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Prevalence and Association of Upper Cross Syndrome with Neck Pain Among University Students

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Abstract

Background: Upper cross syndrome is a type of musculoskeletal disorder defined by muscle deviations of the shoulder, neck, and upper back regions leads to the experience of pain in the shoulder, back and the neck region.

Objective: The purpose of this study was to establish the prevalence of upper cross syndrome in university students, and their relationship to neck pain.

Methodology: For this observational-sectional study, the sample size of the total population was estimated to be 173 carried out for six months in Universities The Institute of Leadership and Management and National College of Business Administration & Economics. A purposive non-convenience sampling approach was applied. The research with 18 to 25 years old approval was sought and consent was given. The participants who developed neck pain to take part in the study were university students. Data were retrieved and analysed, and data analysis was done by using SPSS 26.0 version and chi-square.

Results: In 173 students, proximal cross syndrome with cervical pain prevalence was 38,70%. However there is p=0.994 which indicates no significant relation of head position with the pain and p=0.365 which indicate no significant relation of cervical position with pain in shoulder girdle cross syndrome patients.

Conclusion: There is high prevalence of upper cross syndrome among university students but it does not necessarily cause cervical pain. Also, there was no significant association between cervical and position head position and pain in patients with UCS.

Keywords: Upper cross syndrome, neck pain, slumped posture

Introduction:

Upper Cross Syndrome (UCS) is a muscular dystrophy condition that affects the scalene, sternocleidomastoid, serratus anterior muscles in relation to deep neck flexors; suboccipital, pectoral upper trapezius and levator scapulae muscles in relation to the anterior and posterior muscle groups respectively (1). Described by Dr.Janda this condition is known as proximal or shoulder girdle-crossed syndrome because tight muscles form a cross at the shoulder joint causing postural deformity and discomfort in neck and upper back region (2). Interestingly, the incidence rate is also quite high: 48.7%

of University students are suffering from the neck pain, 66.8% of University students exhibited poor posturing during study times (3).

The labourers are 28% affected attributed to the awkward postures adopted most of the time by the workers (4). The condition is linked with musculoskeletal disorders which is seventh leading group cause of disability globally, affecting mobility and wellbeing (5). The prevalence of UCS is slightly higher in female populations, in urban residents and in developed countries (6). Major risk factors include anatomical abnormalities, chronic postural changes, and kinesiological strain that lead to muscle and joint contracture and dysfunction (7). Sitting or executing repetitive movements at the workplace causes muscle imbalances and stiffness in which deep neck flexors and lower trapezius lose strength while pectorals and upper trapezius muscles tighten (7). These imbalances gradually build up the structural changes in the cervical and thoracic region thus leading to cervical pain, headaches and limited motion (8). These postural changes are worsened by postural stress or activities involving sitting for long periods, such as computer work, making discomfort and disability even worse (9).

The passive postural examination about position of the body, muscular power, range of motion, and spinal curves is another efficient diagnostic tool. X-rays or MRI scans may be employed to evaluate the extent of alterity of the postural distortions (10). The Flesche test is one such clinical test which assists in providing an identification of the cervical mobility restrictions and poor postural alignment as a cause of UCS .Upper Cross Syndrome (UCS) requires a full range of treatment techniques including relief from muscle spasm,postural re-education and restoration of balance (11) Treatment for Upper Cross Syndrome (UCS) involves a combination of interventions to Trigger point therapy, myofascial release and stretching forms aim at working on muscles with a view of enhancing flexibility (3). Appropriate mobilisation, postural adjustment exercises, and postural management strategies, such as the McKenzie technique form the core to get rid of musculoskeletal realignment pain (7, 11). Paracetamol and NSAIDs administration as well as muscle energy techniques, dry needling offer comfort and alleviate discomfort as well as bring back functions (2, 12). Prolonged discomfort and eventual functional limitations can be avoided if treatment initiates at the right time (9).

