Prevalence and Associated Factors of Upper Cross Syndrome Among Physiotherapy Students at the University of Tripoli.

*Ahlam Hassan Elkheshebi * , Nada Abdel Salam Zewa , Maryam Nasser Alkilani and Laila Suleiman.*
Physiotherapy Department Faculty of Medical technology Tripoli University.

*Ahlam Hassan Elkheshebi,physiotherapy department Faculty of Medical technology Tripoli University.
g.d.m.t.16@gmail.com , a.elkheshebi@uot.edu.ly, *ORCID: 0009-0009-1471,*

***Abstract*— Upper Cross Syndrome (UCS) is a common musculoskeletal disorder characterized by postural imbalances of the head, neck, and shoulders, often exacerbated by prolonged electronic device use and poor posture. This study aimed to determine nthe prevalence of UCS and its associated factors among physiotherapy students at the University of Tripoli. A cross-sectional study was conducted from June to September 2024 among 126 physiotherapy students aged 20–25 years, using a self-administered questionnaire and clinical assessments including neck range of motion, wall and ruler test for forward head posture, and thumb test for rounded shoulders. Results revealed a high prevalence of UCS-related symptoms, with 50.8% reporting neck tension, 85% mild pectoral muscle stiffness, 46% forward head posture, and 44.4% rounded shoulders; moreover, 73.8% experienced headaches associated with device use or studying, and 89.7% reported pain during poor posture. Despite these findings, 57.7% did not seek treatment, while only 11.1% received physiotherapy. Statistical analysis demonstrated significant associations between device usage and pain type (p=0.041), as well as between neck tightness and pain (p=0.002). In conclusion, UCS is highly prevalent among physiotherapy students at the University of Tripoli, with poor posture and device usage as major contributing factors, underscoring the need for early intervention, postural education, and physiotherapy to prevent long-term musculoskeletal complications. These findings also highlight the importance of future longitudinal and interventional studies to further explore preventive and therapeutic strategies for UCS in student populations.**

Keywords—Cross Syndrome, Physiotherapy students, Postural dysfunction, Smartphone use.

INTRODUCTION.

Upper Crossed Syndrome (UCS) is a postural disorder characterized by muscular imbalances in the cervical spine and shoulder girdle, leading to forward head posture, rounded shoulders, and thoracic kyphosis. This condition typically involves overactivity and tightness of the upper trapezius and pectoralis muscles, coupled with weakness in the deep neck flexors and lower trapezius, resulting in marked postural deviations and musculoskeletal discomfort [1-3]. These imbalances exert stress on the cervico-thoracic and cervico-cranial junctions, altering the upper body's biomechanics and potentially diminishing functional capacity [4,5].

The increasing prevalence of UCS among university students is attributed to prolonged sedentary behavior, particularly during extended screen time and academic activities. These patterns, frequently observed in physiotherapy and medical students, are strongly linked to poor postural habits and discomfort in the cervical and shoulder regions [6].

Repetitive forward spinal flexion, shoulder protraction, and forward head posture, exacerbated by academic stress, can intensify muscular imbalances and create a cycle of discomfort and impaired concentration [7,8]. Over time, these dysfunctional postural patterns may contribute to chronic musculoskeletal disorders, pain, and a diminished quality of life [9].

Several studies have explored the prevalence of UCS among student populations. For example, a cross-sectional study at the University of Lahore found that 66.8% of students exhibited poor posture, with 37.1% presenting symptoms consistent with UCS [10]. Similarly, Shahid (2016) [11] documented significant neck and thoracic pain among Doctor of Physical Therapy (DPT) students, while Chithra et al. (2023) [12] observed widespread pectoral muscle tightness and upper trapezius weakness among Indian college students. Javed et al. (2022) [13] also reported that nearly half of a sample of 305 students experienced neck tightness and reduced cervical range of motion, indicating a strong association between digital device use and UCS symptoms.

