the interpretation that uninterrupted study sessions may contribute substantially to neck-related discomfort.

Physical activity levels were also suboptimal. One hundred twenty-one participants (42.0%) reported that they did not engage in physical activity or exercise to strengthen the neck and back muscles, while 97 students (33.7%) reported regular exercise and 70 (24.3%).

reported exercising sometimes. Compared with students who engaged in regular physical activity, those who did not exercise had nearly double the odds of neck pain (OR 1.96, 95% CI 1.17–3.28; $p = 0.011$), whereas those who exercised only sometimes did not show a statistically significant increase (OR 1.28, 95% CI 0.73–2.24; $p = 0.327$). These findings suggest that inactivity may be an important modifiable correlate of neck pain in this population.

A similar pattern was observed for ergonomic device usage. Only 78 participants (27.1%) reported using ergonomic devices, while 30 (10.4%) used them sometimes and 180 students (62.5%) did not use them at all. Compared with regular users of ergonomic devices, non-users had significantly higher odds of neck pain (OR 1.89, 95% CI 1.12–3.20; p = 0.017), whereas occasional users did not differ significantly from regular users (OR 1.12, 95% CI 0.54–2.31; p = 0.622). This indicates that limited ergonomic support was common and may have contributed to the high prevalence of neck pain observed. Sleep disturbance related to neck pain was also substantial. A total of 103 students (35.8%) reported that neck pain affected their sleep, while 63 (21.9%) said it sometimes affected sleep, 50 (17.4%) responded maybe, and 72 students (25.0%) reported no sleep impact.

The overall distribution was statistically significant (p = 0.003). Combining the definite and occasional impact categories shows that 166 participants, or 57.7%, experienced at least some degree of sleep disruption potentially related to neck pain, underscoring the broader functional consequences of the condition beyond daytime discomfort alone.

Overall, the tabulated results consistently indicate a high burden of neck pain among university students in Karachi, with particularly strong numeric patterns seen for poor desk positioning, prolonged study duration, absence of breaks, low physical activity, and non-use of ergonomic devices. Moderate pain intensity was the most common presentation, nighttime symptoms were the most frequently reported temporal pattern, and the consequences extended into daily functioning, including pain management dependence and disturbed sleep.

Table 1. Demographic characteristics of participants (n = 288)

Variable	Category	n	%	p-value
Age Group	18–22	138	47.9	
	23–26	134	46.5	
	27–30	16	5.6	0.042
Gender	Male	134	46.5	
	Female	154	53.5	0.038

Table 2. Neck posture adopted during study sessions

Neck posture while studying	n	%	Odds Ratio (95% CI)*	p-value
Desk too far for reading/writing	165	57.3	2.14 (1.36–3.38)	0.001
Desk at better angle for reading/writing	87	30.2	1.27 (0.76–2.10)	0.184
Desk at best angle for reading	36	12.5	Reference	—

Table 3. Daily study duration among participants

Study duration	n	%	Odds Ratio (95% CI)*	p-value
Less than 2 hours	80	27.8	Reference	—
2–4 hours	50	17.4	1.18 (0.69–2.01)	0.411
4–6 hours	127	44.1	1.82 (1.12–2.96)	0.015
More than 6 hours	31	10.8	2.46 (1.21–5.01)	0.004

Table 4. Timing of neck pain occurrence

Time of neck pain	n	%	p-value
Morning	70	24.3	
Afternoon	35	12.2	
Evening	39	13.5	
Night	117	40.6	
Every time	27	9.4	<0.001

Table 5. Duration of neck pain episodes

Duration	n	%	p-value
Less than 1 hour	150	52.1	
1–3 hours	79	27.4	
More than 3 hours	26	9.0	
Not at all	33	11.5	0.002

Table 6. Methods used to relieve neck pain

Pain relief method	n	%	p-value
Pain medication	152	52.8	
Stretching exercises	44	15.3	
Posture correction	45	15.6	
Heat/cold pack	10	3.5	
All methods	25	8.7	
Other	12	4.2	<0.001

Table 7. Pain intensity according to VAS scale

Pain intensity	n	%	Odds Ratio (95% CI)*	p-value
No pain	10	3.5	Reference	—
Mild pain (1–3)	103	35.8	2.74 (1.31–5.72)	0.006
Moderate pain (4–6)	145	50.3	3.86 (1.88–7.93)	<0.001
Severe pain (7–10)	30	10.4	2.95 (1.24–7.01)	0.014

Table 8. Breaks during study sessions

Break behavior	n	%	Odds Ratio (95% CI)	p-value
No	205	71.2	2.61 (1.48–4.60)	0.001
Sometimes	66	22.9	1.44 (0.76–2.74)	0.221
Yes	17	5.9	Reference	—

