Original Article

An Observational Study on Upper Cross Syndrome in Undergraduate Medical Students of Allama Iqbal Medical College

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ABSTRACT

Background: Upper Cross Syndrome (UCS) is a musculoskeletal condition characterized by postural imbalance and functional disability, commonly associated with sedentary behaviour and prolonged study hours. Medical students are at heightened risk due to sustained forward head posture, extended screen use, and academic stress, yet evidence from South Asian populations remains limited. Objective: To determine the prevalence and severity of UCS among undergraduate medical students at Allama Iqbal Medical College, Lahore, and to assess demographic associations with disability levels. Methods: A cross-sectional observational study was conducted among 76 medical students aged 18–30 years. Participants with musculoskeletal pain lasting at least one month were included, while those with congenital deformities, fractures, surgery, or systemic illness were excluded. The Neck Disability Index (NDI), Pectoralis Major Contracture Test, and Trapezius Strength Test were administered. Reliability analysis confirmed strong internal consistency (Cronbach's α = 0.813). Data were analysed using chi-square tests and logistic regression, with significance set at p < 0.05. Results: Moderate disability was the most prevalent finding, reported in 66.2% of participants. Severe disability was noted in 16.9%, while 5.2% were classified as crippled. Gender and age group differences were not statistically significant (p = 0.14 and p = 0.54, respectively). Conclusion: UCS is highly prevalent among medical students, with two-thirds experiencing moderate disability. Preventive ergonomic interventions, posture correction, and stress management strategies are recommended to mitigate long-term musculoskeletal morbidity.
Keywords: Upper Cross Syndrome, Neck Disability Index, Medical students, Posture, Musculoskeletal disorders.

INTRODUCTION

Upper Cross Syndrome (UCS) is a common musculoskeletal imbalance characterized by hyperactivity and shortening of the upper trapezius, levator scapulae, and pectoralis major muscles, accompanied by weakness of the deep neck flexors, rhomboids, and lower trapezius. This imbalance leads to the formation of a characteristic cross-pattern of tightness and weakness across the upper body, resulting in neck pain, postural dysfunction, and functional disability (1). The condition arises from prolonged static postures, particularly forward head and rounded shoulder positions, which are increasingly prevalent in modern sedentary lifestyles (2).

Among university students, and especially medical undergraduates, the risk of UCS is heightened due to long hours of study, use of electronic devices, and sustained seated positions. Studies have reported a notable prevalence of neck and shoulder discomfort among adolescents and working populations; for example, up to 17% of Finnish high school students reported neck and shoulder symptoms, while 30–40% of musculoskeletal complaints in European workers were attributed to occupational exposures (3). Similar occupational risks have been observed among dentists, where 55% reported neck pain linked to posture and ergonomics (4). These findings highlight the impact of poor posture and repetitive activities across different populations, yet evidence specific to medical students in South Asia remains limited.

Psychosocial stress is an additional factor contributing to UCS, particularly among medical students who face high academic demands. Elevated stress levels exacerbate muscle tension, reduce recovery, and amplify vulnerability to musculoskeletal disorders (5). Previous research has also emphasized the role of age, physical inactivity, and ergonomics in UCS, indicating that both biological and environmental factors interact to increase susceptibility (6). While preventive approaches such as posture correction, ergonomic interventions, and strengthening exercises have been suggested, few studies have systematically quantified UCS prevalence and associated risk factors in young adult student populations.

Despite increasing recognition of UCS, a clear knowledge gap remains regarding its prevalence and severity among medical students in Pakistan. Most prior studies have focused on occupational groups such as dentists, physiotherapists, or drivers, leaving student populations underexplored. Given the potential consequences for academic performance, daily functioning, and long-term musculoskeletal health, evaluating UCS in medical students is a critical step toward prevention and early intervention.

The present study was therefore designed to determine the prevalence and severity of UCS among undergraduate medical students at Allama Iqbal Medical College, Lahore. Specifically, it aimed to assess associated risk factors, levels of disability, and demographic correlates, thereby providing evidence to guide ergonomic, educational, and preventive strategies for reducing the burden of UCS in student populations.

