



Article

Prevalence of Neck Pain in Undergraduate Medical Students of Lahore with Prolonged Study Habit

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Cite this Article

Received 2025-05-16

Revised 2025-06-17

Accepted 2025-06-19

Published 2025-06-21

No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

Authors' Contributions

MAAK, MMA, MWA: concept/design; ZMB, HC, NZ: data collection; FS, SK, MMG: analysis/manuscript drafting.

ABSTRACT

Background: Neck pain is a common musculoskeletal complaint among medical students due to academic stress and prolonged sedentary study habits. Despite growing concern, the specific relationship between study duration and neck pain remains inadequately explored, especially in South Asian academic populations. **Objective:** To determine the prevalence and severity of neck pain among undergraduate medical students in Lahore and assess its association with daily study duration using the Neck Disability Index (NDI). **Methods:** This cross-sectional study recruited 131 undergraduate students aged 18–26 years from MBBS, BDS, and DPT programs through non-probability convenience sampling at Akhtar Saeed Medical and Dental College, Lahore. Inclusion criteria encompassed students without prior neck surgery, congenital deformities, or cervical trauma. Participants completed the NDI questionnaire, and data were analyzed using SPSS version 27.0. Descriptive statistics and chi-square tests assessed prevalence, severity, and association with study hours. Ethical approval was obtained from the institutional review board in accordance with the Declaration of Helsinki. **Results:** Neck pain was reported by 39.7% of students, with higher prevalence in females (69.2%). Mild disability was most common (59.6%), with only one case of complete disability. Study duration showed no statistically significant association with neck pain ($\chi^2 = 0.899$, $p = 0.412$), although the 2–4 hour study group reported the highest symptom frequency. **Conclusion:** Neck pain is prevalent among medical students, disproportionately affecting females, and frequently manifests as mild disability. Study duration alone may not be a significant predictor, highlighting the need for ergonomic and psychosocial interventions in academic settings to mitigate neck-related disability.

Keywords: Neck Pain, Medical Students, Study Habits, Neck Disability Index, Ergonomics, Musculoskeletal Disorders, Prevalence Studies.

INTRODUCTION

Neck pain, a common musculoskeletal condition affecting the cervical spine, has seen a rising trend among young adults, especially those engaged in prolonged static postures, such as medical students. Anatomically, the cervical spine comprises seven vertebrae responsible for a significant range of head and neck mobility. The primary motion occurs at the occiput–C1 and C1–C2 levels, with the transverse ligament stabilizing the odontoid process of the axis to prevent anterior subluxation (1). Pain can originate from intervertebral discs, muscles, ligaments, joints, dura mater, or nerve roots, and may present as localized or radiating discomfort to the shoulders and upper limbs (2). Globally, the prevalence of neck pain ranges from 16.7% to 75.1%, with contributing factors including ergonomics, behavioral habits, and psychosocial stressors (3). Medical students represent a vulnerable population for developing neck pain due to the inherent demands of their training, which often includes long hours of study, clinical rotations, and extended use of electronic devices. Studies have identified female students as particularly at risk, with hypotheses pointing to both biomechanical and psychosocial variables influencing this trend (4). Evidence from Ethiopian medical colleges noted a 49.2% prevalence of neck pain in this group, reinforcing the concern that study-related postural stress significantly contributes to discomfort and disability (4). Moreover, such musculoskeletal complaints can hinder academic performance, reduce concentration, and elevate absenteeism rates, thereby compromising future professional development (9,10). The pathophysiology of neck pain among students often remains ambiguous, with many cases being classified as non-specific neck pain. These cases lack identifiable structural abnormalities and are frequently linked to habitual poor posture, such as forward head alignment, often exacerbated by

screen use and desk-bound learning (5,6). In parallel, sleep deprivation and high psychological stress have been reported as co-contributors to musculoskeletal pain among medical students, with reduced sleep quality correlating with increased pain incidence (7,8). While prolonged study hours are intuitively associated with physical strain, the literature offers mixed results on the strength of this relationship. Some studies report a significant link between extended reading time and neck discomfort (14,15), while others suggest that individual posture, stress, and ergonomic awareness may play larger roles.