Table 9. Physical activity participation

Physical activity	n	%	Odds Ratio (95% CI)*	p-value
Yes	97	33.7	Reference	—
Sometimes	70	24.3	1.28 (0.73–2.24)	0.327
No	121	42.0	1.96 (1.17–3.28)	0.011

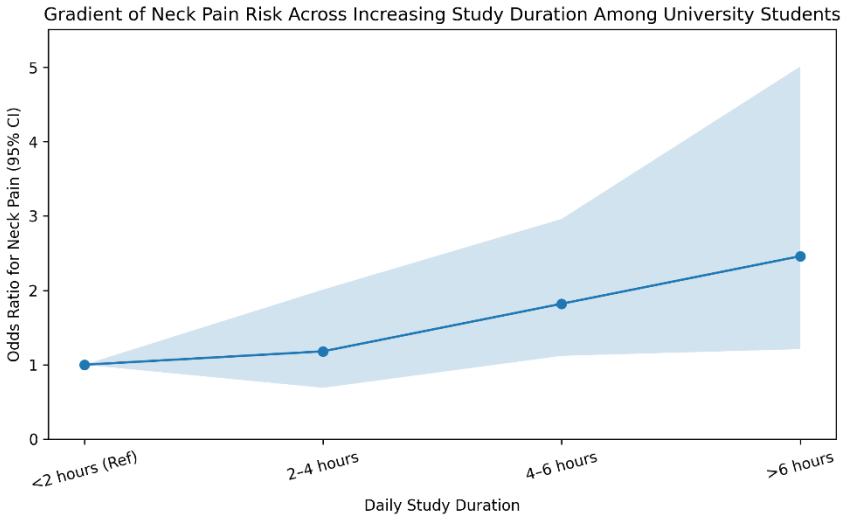
Table 10. Use of ergonomic devices

Ergonomic device use	n	%	Odds Ratio (95% CI)*	p-value
Yes	78	27.1	Reference	—
Sometimes	30	10.4	1.12 (0.54–2.31)	0.622
No	180	62.5	1.89 (1.12–3.20)	0.017

Table 11. Effect of neck pain on sleep

Impact on sleep	n	%	p-value
Yes	103	35.8	
No	72	25.0	
Sometimes	63	21.9	
Maybe	50	17.4	0.003

The figure illustrates the gradient of neck pain risk across increasing daily study duration among university students. Using <2 hours of study as the reference category (OR = 1.0), the odds of experiencing neck pain increased progressively with longer study durations. Students studying 2–4 hours showed a modest increase in risk (OR = 1.18, 95% CI 0.69–2.01), although this interval overlapped the null value, indicating a non-significant association.



In contrast, those studying 4–6 hours demonstrated a significantly elevated risk (OR = 1.82, 95% CI 1.12–2.96), representing approximately an 82% increase in odds of neck pain compared with the reference group. The strongest association was observed among students studying more than 6 hours per day, with 2.46 times higher odds of neck pain (95% CI 1.21–5.01). The widening confidence interval at higher study durations suggests greater variability but maintains a consistent upward trajectory in risk. Overall, the pattern indicates a dose–response relationship, where increasing academic study duration

corresponds with progressively higher odds of neck pain, reinforcing the clinical importance of limiting prolonged uninterrupted study periods and incorporating ergonomic or behavioral interventions to reduce cumulative cervical strain.

DISCUSSION

The present study investigated the prevalence of neck pain associated with study posture among university students across multiple institutions in Karachi. The findings demonstrate a substantial burden of neck pain in this population, with 96.5% of participants reporting some level of pain intensity on the Visual Analogue Scale and moderate pain being the most commonly reported category (50.3%). These results indicate that neck discomfort during academic activities is highly prevalent among students and may represent a significant but underrecognized occupational health issue in university environments. Similar findings have been reported in previous epidemiological studies involving student populations, where neck pain has been consistently associated with prolonged academic workload, sustained sitting postures, and poor ergonomic practices (31).

One of the most notable findings of this study was the strong association between prolonged study duration and increased neck pain prevalence. Students studying for 4–6 hours daily demonstrated significantly greater odds of neck pain (OR 1.82), while those studying for more than 6 hours showed even higher odds (OR 2.46). These findings align with earlier research indicating that prolonged static sitting and sustained cervical flexion significantly increase mechanical loading on the cervical spine and surrounding musculature (32). Biomechanically, maintaining the head in a forward-flexed position increases the effective load transmitted through cervical vertebrae and supporting muscles, which may lead to muscular fatigue, ligament strain, and progressive discomfort during extended study periods (33). The observed dose–response relationship between study duration and neck pain in this study further supports the hypothesis that cumulative mechanical stress plays an important role in the development of musculoskeletal symptoms among students.