MATERIAL AND METHODS

This study employed a cross-sectional observational design to determine the prevalence and severity of Upper Cross Syndrome (UCS) among undergraduate medical students. The study was conducted at Allama Iqbal Medical College (AIMC), Lahore, over a four-month period during the academic year. A convenience sampling approach was adopted, targeting students aged 18–30 years. Eligibility criteria included willingness to participate and the presence of neck or shoulder pain persisting for at least one month. Exclusion criteria comprised congenital shoulder deformities, recent fractures of the cervical or shoulder region, previous surgery involving the neck or upper back, recent trauma, and systemic illnesses likely to affect musculoskeletal function.

Recruitment was carried out through announcements during academic sessions, followed by informed consent obtained from each participant. Ethical clearance for the study was granted by the institutional review board of AIMC, ensuring compliance with the Declaration of Helsinki and national ethical standards.

Data collection involved administration of a structured questionnaire consisting of two parts: demographic information (age, gender, and academic year) and clinical assessment tools. The Neck Disability Index (NDI) was employed to evaluate functional impairment, alongside the Pectoralis Major Contracture Test to identify anterior chest wall tightness and the Trapezius Strength Test to assess muscle weakness. Each assessment was conducted by trained physiotherapists under standardized conditions. The internal consistency of the NDI scale was confirmed in this study population, with Cronbach's alpha recorded at 0.813, indicating good reliability.

Variables were operationally defined as follows: UCS was classified based on the presence of at least one indicator of pectoralis major contracture with concurrent trapezius weakness, accompanied by an NDI score >20. Disability severity was categorized into mild (0–20), moderate (21–40), severe (41–60), and crippled (61–80). Demographic factors, pain intensity, and functional limitations were treated as independent variables.

To minimize bias, assessments were conducted in a blinded manner, with evaluators unaware of participants' demographic details. Confounding factors such as gender and age were analyzed using stratification techniques, and subgroup analyses were performed where relevant. The sample size of 77 participants was based on feasibility, with reference to similar cross-sectional studies on UCS prevalence (7,8).

Statistical analysis was performed using SPSS version 22. Descriptive statistics were used to summarize baseline characteristics. Categorical variables were expressed as frequencies and percentages, while continuous variables were reported as means and standard deviations. Group comparisons were evaluated using chi-square tests for categorical data and independent t-tests for continuous data. Logistic regression models were applied to identify predictors of moderate-to-severe disability, adjusting for age and gender. Statistical significance was set at $p < 0.05$, with 95% confidence intervals reported for key associations. Missing data were handled using listwise deletion, as the dataset contained no significant missing values.

Reproducibility was ensured by employing standardized tools and procedures, maintaining an audit trail of data collection, and coding datasets to preserve participant confidentiality. All collected data were stored securely and analyzed under strict data integrity protocols, ensuring transparent reporting and replicability of the study findings.

RESULTS

Among the 76 participants, moderate disability was the most prevalent category overall, affecting 66.2% of the study population. When stratified by gender, 70.0% of males (n=28) and 62.2% of females (n=23) demonstrated moderate disability, indicating that both groups were predominantly affected at this level. Severe disability was reported by 15.0% of males (n=6) and 18.9% of females (n=7). Interestingly, none of the male participants were classified as crippled, while 10.8% of females (n=4) fell within this most severe category. Only 11.7% of the total cohort reported mild disability, with slightly higher proportions among males (15.0%) compared to females (8.1%). Despite these numerical differences, the chi-square analysis demonstrated no statistically significant association between gender and disability severity ($\chi^2 = 5.46$, df = 3, $p = 0.14$).