Despite numerous investigations into the prevalence of neck pain in student populations, a consistent and detailed understanding of its relationship with study duration remains limited. For instance, studies in Peshawar and Tabriz confirmed a high prevalence of neck pain among physical therapy and clinical students, often presenting with mild to moderate disability and higher female susceptibility (16,17). However, most of these studies lack a uniform methodology or standardized tools to assess disability levels and do not thoroughly examine the interaction between gender, study habits, and symptom severity. Moreover, gaps remain in quantifying the severity of neck pain and disability using validated instruments like the Neck Disability Index (NDI), particularly within Pakistani undergraduate cohorts. Given the increasing academic pressure and digital dependency among medical students, it is essential to understand whether the duration of study itself is a significant predictor of neck pain or whether other confounding factors mediate this relationship. The current study aims to determine the prevalence of neck pain among undergraduate medical students in Lahore with varying durations of study hours, using the NDI as an objective assessment tool. The objective is to evaluate the association, if any, between study duration and neck pain severity, thereby clarifying a potential target for ergonomic or behavioral interventions in medical education settings.

MATERIALS AND METHODS

This cross-sectional study was conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure transparency, reproducibility, and completeness. The study was carried out at Akhtar Saeed Medical and Dental College, Lahore, Pakistan, over a seven-month period from May to December 2023. The primary objective was to assess the prevalence of neck pain among undergraduate medical students and to explore its association with study hours using the Neck Disability Index (NDI) as the principal outcome measure. Participants were recruited through non-probability convenience sampling. Eligible participants included male and female undergraduate students aged 18 to 26 years enrolled in 3rd, 4th, or final professional years of MBBS, Doctor of Physical Therapy (DPT), and Bachelor of Dental Surgery (BDS) programs. Students were included only if they had no prior history of neck surgery, congenital neck deformities, cervical fractures, or whiplash injuries to minimize the influence of confounding musculoskeletal or neurological conditions. Prior to participation, written informed consent was obtained from all students, ensuring voluntary participation and ethical compliance. Data collection was facilitated through the administration of a standardized Neck Disability Index (NDI) questionnaire. The NDI, a validated tool for assessing functional limitations related to neck pain, consists of ten items scored on a 6-point Likert scale, yielding a total score indicative of disability severity ranging from none to complete (1). Questionnaires were distributed and self-completed under supervision to reduce potential reporting bias. All participants completed the questionnaire in full; hence, no missing data were recorded. In cases where responses were unclear or ambiguous, participants were contacted directly for clarification to preserve data integrity.

The sample size was calculated using OpenEpi version 2023, incorporating a 95% confidence interval, a 5% margin of error, and an estimated neck pain prevalence based on prior literature. To ensure methodological rigor and consistency, the questionnaire scoring was carried out using the scoring guide provided with the NDI instrument. Descriptive statistics were used to summarize quantitative variables such as age and study hours, while categorical variables, including gender, presence of neck pain, and severity levels, were reported as frequencies and percentages. Inferential statistics were applied using IBM SPSS Statistics version 27.0. The chi-square test was employed to determine the association between neck pain and study hours, with a significance threshold set at $p < 0.05$. Potential confounding variables, such as gender, were addressed in stratified analyses to examine effect modification. Given the study's cross-sectional design, causality could not be established, and generalizability was cautiously interpreted due to the use of convenience sampling within a single academic institution. Ethical approval for the study was granted by the Institutional Review Board of Akhtar Saeed Medical and Dental College, Lahore, ensuring compliance with the ethical principles outlined in the Declaration of Helsinki. All participants were briefed about the purpose of the study, their right to withdraw at any time without penalty, and the confidentiality of their responses. This methodology ensures that the study is replicable and provides a solid foundation for future investigations exploring musculoskeletal health in academic environments.

RESULTS

A total of 131 undergraduate medical students participated in the study, comprising 92 females (70.2%) and 38 males (29.0%), with one participant unaccounted for in gender categorization. The predominant age group was 21–23 years, representing 74.0% of the sample. All participants provided complete responses, resulting in no missing data. The overall prevalence of neck pain among the cohort was 39.7% ($n=52$). Females reported a significantly higher frequency of neck pain ($n=36$; 69.2%) compared to males ($n=16$; 30.7%). The distribution of neck pain between genders was not statistically significant ($\chi^2 = 0.048$, $p = 0.827$), suggesting no gender-based association in the dataset despite the apparent trend. Regarding daily study duration, 57.3% of students reported studying for 2–4 hours, 29.8% for 4–6 hours, and 13.0% for 6–8 hours. Among those with neck pain, the majority (57.7%) belonged to the 2–4 hour study group, followed by 23.1% in the 4–6 hour group and 19.2% in the 6–8 hour group. Chi-square analysis indicated no statistically significant association between study duration and neck pain prevalence ($\chi^2 = 0.899$, $p = 0.412$), indicating that study hours alone were

