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Association of Upper Cross Syndrome with Emotional well-being of Medical Students

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ABSTRACT

Background: Upper cross syndrome (UCS) is associated with postural abnormalities and neck-related musculoskeletal disability, which may influence emotional well-being.

Objective: To investigate the association between UCS and emotional well-being among students at the University of Lahore.

Methods: A cross-sectional observational study was conducted over six months among 112 students aged 18–25 years using non-probability convenience sampling. Data were collected through a demographic questionnaire, Neck Disability Index (NDI), and World Health Organization Five Well-Being Index (WHO-5). Descriptive statistics and Pearson's chi-square test were used for analysis in SPSS version 25.

Results: The mean age was 22.09 ± 1.84 years, and 77.7% of participants were female. NDI results showed mild disability in 37.5%, moderate disability in 25.0%, severe disability in 6.3%, and no disability in 31.3%. The mean WHO-5 score was 20.46 ± 2.75. A statistically significant association was observed between NDI categories and WHO-5 scores ($\chi^2 = 119.473$, df = 33, $p < 0.001$).

Conclusion: Upper cross syndrome and associated neck disability may affect the emotional well-being of medical students. Promoting proper posture, ergonomic practices, and early physiotherapy intervention may help improve students' physical and emotional well-being.

Keywords: Emotional Well-Being, Medical Students, Neck Disability Index, Neck Pain, Posture, Upper Cross Syndrome, WHO-5.

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Introduction

Upper cross syndrome (UCS) is a postural and musculoskeletal imbalance characterized by altered muscle activation and length relationships involving the cervical, shoulder, and upper thoracic regions (1). It is commonly associated with tightness and over activity of the pectoral muscles, upper trapezius, levator scapulae, and sternocleidomastoid, accompanied by weakness or reduced activation of the deep neck flexors, middle and lower trapezius, rhomboids, and serratus anterior (2–4). These imbalances may disrupt normal cervical and scapular biomechanics, contributing to forward head posture, rounded shoulders, increased thoracic kyphosis, and altered shoulder-girdle positioning. Musculoskeletal disorders (MSDs), which encompass a broad range of conditions affecting muscles, joints, tendons, ligaments, nerves, and supporting structures, constitute an important public health concern because of their effects on physical functioning, quality of life, and occupational productivity (2,3). Within this context, UCS warrants attention because persistent postural abnormalities and associated musculoskeletal symptoms may interfere with daily activities and functional performance, particularly among individuals who spend prolonged periods sitting or working in sustained, non-neutral postures (5,6).

The development of UCS is generally attributed to sustained postural loading, repetitive activities, and imbalances between muscles that tend to become shortened or overactive and those that become lengthened or inhibited. Prolonged sitting, inappropriate workstation ergonomics, repetitive computer use, and habitual forward head positioning may contribute to increased thoracic kyphosis and altered scapular mechanics, potentially promoting the development or persistence of upper-quarter musculoskeletal symptoms (7–10). Other factors, including occupational workload, age, sex-related differences, and work-related postural demands, have also been investigated in relation to postural dysfunction and musculoskeletal complaints (11–13). The clinical manifestations of UCS may include neck and shoulder discomfort, muscle tightness, reduced cervical or thoracic mobility, scapular dyskinesis, and impaired muscular performance. Forward head posture may additionally affect postural control and alter the mechanical demands placed on the cervical spine and shoulder girdle (14,15). The resulting symptoms may limit routine activities, reduce functional capacity, and adversely affect an individual's perceived physical health and well-being.

Evidence from different occupational and educational settings indicates that upper-quarter postural abnormalities and symptoms consistent with UCS are common among populations exposed to prolonged sitting and repetitive work. A systematic review and meta-analysis of physiotherapeutic interventions has further highlighted the clinical relevance of UCS and the need for appropriate assessment and management strategies (14). Studies conducted among computer users in Pakistan have reported substantial proportions of participants experiencing neck and upper-back discomfort, forward head posture, and increased thoracic curvature (15). Similarly, research among physiotherapists has documented a considerable burden of UCS and work-related musculoskeletal symptoms (16). Students are another potentially vulnerable population because academic activities frequently involve extended periods of reading, writing, computer use, and studying in sustained postures. A study conducted among medical students at the University of Lahore reported a substantial prevalence of UCS-related symptoms and postural abnormalities, emphasizing the importance of recognizing these problems in undergraduate healthcare education settings (10). Nevertheless, the frequency of specific postural abnormalities and associated symptoms may vary across populations according to assessment criteria, study settings, and individual behavioral and occupational characteristics (14–16).