Additional findings support this trend: Kittad (2023) [9] identified upper trapezius tightness in more than half of students preparing for competitive examinations, and Dhage (2019) [14] reported a high UCS prevalence among physiotherapy students. In a broader context, Zhang (2023) [15] documented a 59.7% UCS prevalence among over 2,500 Chinese college students, with a significant correlation to internet addiction. Collectively, these studies reinforce the role of poor posture, psychological stress, and prolonged screen time in the development of UCS.

Despite this growing body of evidence, limited research has been conducted specifically on physiotherapy students at the Faculty of Medical Technology, University of Tripoli. Given that these students are future healthcare professionals

expected to educate and manage patients with postural dysfunctions, it is essential to assess their own musculoskeletal health. Accordingly, this study aims to determine the prevalence of UCS among this academic group and to highlight its implications for physical health, academic performance, and future clinical responsibilities.

METHOD.

A descriptive cross-sectional study was conducted between June and September 2024 in the Department of Physiotherapy, Faculty of Medical Technology, University of Tripoli, to determine the prevalence of Upper Crossed Syndrome (UCS) among undergraduate physiotherapy students. A census approach was adopted, inviting all eligible students available during the data collection period (N≈129), of whom 126 (104 females and 22 males) met the inclusion criteria and completed the assessment, representing approximately 42% of the total student population in the department. Students with a history of upper body trauma, diagnosed musculoskeletal disorders, or congenital deformities were excluded. Administrative approval was obtained from the Physiotherapy Department, and data were collected in a low-risk, anonymized manner with voluntary informed participation and without any therapeutic intervention. Data collection was conducted in two phases: completion of the questionnaire and physical assessments, as described below.

(1) *Completion of a structured, self-administered questionnaire.* The questionnaire was adapted from a previously validated UCS screening tool [13] and reviewed by academic experts for clarity and relevance. It consisted of four main sections:

- Demographic Information: Age, gender, academic level.
- Behavioral and Study *Habits:* Frequency and duration of device use (e.g., smartphone, laptop), study hours, and preferred study positions.
- Musculoskeletal Symptoms: Presence of symptoms such as neck pain, shoulder tension, headaches, and the need to support the head/neck/upper back while studying or using electronic devices.

(2) Physical assessments for UCS among participants were included:

- Cervical Range of Motion (ROM): Measured using a goniometer, assessing neck flexion (normal range: 40–60°), extension (60–80°), lateral flexion (40–50°), and rotation (70–90°) [16,17].
- Forward Head Posture: Evaluated using the wall-and-ruler method, where the distance between the occiput and the wall was measured. A zero distance was considered normal, while any measurable gap indicated forward head posture.
- Arounded Shoulders: Assessed using the thumb test, where the position of the thumbs in a relaxed standing position (facing forward vs. inward rotation) indicated the presence of rounded shoulders, as seen in figure 1.

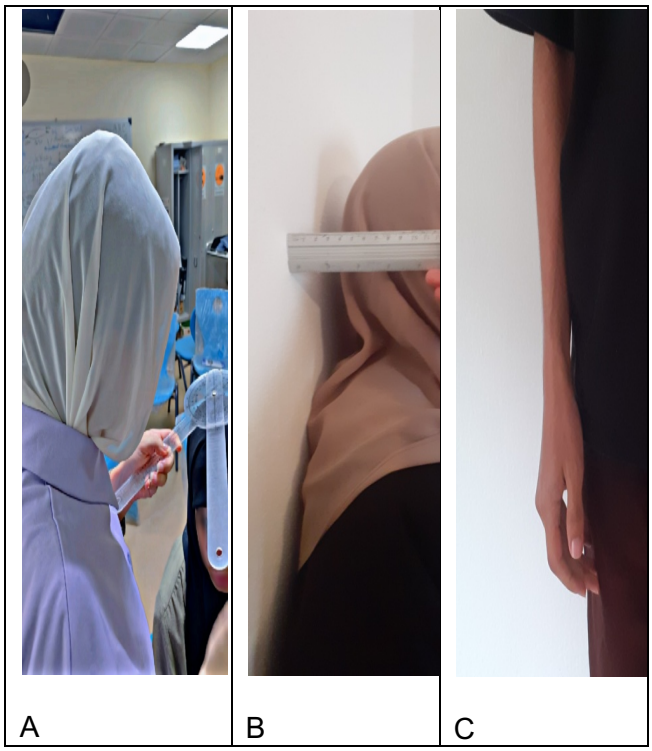

Figure 1. Physical assessment tools used among participants, including (A) goniometric assessment of cervical ROM, (B) wall-and-ruler test for head posture and (C) thumb test for rounded shoulders