Aziz (2024) observed UCS in 54.1 per cent of bankers in Faisalabad and has linked it with the same causes such as sitting for long hours and having a wrong posture (13). Likewise, Thomas et al. (2024) found that multiparous women had more prevalence of UCS and stated that posture related habits are those which are most considerations for UCS (14). Additionally, Babaei et al. (2024), UCS patients who received Alexander technique lessons reported better changes in their physical and psychological status (15) as compared with those who underwent regular physiotherapy treatments Mudassar et al. (2023) revealed that passive stretch muscle energy techniques could also significantly relieve pain and increase patients' range of motion (2).

The above findings also appeared in Rana (2020) wherein muscle energy techniques were more effective compared to traditional interventions in handling UCS associated neck pains (16). The theme of posture correction still dominates the presented literature by Khawar (2022) also payed attention to the importance of ergonomics interventions and UCS in cases of sedentary work (17). In the same way, Naseer (2021) also highlighted how a long period of sitting affects UCS(18). Occupational factors were also depicted by chan (2020) and Mujawar (2019) while emphasizing the aspect of UCS with examples being neck strain among university students due to posture of long hours of working with laptops and repetitive movements among laundry workers (19, 20). Although many investigations have investigated the occurrence rate of UCS, risk factors, and management plans for treating USCs, few papers relate to potential cervical pain and its occurrence in university students. Since poor posture due to sitting has been associated with extended desk work and increased utilization of digital devices, the absence of data establishing the epidemiologic association between UCS and neck pain in this subjects is a significant research deficiency. Such discoveries could help design administrative health interventions to reduce musculoskeletal disabilities, raise ergonomics' consciousness, and advance

student health and academic outcomes. This study endeavours to fill this gap by assessing the prevalence and relationship between UCS and cervical pain among university students.

Methodology:

It used an analytical cross-sectional research design, and data was collected over six months from Institute of Leadership and Management (ILM) Lahore and National College of Business Administration & Economics (NCBAE Lahore. Participation in the study was sought after receiving ethical approval from the ethical committee of the Institute of Leadership and Management Before undertaking the study, the sample size was estimated objectively by Epitool based on previous research findings (P = 0.66; e = 0.05; Z = 0.95) (3). Respondents were selected purposively by a non probability convenience sampling method. The inclusion criteria used necessary that the participants are university students within the age range of eighteen to twenty-five years and who gave their consent to participate in the study and those that were complaining of neck pains (1). Patient exclusion criteria comprised cervical surgery, injury or trauma within three months prior to the study, history of spinal illnesses, or upper back injuries (3).

The participants completed informed consent, and data collection presumed questionnaires which were administered to the students, accompanied by a briefing of the study's purpose and purposeful explanation so as to allow for appropriate completion. The questionnaires that aimed at explaining participant roles were distributed and reviewed personally. Data were collected using three tools: Other measures to be used are the Neck Disability Index (NDI), the Numeric Pain Rating Scale (NPRS) and the Reedco Posture Scale (RPS). The NDI, with interclass correlation coefficient of 0.88, consists of ten questions that measures pain-related disability up to 50, concerning severe disability (21). The NPRS is a valid and reliable measure showing moderate inter rater reliability (ICC = 0.67) The NPRS quantifies pain severity and ranges from 0 to 10 with the higher number reflecting the severity of pain (21). The RPS was developed to assess postural flexion dysfunction; the obtained outcomes of ten tested postural positions are visually evaluated; if the score is below 59, there is dysfunction; in contrast, 100 indicates ideal posture. The RPS is high reliability with ICC scores varying between 0.81 – 0.95 (22).

The study data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Age was analyzed by mean ± standard deviation for quantitative variables whereas gender as a qualitative variable was analyzed by presenting results as frequencies and percentages, represented graphically either in tables. The chi-square tests were used to determine the presence of relations between the variables.