In addition to its physical consequences, musculoskeletal discomfort may be associated with psychological distress and reduced emotional well-being. Pain and functional limitations can interfere with concentration, sleep, academic performance, social participation, and everyday activities, potentially contributing to emotional strain. Conversely, psychological distress may influence pain perception, muscle tension, coping behavior, and the persistence of musculoskeletal symptoms. Evidence from a systematic review and meta-analysis has demonstrated an association between neck pain and symptoms of depression and anxiety, supporting the importance of considering psychological factors when evaluating musculoskeletal conditions (17). Studies investigating upper trapezius pain and myofascial trigger points have also reported relationships between musculoskeletal symptoms and depression, anxiety, stress, or depressive symptoms (18-20). Research among students has further examined associations between upper-body postural abnormalities and mental health, as well as between neck pain and psychological or lifestyle-related factors (21-23). Although these findings suggest a potential relationship between physical discomfort and psychological health, they do not establish that UCS directly causes emotional difficulties. Moreover, evidence specifically examining the relationship between UCS-related neck disability and emotional well-being among medical students remains limited in the context of the present study.

Assessment of UCS-related symptoms and their potential psychological correlates requires appropriate and standardized measurement tools. Clinical assessment may include examination of posture, muscle length and strength, scapular positioning, and cervical mobility, while patient-reported instruments can quantify the perceived

severity and functional consequences of neck symptoms (16,24). The Neck Disability Index (NDI) is a commonly used instrument for evaluating neck-related pain and disability and can help characterize the extent to which neck symptoms interfere with everyday functioning (25). Emotional well-being can be assessed using the World Health Organization Five Well-Being Index (WHO-5), a brief self-report measure of subjective psychological well-being that has been evaluated across different populations and countries (26). Using these instruments together provides a structured approach to examining the relationship between neck-related disability and emotional well-being, although questionnaire scores alone cannot confirm a clinical diagnosis of UCS or establish a causal relationship between physical and psychological outcomes.

Medical students represent a particularly relevant population for this investigation because their academic routines may involve prolonged study periods, sustained sitting, extensive reading, and frequent use of digital devices. Musculoskeletal discomfort and associated functional limitations may affect their daily routines during a demanding stage of education, while emotional well-being is also important for academic engagement and general health. Identifying a relationship between neck-related disability and emotional well-being could help inform future research and support the development of integrated approaches to postural education, ergonomic awareness, musculoskeletal assessment, and student well-being. However, findings from a single educational institution should be interpreted within the context of the population studied, and potential confounding factors should be considered when interpreting associations between self-reported physical and emotional outcomes. Therefore, the present study was conducted to investigate the association between UCS assessed using the NDI for neck-related disability and emotional well-being, assessed using the WHO-5 well-being scale, among medical students at the University of Lahore. It was intended to contribute to the understanding of the relationship between musculoskeletal functioning and emotional well-being in this population and to provide a basis for further research into the physical and psychological health of medical students.

Material and Methods

A cross-sectional observational study was conducted to investigate the association between neck-related disability and emotional well-being among medical students at the University of Lahore, Pakistan. The study was conducted over a period of six months and included 112 participants recruited using a non-probability convenience sampling technique. Eligible participants were approached at the university and in university and private hostels. The study was designed to assess neck-related functional disability using the Neck Disability Index (NDI) and emotional well-being using the World Health Organization Five Well-Being Index (WHO-5). The cross-sectional design enabled the assessment of the relationship between these variables at a single point in time; therefore, the findings were interpreted in terms of association rather than causation.

Students aged 18–25 years, irrespective of sex, who were enrolled beyond the third year of their clinical academic training and provided informed consent were eligible for inclusion (27–29). Students with a history of psychological disorders, including depression or anxiety, were excluded, as were pregnant or postpartum students and individuals with a history of substance abuse or chronic systemic disease (29). Participants with a history of cervical trauma or surgery or pre-existing cervical pathologies, including cervical radiculopathy and cervical spondylosis, were also excluded (30). These eligibility criteria were applied to identify the intended study population and reduce the potential influence of pre-existing conditions on the assessment of neck-related disability and emotional well-being.