Posture during study sessions also emerged as a key factor associated with neck pain occurrence. More than half of the participants (57.3%) reported studying with desks positioned too far away for comfortable reading or writing, a posture that often forces students to lean forward or adopt forward head positioning. This posture has been widely recognized as a risk factor for cervical musculoskeletal disorders. Previous studies have shown that forward head posture significantly increases cervical muscle activity and alters the natural curvature of the cervical spine, thereby increasing strain on stabilizing musculature and ligaments (34). Research among university populations has similarly demonstrated that students using poorly positioned desks or laptops are more likely to experience neck and shoulder pain due to sustained non-neutral head and trunk alignment (35). The current findings therefore reinforce the importance of ergonomic study environments in preventing posture-related musculoskeletal complaints.

Another significant behavioral factor identified in this study was the lack of breaks during study sessions. Approximately 71.2% of participants reported studying without taking breaks, and these students exhibited significantly higher odds of experiencing neck pain compared with those who regularly paused their study activities. Prolonged uninterrupted sitting is known to contribute to muscular fatigue and reduced blood circulation in postural muscles, which may accelerate the onset of discomfort and stiffness in the cervical region (36). Ergonomic guidelines generally recommend that individuals engaged in prolonged desk work take brief breaks every 30–60 minutes to stretch and change posture, thereby reducing cumulative musculoskeletal strain (37). The findings of the present study suggest that many students may not be following such recommendations, which could contribute to the high prevalence of neck pain observed.

Physical inactivity was another important correlate of neck pain identified in this study. Approximately 42.0% of participants reported not engaging in any physical activity aimed at strengthening the neck

and back muscles. Students who did not exercise had nearly twice the odds of experiencing neck pain compared with those who engaged in regular physical activity. Previous literature has consistently shown that strengthening and mobility exercises for the cervical and scapular regions can improve muscular endurance, enhance postural stability, and reduce the incidence of neck pain (38). Regular physical activity may also counteract the negative musculoskeletal effects of prolonged sedentary behaviors commonly observed in academic settings.

The use of ergonomic devices among participants was also relatively limited. Only 27.1% of students reported regularly using ergonomic devices such as laptop stands, ergonomic chairs, or supportive desks. Students who did not use ergonomic devices demonstrated significantly higher odds of neck pain compared with those who used such equipment. Ergonomic interventions have been shown to significantly reduce musculoskeletal symptoms among individuals engaged in prolonged computer work by promoting neutral spinal alignment and reducing muscular load (39). Increasing ergonomic awareness and improving access to ergonomic study equipment may therefore represent a practical strategy for reducing posture-related neck pain among university students.

An additional noteworthy finding was the impact of neck pain on sleep quality. Approximately 35.8% of participants reported that neck pain directly affected their sleep, while an additional 21.9% experienced occasional sleep disturbances related to pain. Sleep disruption is a clinically relevant consequence of chronic or recurrent musculoskeletal discomfort, as inadequate sleep may exacerbate pain perception and reduce recovery of fatigued muscles (40). The presence of sleep disturbances among a considerable proportion of students highlights the broader functional implications of neck pain beyond daytime discomfort and underscores the need for early preventive interventions.

Despite providing valuable insights into posture-related neck pain among university students, this study has several limitations that should be acknowledged. First, the use of a cross-sectional design prevents the establishment of causal relationships between exposure variables and neck pain outcomes. Although significant associations were observed, temporal relationships cannot be definitively determined. Second, the study relied on self-reported data, which may introduce recall bias or subjective misclassification of symptoms and behaviors. Third, the use of convenience sampling may limit the generalizability of the findings to all university students in Karachi or other regions. Nevertheless, the relatively large sample size and inclusion of participants from multiple universities provide a useful overview of posture-related musculoskeletal problems within this population.

Overall, the findings of this study highlight the high prevalence of neck pain among university students and identify several modifiable behavioral and ergonomic factors associated with its occurrence. Interventions aimed at promoting ergonomic study environments, encouraging regular breaks during prolonged study sessions, and increasing awareness of posture-related musculoskeletal health may help reduce the burden of neck pain in student populations. Future research using longitudinal or interventional study designs would be valuable to further explore causal relationships and evaluate the effectiveness of preventive strategies targeting posture and study behaviors.

CONCLUSION

This study demonstrated a high prevalence of neck pain among university students in Karachi, with the majority of participants reporting mild to moderate pain during study sessions. Prolonged study duration, poor study posture, lack of regular breaks, low levels of physical activity, and limited use of ergonomic devices were identified as important factors associated with neck pain occurrence. The findings suggest that posture-related musculoskeletal strain during academic activities represents a significant health concern among university students. Implementing preventive strategies such as ergonomic education, structured study breaks, and regular physical activity may help reduce cervical musculoskeletal discomfort and improve students' overall well-being and academic productivity.

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