Results:

The study involved 173 university students in the following table 1 with a mean age of 22.2 ¼ 1.69 years and aged between 18 ¼ 25years. Out of the mentioned patients, 33 (19.1%) were male whereas 140 (80.9%) were female among the participants. As in table 1, 121 participants (69.9%) were from University of ILM and 52 (30.1%) from NCBA&E. The distribution by academic year was as follows First Year accounted for 9.8% of the respondents followed by Second Year 15%, Third Years 17.3%, Fourth Years 24.9% and final years 32.9%. Table 1 As shown in Presently, people spent 63.83 ± 24.77 % daily using computers or cellphones, the using proportion of each subject range from 7-100%. Table 2 mentioned regarding pain prevalence 66 (38.2%) no pain, 67 (38.7%) very mild pain, 27 (15.6%) moderate pain, 10 (5.8%) fairly severe pain and 3 (1.7%) very severe pain. The intensity of the patients' pain also differed; most patients had mild pain (54.3–60.7%) or moderate pain (15.6–38.7%).

Additionally Table 2 showed REEDCO scale postural examination that 66 (38/2%) students tilted their heads to the right while 107 (61/8%) had straight head position. For students with their heads turned, pain severity scores varied from zero (24 students) to very severe pain (1 student). Among the

participants with erect head positions, 42 volunteers stated no headaches, and only 02 persons said they suffer from very severe headaches. Table 3 showed that NDI as Functional difficulties reported by students included Personal work 44.5% Reading 44.5% Recreation activity 48.6% Concentration 39.9% Work 31.8% Lifting 33.5%.

In table 4, 19 out of 171 students had markedly forward heads, 111 students slightly forward heads, and 43 students erect necks. The pain intensity was also not associated with head or neck position as depicted by the Pearson correlation coefficients of 0.22 and 8.736 and p-values of 0.994 and 0.365.

Table 1: Demographic variables of Participants:

Variables		**Mean ± S.d**	**Frequency (%)**
Age		22.23 ±1.69	-
Computer or mobile usage		63.83± 24.77	-
Gender	**Male**	-	33 (19.1%)
	Female	-	140 (80.9%)
University	**ILM**	-	121 (69.9%)
	NCBA&E	-	52 (30.1%)
Study Year	**First-year**	-	17 (9.8%)
	2nd year	-	26 (15%)
	3rd year	-	30 (17.3%)
	4th year	-	43 (24.9%)
	Final year	-	57 (32.9%)

Table 2: Frequency of NPRS among participants:

Variable			**Frequency**
NPRS	Pain intensity	I have no pain at the moment	66 (38.2%)
		The pain is very mild at the moment	67(38.7%)
		The pain is moderate at the moment	27(15.6%)
		The pain is fairly severe at the moment	10(5.8%)
		The pain is very severe at the moment	3 (1.750
	Last week pain	0 (No Pain)	37 (21.4%)
		1-3 (Mild Pain)	105 (60.7%)
		4-6 (Moderate Pain)	30 (17.3%)
		7-10(Severe Pain)	1 (0.6%)
	Worst pain	0 (No Pain)	42 (24.3%)
		1-3 (Mild Pain)	52 (30.1%)
		4-6 (Moderate Pain)	67 (38.7%)
		7-10(Severe Pain)	12 (6.9%)
REEDCO Scale	Head	head turned to one side	66 (38.2%).
		head erect	107(61.8%)
	Neck	head markedly forward	19(11%)
		head slightly forward	111(64.2%)
		neck erect	43(24.9%)

Table 3: Frequency of NDI of participants:

Variables		**Frequency**
Personal Care (Washing,	I can look after myself normally without causing extra pain	77 (44.5%)
Dressing, etc.)	I can look after myself normally but it causes extra pain	65(37.6%)
	It is painful to look after myself and I am slow and careful	22(12.7%)
	I need some help but can manage most of my care	7(4%)
	I need help every day in most aspects of self-care	2(1.2%)
Reading	I can read as much as I want to with no pain in my neck	33 (19.1%)
	I can read with slight pain in my neck	77(44.5%)
	I can read with moderate pain in my neck	49(28.3%)
	I can't read of moderate pain in my neck	10(5.8%)
	I can hardly read as severe pain in my neck	3(1.7%)
	I cannot read at all	1(0.6%)
Headaches	I have no headaches at all	26(15%)
	slight headaches, which come infrequently	75(43.4%)
	moderate headaches, which come infrequently	43(24.9%)
	moderate headaches, which come frequently	19(11%)
	I have severe headaches, which come frequently	6(3.5%)
	I have headaches almost all the time	4(2.3%)
Concentration	concentrate fully when I want to with no difficulty	49(28.3%)
	concentrate fully when I want to with slight difficulty	69(39.9%)
	a fair degree of difficulty in concentrating when I want to	39(22.5%)
	lot of difficulty in concentrating when I want to	9(5.2%)
	a great deal of difficulty in concentrating when I want to	3(1.7%)
	I cannot concentrate at all	4(2.3%)
Recreation	I can engage in all my recreational activities with no neck pain at all	54 (31.2%)
	I can engage in all my recreational activities, with some pain in my neck	84(48.6%)
	I can engage in most, but not all of my usual recreational activities because of pain in my neck	22(12.7%)

	I cannot engage in a few of my usual recreational activities because of the pain in my neck	5(2.9%)
	I can hardly do any recreational activities because of the pain in my neck	8(4.6%)
Work	I can do as much work as I want to	55 (31.8%)
	I can only do my usual work, but no more	54(31.2%)
	I can do most of my usual work, but no more	55(31.8%)
	I cannot do my usual work	6(3.5%)
	I can hardly do any work at all	3(1.7%)
Lifting	I can lift heavy weights without extra pain	54(31.2%)
	I can lift heavy weights but it gives extra pain	58(33.5%)
	Pain prevents me from lifting heavy weights off the floor, but I can manage if they are on the table	38(22%)
	Pain prevents me from lifting heavy weights, but I can manage light to medium weights	7(4%)
	I can only lift very light weights	15(8.7%)
	I cannot lift or carry anything	1(0.6%)
Driving	drive my car without any neck pain	53(30.6%)
	I can drivemy car as long as I want with slight pain in my neck	29(16.8%)
	drive my car as long as I want with moderate pain in my neck	21(12.1%)
	can't drive my car as long as I want because of moderate pain in my neck	8(4.6%)
	I can hardly drive at all because of severe pain in my neck	2(1.2%)
	I can't drive my car at all	17(9.8%)
Sleeping	I have no trouble sleeping	56 (32.4%)
	My sleep is slightly disturbed (less than 1 hr sleepless)	39(22.5%)
	My sleep is mildly disturbed (1-2 hrs sleepless)	40(23.1%)
	My sleep is moderately disturbed (2-3 hrs sleepless)	31(17.9%)
	My sleep is greatly disturbed (3-5 hrs sleepless)	5(2.9%)
	My sleep is completely disturbed (5-7 hrs sleepless)	2(1.2%)

Table 4: Association of Head and Neck position with pain:

		NPRS					**Chi-square**	**p-value**
		No pain	Mild pain	Moderate pain	Fairly severe pain	Very severe pain		

REEDCO	Head	Turned to one side	24	26	11	4	1	0.22	0.994
		Erect head	42	41	16	6	2		
		Total	66	67	27	10	3		
	Neck	Markedly forward	9	7	3	0	0	8.736	0.365
		Slightly forward	37	49	16	6	3		
		Erect	20	11	8	4	0		
		Total	66	67	27	10	3		

Discussion:

The objective of this study was to assess the frequency and correlation of upper cross syndrome (UCS) with neck pain among university students. UCS is characterized by stiffness and weakness in the cervical, upper spine, and shoulder region muscles, often resulting from prolonged sitting and improper posture. The findings revealed that cervical discomfort is prevalent among university students due to extended hours of sitting. Among 173 students, 38.2% reported no pain, 38.7% experienced very mild pain, 15.6% had moderate pain, 5.8% reported fairly severe pain, and 1.7% experienced very severe pain. These results align with Shahid et al. (2016), who found 35.2% of participants reported cervical aches, with 76.6% having moderate pain and 22.1% experiencing mild discomfort (1). Their findings also highlighted an association between work duration and cervical discomfort, which supports the current study's outcomes.