not predictive of neck pain in this cohort. Assessment of neck pain severity, based on the Neck Disability Index (NDI), revealed that 59.6% (n=31) of symptomatic students experienced mild disability. Moderate disability was reported by 17.3% (n=9), severe disability by 5.8% (n=3), and complete disability by only one student (1.9%). Notably, 8 participants with neck pain (15.4%) reported no disability. Among students without neck pain (n=79), all scored within the "no disability" range on the NDI, underscoring the tool's discriminative capability.

Table 1: Prevalence of Neck Pain by Gender

Gender	Neck Pain (n, %)	No Neck Pain (n, %)	Total
Male	16 (30.7%)	22 (27.8%)	38
Female	36 (69.2%)	56 (70.9%)	92
Total	52 (39.7%)	79 (60.3%)	131

Table 2: Frequency of Neck Pain by Study Hours

Study Hours	With Neck Pain (n, %)	Without Neck Pain (n, %)	Total	χ^2	p-value
2–4 hours	30 (57.7%)	45 (57.0%)	75	0.899	0.412
4–6 hours	12 (23.1%)	27 (34.2%)	39		
6–8 hours	10 (19.2%)	7 (8.9%)	17		
Total	52 (39.7%)	79 (60.3%)	131		

Table 3: Severity Levels of Neck Disability (NDI) Among Symptomatic Students

NDI Severity Level	Number of Students (n)	Percentage (%)
No Disability	8	15.4%
Mild Disability	31	59.6%
Moderate Disability	9	17.3%
Severe Disability	3	5.8%
Complete Disability	1	1.9%
Total	52	100%

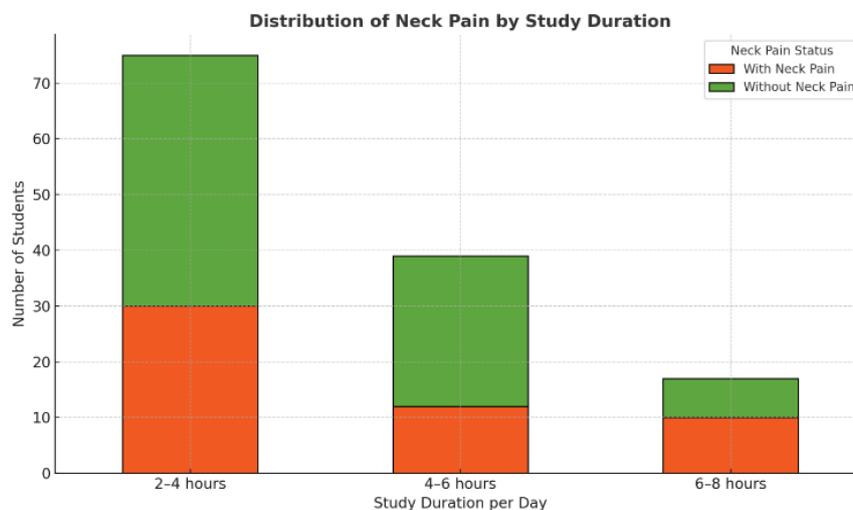


Figure: Comparative Distribution of Neck Pain Prevalence Across Study Duration

The bar chart below illustrates the relationship between self-reported daily study hours and the presence or absence of neck pain among students. While the highest frequency of neck pain was observed in the 2–4 hour group (n=30), the proportion of students without neck pain in the same group was nearly equivalent (n=45). The 6–8 hour group, although smaller in size, demonstrated a comparatively higher proportion of symptomatic students (58.8%) relative to asymptomatic individuals (41.2%), suggesting a potential clinical trend despite the lack of statistical significance. This non-linear distribution implies that factors beyond mere study duration—such as posture, ergonomics, or stress—may influence symptom manifestation.