Data were collected using a structured demographic questionnaire, the Neck Disability Index, and the WHO-5 Well-Being Index. The demographic questionnaire was used to record relevant participant characteristics, including age, sex, body mass index (BMI), academic programme, and semester of study. The NDI was administered to assess the perceived impact of neck-related symptoms on functional activities and everyday life. The questionnaire scores were used to classify participants according to the disability categories applied in the study, namely no disability, mild disability, moderate disability, and severe disability. The WHO-5 was used to evaluate participants' subjective emotional well-being through five self-reported items addressing positive well-being over the preceding two weeks. Each item was scored on a six-point response scale from 0 to 5, yielding a raw total score ranging from 0 to 25, with higher scores indicating better well-being and lower scores indicating poorer well-being (26). Both instruments were administered to the eligible participants, and the completed questionnaires were reviewed for completeness before data entry. The use of these standardized instruments facilitated the systematic assessment of neck-related disability and emotional well-being within the study population.

Ethical considerations were observed throughout the research process, and the study was conducted in accordance with the ethical principles. The relevant institutional ethical committee requirements of the University of Lahore were followed. Written informed consent was obtained from all participants before data collection, and the purpose and procedures of the study were explained to them. Participants were informed that their involvement was voluntary, that they could withdraw from the study at any time without penalty, and that

participation did not require them to undergo any invasive procedure. Confidentiality and anonymity were maintained throughout the study, and personally identifiable information was not included in the analytical dataset. The collected data were stored securely in password-protected electronic files and, where applicable, in locked physical storage accessible only to authorized members of the research team. The institutional ethics approval reference and date should be inserted into the final manuscript after verification against the official approval documentation.

The collected data were coded, entered, and analyzed using IBM Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics were used to summarize the demographic characteristics and study variables. Continuous variables, including age, semester of study, and WHO-5 scores, were expressed as means and standard deviations, as appropriate. Categorical variables, including sex, BMI categories, academic program, and NDI disability categories, were presented as frequencies and percentages. Histograms were used to illustrate the distributions of continuous variables, while bar charts were used to display categorical variables. The association between NDI disability categories and WHO-5 scores was examined using the Pearson chi-square test, with statistical significance defined as a two-sided p-value of less than 0.05. The findings were interpreted according to the observed distributions and statistical results, while recognizing that the cross-sectional design did not permit conclusions regarding causality.

Results

Study included 112 participants, with a mean age of 22.09 ± 1.84 years. Female students constituted the majority of the sample (87; 77.7%), while 25 (22.3%) were male. Regarding BMI, 85 (75.9%) participants were classified as having normal weight, 17 (15.2%) as overweight, and 10 (8.9%) as underweight. Students enrolled in the DPT program represented the largest reported academic group, accounting for 43.8% of the sample.

Table 1. Demographic characteristic of participants (N = 112)

Characteristic	Frequency, n (%) or mean ± SD
Age (years)	22.09 ± 1.84
Sex	
Male	25 (22.3%)
Female	87 (77.7%)
Body mass index (BMI)	
Underweight	10 (8.9%)
Normal weight	85 (75.9%)
Overweight	17 (15.2%)