Table 1. Cross-tabulation of NDI Disability Severity by Gender

NDI Category	Male (n=40)	Female (n=36)	Total (n=76)	p-value
Mild Disability (0–20)	6 (15.0%)	3 (8.1%)	9 (11.7%)	
Moderate Disability (21–40)	28 (70.0%)	23 (62.2%)	51 (66.2%)	
Severe Disability (41–60)	6 (15.0%)	7 (18.9%)	13 (16.9%)	
Crippled (61–80)	0 (0.0%)	4 (10.8%)	4 (5.2%)	
Chi-square (df=3)				5.46
p-value				0.14

Table 2. Cross-tabulation of NDI Disability Severity by Age Group

Age Group (years)	Mild Disability	Moderate Disability	Severe Disability	Crippled	p-value
18–20 (n=15)	1 (6.7%)	8 (53.3%)	5 (33.3%)	1 (6.7%)	
21–25 (n=23)	2 (8.3%)	17 (70.8%)	4 (16.7%)	1 (4.2%)	
26–30 (n=38)	6 (15.3%)	26 (68.4%)	4 (10.5%)	2 (5.3%)	
Chi-square (df=6)					5.01
p-value					0.54

Age-stratified analysis revealed a consistent predominance of moderate disability across all groups. In the youngest participants (18–20 years, n=15), 53.3% (n=8) had moderate disability, while severe disability was observed in 33.3% (n=5), the highest proportion across all age groups. Among those aged 21–25 years (n=23), 70.8% (n=17) were classified as moderately disabled, with 16.7% (n=4) reporting severe disability. The oldest age group (26–30 years, n=38) showed a similar trend, with 68.4% (n=26) having moderate disability and 10.5% (n=4) severe disability. Crippled cases were relatively rare, reported in 6.7% of 18–20 year-olds (n=1), 4.2% of 21–25 year-olds (n=1), and 5.3% of 26–30 year-olds (n=2). Chi-square testing again showed no significant association between age group and disability severity ($\chi^2 = 5.01$, df = 6, p = 0.54).
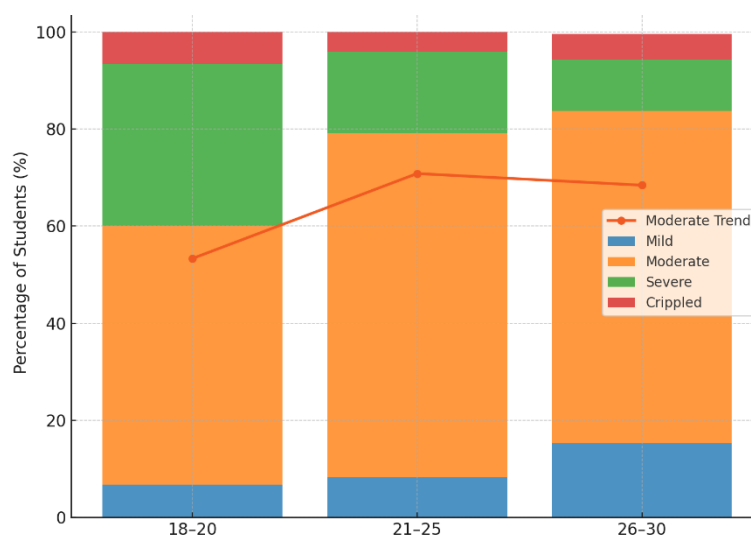
Figure 1 Disability Severity Distribution Across Age Groups

The figure shows the age-stratified distribution of disability severity, with stacked bars illustrating the percentage breakdown across severity levels, and an overlaid trend line emphasizing the predominance of moderate disability. The 21–25 year group had the highest proportion of moderate cases (70.8%), while severe disability was most frequent in the youngest group (18–20 years, 33.3%). Crippled cases remained low across all groups, ranging from 4.2% to 6.7%. This visualization highlights the consistent dominance of moderate disability across age strata, with a clinically relevant shift toward greater severity in the youngest participants.