DISCUSSION

The present study evaluated the prevalence and severity of neck pain among undergraduate medical students in Lahore, focusing on the relationship between study duration and neck-related disability. Our findings revealed a relatively high prevalence of neck pain (39.7%), with a disproportionate burden among female students (69.2%). These results are consistent with prior investigations that have identified female gender as a significant correlate of musculoskeletal complaints, particularly neck pain, in academic populations (14,15). Several physiological and psychosocial explanations have been proposed to account for this discrepancy,

including lower neck muscle endurance, higher stress sensitivity, and greater reporting tendencies among females (3,10). Although a majority of students reported studying for 2–4 hours per day, which accounted for the highest frequency of neck pain, statistical analysis did not establish a significant association between study duration and neck pain severity ($p = 0.412$), highlighting that study time alone may not be the principal etiological factor.

The findings support previous reports by Johora (2016) and Yunn (2013), both of whom observed higher neck pain prevalence among students with prolonged academic commitments and electronic device use (14,15). However, our results differ in that neck pain was not linearly related to longer study hours. While this may initially seem counterintuitive, it reflects the complexity of musculoskeletal pain syndromes, which are often influenced by multifactorial mechanisms including ergonomic setup, posture maintenance, muscle fatigue, stress levels, and physical inactivity (4,5,9). In fact, some participants with shorter study durations reported substantial disability, which may be attributed to poor postural habits or a lack of physical conditioning rather than duration alone. These patterns reinforce the notion that it is not the absolute quantity of study time, but rather the quality of body mechanics and environmental support during those hours, that may serve as modifiable risk factors.

The dominance of mild neck disability among symptomatic participants (59.6%) aligns with earlier studies conducted in similar educational contexts, such as Ibrahim's 2017 study among physical therapy students in Peshawar, which documented a high prevalence of mild to moderate neck complaints (16). Likewise, Sadat (2013) reported a 39.4% neck pain prevalence among medical students in Tabriz, with the majority of cases resulting in mild functional limitation (18). These comparisons affirm the validity and reproducibility of our findings and underscore the global relevance of neck pain as an emerging health concern in student populations. Our study further contributes to the literature by utilizing the Neck Disability Index (NDI), a validated and clinically meaningful instrument, which enhances the accuracy and comparability of our outcome assessment (12).

From a theoretical standpoint, these results reinforce the biopsychosocial model of musculoskeletal pain, which posits that physical symptoms are a product of dynamic interactions between anatomical, psychological, and behavioral factors. The lack of significant association between study duration and neck pain severity may suggest that cognitive stress, sleep deprivation, and psychosocial strain—factors known to be prevalent among medical students—could play a more substantial role in symptom development than previously assumed (7,8). This understanding has important clinical implications. It calls for a multidimensional approach to prevention and intervention strategies, incorporating ergonomic training, stress management, physical activity promotion, and regular musculoskeletal screening within medical institutions.

Despite its strengths—including the use of a standardized assessment tool, a focused target population, and complete data capture—this study is not without limitations. The cross-sectional design precludes any inference of causality between study habits and neck pain. The sample was derived from a single academic institution using non-probability convenience sampling, which may limit the generalizability of the findings to other medical colleges or regions. Furthermore, potential confounding factors such as screen time duration, posture specifics, psychosocial stress, and physical activity levels were not assessed, which could have further elucidated the mechanisms underlying neck pain prevalence. Lastly, although statistical tests confirmed no significant association between study hours and neck pain, the sample distribution across study-hour categories was unequal, potentially affecting the power of subgroup comparisons. Future research should adopt longitudinal or multi-center designs to validate and expand upon these findings. Incorporating objective ergonomic assessments, psychological screening tools, and physical activity profiling could enable a more comprehensive evaluation of contributing factors. Additionally, intervention-based studies assessing the efficacy of posture correction, workstation optimization, and stress reduction programs would be valuable in designing student-centered musculoskeletal health policies. Given the burden of neck pain on academic performance and quality of life, proactive measures addressing both physical and psychosocial determinants are urgently warranted in medical education settings.

CONCLUSION

This study concluded that neck pain is a prevalent concern among undergraduate medical students in Lahore, with a notably higher occurrence in females and predominantly mild disability as measured by the Neck Disability Index. Despite the widespread assumption that prolonged study habits contribute to neck pain, no statistically significant association was observed between study duration and neck pain severity, underscoring the influence of multifactorial contributors beyond study hours alone. These findings emphasize the need for proactive clinical measures, such as ergonomic education, postural correction strategies, and stress reduction programs within academic institutions, to mitigate musculoskeletal strain among students. From a research perspective, future investigations should explore additional biomechanical and psychosocial determinants of neck pain to inform targeted interventions and promote long-term musculoskeletal health in young, high-risk populations.

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