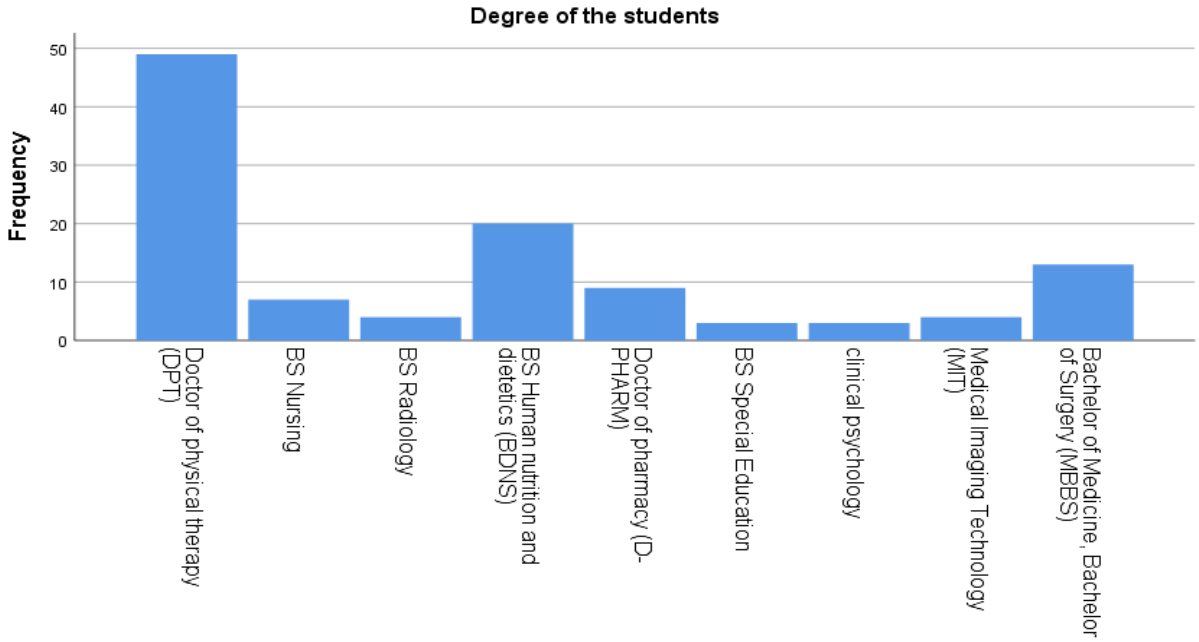


Figure 1. Bar chart showing the degree of the students

The study included 112 students from different academic programs. The largest proportion of participants belonged to the Doctor of Physical Therapy (DPT) program, comprising 49 students (43.8%), followed by BS Human Nutrition and Dietetics, with 20 students (17.9%), and MBBS, with 13 students (11.6%). Doctor of Pharmacy (Pharm-D) students accounted for 9 participants (8.0%), while BS Nursing included 7 students (6.3%). Medical Imaging Technology and BS Radiology comprised 4 (3.6%) and 4 (3.6%) students, respectively. BS Special Education and Clinical Psychology had the lowest representation, with 3 students (2.7%) each. Overall, the sample was predominantly composed of DPT students, while the remaining participants represented a range of other healthcare-related academic programs. The mean semester of study was 7.53 ± 2.75.

The Neck Disability Index (NDI) results showed that 42 participants (37.5%) experienced mild disability, representing the largest group, followed by 35 (31.3%) with no disability, 28 (25.0%) with moderate disability, and 7 (6.3%) with severe disability. The mean WHO-5 Well-Being Index score was 20.46 ± 2.75. The chi-square analysis indicated a statistically significant association between NDI categories and WHO-5 scores ($\chi^2 = 119.473$, $p < 0.001$). Hence, neck pain and disability caused by upper cross syndrome had a significant impact on emotional wellbeing in medical students.

Table 2. Distribution Association between NDI categories and WHO-5 scores among medical students (N = 112)

Variable	Value
Neck Disability Index (NDI) categories, n (%)	
No disability	35 (31.3%)
Mild disability	42 (37.5%)
Moderate disability	28 (25.0%)
Severe disability	7 (6.3%)
World Health Organization- Five (WHO-5) Well-Being Index score	
Mean	20.4643
Standard deviation	2.74741
Chi-square test results	
Pearson chi-square	119.473
Significance	.000

Discussion

The present study investigated the association between neck-related disability and emotional well-being among students at the University of Lahore using the Neck Disability Index (NDI) and the World Health Organization Five Well-Being Index (WHO-5). The findings indicated that neck-related disability was common in the study population and that the statistical analysis demonstrated an association between NDI categories and WHO-5 scores. Of the 112 participants, 37.5% reported mild disability, 25.0% reported moderate disability, and 6.3% reported severe disability, while 31.3% reported no disability. The mean WHO-5 score was 20.46 ± 2.75. These findings highlighted the relevance of examining musculoskeletal health alongside emotional well-being in students pursuing demanding academic programmes. However, because the study used a cross-sectional design, the observed association could not establish whether neck-related disability preceded changes in emotional well-being or whether psychological and other factors contributed to the reported musculoskeletal symptoms.

The distribution of neck-related disability was consistent with previous research indicating that students and other populations exposed to prolonged sitting, repetitive academic activities, and sustained non-neutral postures experienced considerable upper-quarter musculoskeletal problems. Mubeen et al. investigated UCS among medical students at the University of Lahore and reported a substantial burden of neck discomfort and postural abnormalities, emphasizing the relevance of the problem in this educational setting (10). The present study extended this area of investigation by examining neck-related disability alongside emotional well-being rather than focusing exclusively on postural abnormalities or the prevalence of musculoskeletal symptoms. Nevertheless, direct comparisons between the reported proportions should be made cautiously because the previous study and the present investigation may have differed in their assessment procedures, eligibility criteria, and operational definitions of UCS. In particular, the NDI quantified perceived neck-related functional disability and did not independently establish a clinical diagnosis of UCS. Consequently, the finding that 68.8% of participants reported some degree of disability should not be

interpreted as a confirmed prevalence estimate for clinically diagnosed UCS.