DISCUSSION

This study investigated the prevalence and severity of Upper Cross Syndrome (UCS) among medical students at Allama Iqbal Medical College, Lahore, and found that two-thirds of participants (66.2%) experienced moderate disability. Although disability severity varied slightly across gender and age strata, neither association reached statistical significance, indicating that UCS is a widespread concern affecting students regardless of demographic characteristics. Importantly, a notable proportion of females (10.8%) were categorized as crippled, while severe disability was more prominent among the youngest group (18–20 years, 33.3%), suggesting that vulnerability may be heightened at specific stages of training or with differing coping strategies.

These findings align closely with previous investigations reporting high UCS prevalence in young adults and student populations. Mubeen et al. observed that nearly half of medical students in Lahore experienced neck discomfort, primarily attributed to poor posture (9). Similarly, Chandarana et al. documented a 37% prevalence of UCS among college students, with abnormal posture identified as the principal risk factor (10). Our observed prevalence of 66.2% falls within the higher range of previously reported values, approximating

the 67.7% prevalence documented in computer operators exposed to prolonged screen time (11). Together, these studies reinforce the central role of sedentary behaviors and posture-related stresses in UCS development among young populations.

Beyond student cohorts, occupational studies have also demonstrated a high burden of UCS. Mujawar and Sagar reported a prevalence of 28% among laundry workers, with posture and pectoral muscle tightness identified as primary contributors (12). Among dentists, Rafie et al. highlighted musculoskeletal symptoms in over half of practitioners, particularly involving the cervical spine (13). Similarly, long-distance bus drivers frequently reported neck and shoulder pain due to sustained poor posture, mirroring the postural stresses experienced by students (14). Our findings extend this occupational evidence by highlighting that medical students—despite their health awareness—remain significantly affected by UCS, underscoring the pervasiveness of posture-related musculoskeletal disorders across contexts.

The disproportionate prevalence of higher disability levels in females observed here is consistent with earlier surveys reporting greater susceptibility among women physiotherapists (15). Potential explanations include sex-related differences in muscle strength, ergonomic exposure, or psychosocial stressors. The concentration of severe disability among the youngest students may reflect inadequate ergonomic adaptation at the onset of medical education, where academic pressures and unaccustomed study habits converge to amplify musculoskeletal strain. Although these patterns were not statistically significant in our analysis, they merit further exploration in larger cohorts.

Our study has several strengths, including the use of validated assessment tools such as the Neck Disability Index, which demonstrated strong internal consistency in this sample (Cronbach's α = 0.813). However, limitations must be acknowledged. The single-institution sample restricts generalizability, and the cross-sectional design precludes causal inference. Furthermore, confounders such as body mass index, physical activity, and ergonomic workstation characteristics were not assessed. Despite these limitations, the study provides valuable baseline data on the high prevalence of UCS among Pakistani medical students.

The findings carry important implications for preventive and interventional strategies. Incorporating ergonomic training into medical curricula, promoting regular physical activity targeting postural correction, and fostering stress management programs could reduce the burden of UCS in student populations. Early interventions are critical not only to alleviate immediate pain and disability but also to prevent long-term musculoskeletal morbidity that may impact future clinical practice.

CONCLUSION

This study demonstrates the high prevalence of Upper Cross Syndrome among undergraduate medical students, with two-thirds experiencing moderate disability and notable proportions reporting severe or even crippling levels of impairment. Although no statistically significant associations were found with gender or age, the observed numerical patterns—higher severe disability in younger students and increased crippled cases among females—suggest potential vulnerability in specific subgroups. The findings underscore the pervasive impact of posture-related musculoskeletal disorders in medical education, highlighting the need for proactive preventive measures. Integrating ergonomic awareness, postural correction exercises, and stress management strategies into student health programs may help reduce the burden of UCS and its long-term consequences. Future research with larger, multi-institutional cohorts and longitudinal designs is warranted to clarify causal pathways and inform evidence-based interventions.

REFERENCES

1. Morris CE, Bonnefin D, Darville C. The torsional upper crossed syndrome: A multi-planar update to Janda's model, with a case series introduction of the mid-pectoral fascial lesion as an associated etiological factor. J Bodyw Mov Ther. 2015;19(4):681–9.