The internal consistency of the questionnaire was evaluated using Cronbach's alpha, resulting in a high reliability coefficient of 0.88. Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics (frequencies and percentages) were used to report prevalence rates. Pearson's Chi-square test was applied to determine associations between behavioral variables and the presence of UCS-related symptoms. A p-value of less than 0.05 was considered statistically significant.

RESULTS.

A total of 129 students from the Department of Physiotherapy participated in this study. Among them, 126 students (97.6%) fulfilled the inclusion criteria, having no history of upper body trauma or postural structural deformities. As shown in table 1, the majority of participants were female (82.5%), and the predominant age group was 23–25 years (62.7%). This indicates a relatively young cohort, reflective of undergraduate-level academic enrollment.

Table 1. Demographic Characteristics of Participants (n = 126).

Variable	Description	No	%
Gender	female male	104 22	82.5 % 17.5 %
Age	20 to22 23 to 25	47 79	37.3 % 62.7 %
History Of Postural Deformity	No	126	100%
History Of Upper Back Injury	No	126	100%

Device usage and study behaviors were also investigated to identify possible risk factors. According to table 2, the majority of students (89.7%) reported frequent use of mobile phones, while smaller percentages used laptops (9.5%) or desktop computers (0.8%). Regarding study duration, 30.1% reported studying for 2–4 hours per day, and 25.4% for more than 6 hours daily. Most participants (85%) experienced varying levels of pectoral stiffness during studying. Pain was most commonly localized to the neck (43.7%), followed by the upper back (16.7%), shoulders (13.5%), and multiple areas (7.9%). Notably, 57.7% of students reported taking no treatment for pain, while 30.2% used painkillers and only 11.1% received physical therapy. The type of pain was reported as intermittent by 69%, continuous by 12%, and absent by 19%.

Table 2. Behavioral, Study Habits, and Pain Characteristics of Participants (n = 126).

Variable	Description	No	%
Frequently used gadget	phone laptop computer	113 12 1	89.7% 9.5% 0.8%
Number of study hours per day	1 to 2 2 to 4 4 to 6 more than 6	22 38 34 32	17.5% 30.1% 27% 25.4%
Stiffness in Pectoral muscle while studying	mild moderate severe	107 17 2	85% 13.5% 1.5%
In which area do you feel pain the most?	Neck Shoulder Upper back All of the above No pain	55 17 21 10 23	43.7% 13.5% 16.7% 7.9% 18.2%
The Kind of Pain While Studying\ Using Electronic Devices	Continuous intermittent no pain	15 87 24	12% 69% 19%
When you feel pain in shoulders/head and upper back what do you do?	No treatment Physical therapy Pain killers	74 14 38	57.7% 11.1% 30.2%

In terms of symptom prevalence, the findings demonstrate a significant burden of musculoskeletal discomfort among participants. As summarized in table 3, approximately 73.8% of students reported experiencing headaches after prolonged studying or use of electronic devices. Additionally, 50.8% reported tightness in the neck, and a notable 89.8% experienced pain while studying in inappropriate postures. Furthermore, 67.5% of students indicated the need to support their neck, head, or upper back during academic tasks involving electronic device use, suggesting the potential development of UCS patterns.

Table 3. Musculoskeletal Symptoms Among Participants (n = 126).