The predominance of female participants in the present sample, who accounted for 77.7% of the study population, also warranted consideration when interpreting the findings. Previous research had examined sex-related differences and other individual and occupational factors in relation to postural dysfunction and musculoskeletal symptoms (11,12). However, the present study did not provide sex-stratified NDI or WHO-5 results, and therefore it could not establish whether neck-related disability or emotional well-being differed between male and female participants. Similarly, although 75.9% of participants had a normal BMI and the mean semester of study was 7.53 ± 2.75, the available analysis did not determine whether BMI, academic programme, or stage of training was associated with neck disability. These characteristics provided useful descriptive information about the study population, but their independent relationships with the principal outcomes remained undetermined. Future investigations could examine these factors alongside screen exposure, study duration, workstation ergonomics, physical activity, sleep quality, and academic workload to develop a more comprehensive understanding of musculoskeletal health among students.

The relationship between musculoskeletal symptoms and psychological well-being has also been explored in studies involving pain, myofascial trigger points, depression, anxiety, and stress. Irfan et al. reported an association between upper trapezius pain, perceived exertion, and depressive symptoms among workers in the food industry, suggesting that musculoskeletal discomfort and psychological health may be interrelated in occupational settings (18). Similarly, Nascimento et al. identified relationships between active myofascial trigger points, depressive symptoms, pain-related characteristics, and shoulder function among individuals with shoulder pain (19). Kashif et al. also reported associations between myofascial trigger points in the neck and shoulder region and symptoms of depression, anxiety, and stress among university students (20). These findings were broadly consistent with the present study's observation that neck-related disability and emotional well-being were statistically associated. However, the populations and outcome measures differed, and the findings could not be considered directly equivalent. In particular, the present study assessed general subjective well-being using the WHO-5 rather than directly measuring depression, anxiety, or stress. Therefore, the observed association should not be interpreted as evidence that participants with neck disability necessarily had a depressive or anxiety disorder.

The possible relationship between neck-related disability and emotional well-being could also be understood in the context of the broader evidence linking neck pain with psychological distress. Liu et al., in a systematic review and meta-analysis, reported an association between neck pain and symptoms of depression and anxiety, supporting the importance of considering psychological factors when assessing musculoskeletal complaints (17). Research among university students had similarly explored relationships between neck pain and psychological or lifestyle-related factors, including sleep quality and mindfulness, indicating that musculoskeletal symptoms may occur alongside broader challenges affecting student well-being (22,23). Furthermore, Pourmavaddat and Pourmaveddat examined upper-body abnormalities in relation to mental health among female university students, providing additional context for investigating the physical and psychological dimensions of student health (21). Collectively, these studies supported the clinical relevance of the present investigation, although they did not establish a single causal pathway between postural dysfunction and emotional well-being. Pain-related limitations, academic pressures, sleep disturbances, and psychological distress may interact in complex ways, and these factors were not comprehensively evaluated in the present study.

The mean WHO-5 score of 20.46 ± 2.75 provided a descriptive estimate of subjective well-being among the participants. The WHO-5 was an appropriate instrument for assessing positive psychological well-being, and its measurement properties had been investigated across different countries and populations (26). However, the mean score alone did not establish the proportion of participants experiencing clinically significant psychological distress, nor did it demonstrate how well-being varied across the different NDI categories. The statistically significant association reported in the present study suggested that the distribution of neck disability and well-being scores was related, but the available results did not provide the direction or magnitude of this relationship. Consequently, it could not be concluded that greater neck disability was necessarily associated with lower well-being in this sample without examining the underlying group-specific scores or cross-tabulated data. Future studies should report mean WHO-5 scores and measures of variability for each disability category, together with effect sizes and confidence intervals, to clarify the clinical significance of the observed relationship.

Conclusion

In conclusion, upper cross syndrome (UCS) was prevalent among the medical students, and a statistically significant association was observed between Neck Disability Index categories assessed for UCS and emotional well-being. The findings highlighted the importance of integrating musculoskeletal and emotional health into student healthcare through ergonomic education, regular physical activity, appropriate physiotherapy assessment, and access to psychological support when needed.

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Authors' Contributions

ICMJE authorship criteria	Detailed contributions	Authors
Substantial Contributions	Conception or Design of the work	1,2
	Data acquisition	1,3
	Data analysis or interpretation	2,3
Drafting or Reviewing	Draft the work	3
	Review critically	1,2,3
Final approval	Final approval of the version to be published.	1,2,3
Accountable	Agreement to be accountable for all aspects of the work.	1,2,3

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