2. Mujawar JC, Sagar JH. Prevalence of upper cross syndrome in laundry workers. Indian J Occup Environ Med. 2019;23(1):54–6.

3. Dhage P, Anap D. Prevalence of an "Upper Crossed Syndrome in Physiotherapy College Students" – A Cross-Sectional Study. VIMS Health Sci J. 2019;6(1):10–3.

4. Shahid S, Tanveer F, Dustgir A. Prevalence and risk factors for the development of upper-crossed syndrome among DPT students of University of Lahore. Age (Omaha). 2016;19:0–98.

5. Al-Mohrej OA, AlShaalan NS, Al-Bani WM, Masuadi EM, Almodaimegh HS. Prevalence of musculoskeletal pain of the neck, upper extremities and lower back among dental practitioners in Riyadh: A cross-sectional study. BMJ Open. 2016;6(6):e011100.

6. Rafie F, Zamani Jam A, Shahravan A, Raoof M, Eskandarizadeh A. Prevalence of upper extremity musculoskeletal disorders in dentists: symptoms and risk factors. J Environ Public Health. 2015;2015:517346.

7. Van der Molen HF, Foresti C, Daams JG, Frings-Dresen MH, Kuijer PPF. Work-related risk factors for specific shoulder disorders: a systematic review and meta-analysis. Occup Environ Med. 2017;74(10):745–55.

8. Latko WA, Armstrong TJ, Franzblau A, Ulin SS, Werner RA, Albers JW. Cross-sectional study of the relationship between repetitive work and the prevalence of upper limb musculoskeletal disorders. Am J Ind Med. 1999;36(2):248–59.

9. Tajika T, Yamamoto A, Oya N, Okura C, Shinagawa S, Kitagawa T, et al. Association between dysfunction of upper extremity and locomotive syndrome in the general population. J Orthop Sci. 2017;22(1):144–8.

10. Mubeen I, Malik S, Akhtar W, Iqbal M, Asif M, Arshad A, et al. Prevalence of upper cross syndrome among medical students of University of Lahore. Int J Physiother. 2016;3(3):381–4.

11. Daneshmandi H, Harati J, Fahim Poor S. Bodybuilding links to upper crossed syndrome. Phys Act Rev. 2017;5:124–31.

12. Chandarana P, Rathod S, Sorani D. Prevalence of upper crossed syndrome in college students – an observational study. Int J Health Sci Res. 2022;12(3):179–86.

13. Naseer R, Tauqeer S. Prevalence of upper cross syndrome in different occupations. Pak J Phys Ther. 2021;3:3–7.

14. Karimian R, Rahnama N, Ghasemi G, Lenjannejadian S. Association between upper-extremity musculoskeletal disorders and upper cross syndrome among teachers, and the effects of corrective exercises with ergonomic intervention. Stud Med Sci. 2021;31(4):10–5.

15. Mubashir M. A cross-sectional survey on prevalence of upper cross syndrome and its correlation with WRMSDs in working physiotherapists. Pak J Rehabil. 2021;10(1):42–50.

16. Fatima A, Ashraf HS, Sohail M, Akram S, Khan M, Azam H. Prevalence of upper cross syndrome and associated postural deviations in computer operators: a qualitative study. Asian J Allied Health Sci. 2022;7(3).

17. Hussain G, Nawaz A, Haroon M, Amon SK, Khan H. Prevalence of upper cross syndrome in working female physiotherapists: a cross-sectional survey. Biol Clin Sci Res J. 2023;402.

18. Rugbeer N, Neveling N, Sandla T. Prevalence of work-related musculoskeletal disorders in long-distance bus drivers. S Afr J Sports Med. 2016;28(2):55–8.

19. Parno A, Sayehmiri K, Parno M, Khandan M, Poursadeghiyan M, Maghsoudipour M, et al. The prevalence of occupational musculoskeletal disorders in Iran: a meta-analysis. Work. 2017;58(2):203–14.