The average age of participants in the current study was 22.23 ± 1.69 years, with a mean daily device usage of 63.83 ± 24.77%, ranging from 7% to 100%. Prolonged use of electronic devices may contribute to postural imbalances and associated pain. Mujawar et al. (2019) similarly observed a high prevalence of UCS among laundry workers, attributing it to repetitive tasks and poor ergonomics (20). However, their findings differed in population characteristics, with the prevalence of UCS reported at 28%, primarily associated with muscle weakness and tightness.

The current study further showed that 44.5% of students had difficulty with personal work and reading, 43.4% experienced headaches, 39.9% faced concentration challenges, and 48.6% struggled with recreational activities. Shahid et al. (2016) similarly reported cervical discomfort affecting activities of daily living, including limited neck range of motion(1). However, Chandarana et al. (2022) identified a unique perspective, associating muscle firmness and weakness in the pectoral and cervical regions with UCS (23), though their findings differed from the present study due to a smaller sample size and a focus on specific biomechanical factors.

In this research, head position analysis indicated that 38.2% of students had their heads turned to one side, while 61.8% maintained an erect head posture. Students with heads turned to one side exhibited varying levels of pain, but statistical analysis showed no significant association between head position and neck pain ($p = 0.994$, Chi-square= 0.22). This finding contrasts with Mubashir et al. (2021), who observed a significant relationship between head posture, working hours, and neck disability among physiotherapists(4). The discrepancy may stem from differences in participant demographics and occupational demands.

Comparatively, Thomas et al. (2024) highlighted UCS susceptibility in postpartum women, attributing it to poor postural habits, with a prevalence of 66.7% (14). While the conclusions differ due to variations in age and participant characteristics, the role of posture as a key factor aligns with the present study. Additionally, Arshad (2021) reported neck pain in 66.4% of bank staff, linking it to

prolonged tie-wearing and sedentary work, which parallels the current study's emphasis on the impact of prolonged sitting and posture on neck discomfort (24). Overall, the findings of this research emphasize the significant prevalence of cervical discomfort among university students, influenced by postural habits, prolonged device usage, and sedentary lifestyles. While there are overlaps with existing studies, variations in demographics, sample size, and occupational factors account for differences in reported outcomes.

The main limitations of the study as since the research was aimed at university students in Lahore, the generalization of the results beyond this specific group of users may not be possible. Thus, the study needs to present a larger number of participants from different areas and cities in order to enhance the relevancy of the future research findings. Furthermore, the study focused only the age of 18-25 and excluded both younger and older population and as such the study imitations may not apply to older population. In this way, the growth of the sample should include participants from other age groups that would increase the relevance of the work to different audiences. Moreover, sample was collected purposively from only two universities of one region which may constrain the variation of representativeness of participants. Since the participants are students of two different universities and colleges, it means that a more diversified sample will be more beneficial for the understanding of the subject matter. Lastly, the duration of this study was relatively short thus limiting the depth in the collection and analysis of the data collected may have retrieved less rich data in the study. Future studies might consider extending the duration of the study to be able to better document and analyze different data aspects.

Conclusion:

The current study revealed that 38.7% among the university students were limbered with upper cross syndrome (UCS) accompanied by neck pain. Then, there was no statistically significant relationship found between postural angles of the head and neck, and the severity of the pain ($p > 0.05$). These findings imply that although UCS is common, its relationship with posture might not determine pain intensity.

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