Variable	Description	No	%
Tightness Around The Neck	Yes No	64 62	50.8% 49.2%
Pain When Studying In Inappropriate Body Position	Yes No	113 13	89.8% 10.3 %
Headaches After Studying\ Using Phone or Other Devices	Yes No	93 33	73.8% 26.2%
Need Support Neck\ Head\ Upper Back While studying or using Electronic Devices	Yes No	85 41	67.5% 32.5%

Physical examination outcomes revealed structural postural deviations consistent with UCS. As shown in table 4, only 54% of participants maintained a normal head posture (where the head touched the wall in the wall-and-ruler test), while 46% demonstrated forward head posture, with some showing a distance exceeding 6 cm between the wall and the back of the head. Rounded shoulders were present in 44.4% of participants based on the thumb test, and 34.1% reported restricted neck movement flexion, extension, lateral flexion, and rotation, highlighting varying degrees of movement limitations consistent with UCS-related musculoskeletal imbalances.

Table 4. Physical Assessment for UCS Among Participants (n = 126).

Variable	Description	No	%
Head posture(wall and ruler)	touch wall Does not touch	68 58	54% 46%
Shoulder posture	Erect Rounded	70 56	55.6% 44.4%
move neck up/down or to one side, have any restriction in movement?	Yes No	43 83	34.1% 65.9%

To assess statistical associations between key variables, Chi-square tests were applied. As presented in table 5, there was a significant association between the type of frequently used electronic device and the type of pain experienced during study or device use ($\chi^2 = 9.961$, df = 4, p = 0.041). This suggests that device type may influence pain patterns.

Table 5. Association Between Frequently Used Device and Type of Pain (Chi-square Test, n = 126).

	Value	df	Asymptotic Significances(2-sided)
Pearson Chi-Square	9.961[a]	4	.041
Likelihood Ratio	9.539	4	.049
N of Valid Cases	126		

[a] .5 cells (55.6%) have expected count less than 5. The minimum expected count is 11.

Similarly, as shown in table 6, a significant association was found between neck tightness and the type of pain experienced ($\chi^2 = 12.796$, df = 2, p = 0.002), indicating that students with reported neck tightness were more likely to experience intermittent or continuous pain.

Table 6. Association Between Neck Tightness and Type of Pain (Chi-square Test, n = 126).

	Value	df	Asymptotic Significance(2-sided)
Pears on Chi-Square	12.796[a]	2	.002
Likelihood Ratio	13.664	2	.001
Linear-by-Linear Association	9.310	1	.002
N of Valid Cases	126		

[a] .0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.89.

DISCUSSION.

Upper Cross Syndrome (UCS) is a prevalent musculoskeletal condition characterized by muscular imbalances in the head, neck, and shoulder regions, often resulting in postural disturbances and discomfort [1]. This study aimed to determine the prevalence and associated factors of UCS among physiotherapy students at the University of Tripoli. A total of 126 participants were assessed between June and September 2024, representing approximately 42% of the total student population . The sample predominantly consisted of female students (82.5%), with the majority aged between 23 and 25 years (62.7%). All participants met the inclusion criteria, which required the absence of prior musculoskeletal injuries or structural deformities.

The majority of participants (89.7%) reported frequent smartphone use, and many reported extended daily study periods—30.1% for 2–4 hours, 27% for 4–6 hours, and 25.4% for more than six hours. These behaviors are significant contributors to UCS development due to prolonged static postures and repetitive musculoskeletal strain. Notably, data collection coincided with the final examination period, a time of high academic stress and increased study hours, which may have temporarily elevated symptom prevalence and postural deviations. This timing should be considered when interpreting prevalence rates, as they may not fully represent baseline conditions. This pattern aligns with the educational structure of the Department of Physiotherapy , which adopts an open semester system consisting of 14 academic weeks. This system includes midterm examinations, submission of assignments and periodic reports, followed by a two- to four-week final examination period covering both theoretical and practical components. Students in the department rely heavily on electronic learning platforms, often forming online communication groups with academic advisors and course coordinators for discussion and academic support. Additionally, a large proportion of students frequently download electronic lecture materials and scientific references for continuous access and study, which further contributes to prolonged screen time and sedentary study habits. For comparison, Javed (2022) [13] reported 83.9% smartphone usage and only 2.95% studying more than six hours among medical students, indicating a higher prevalence of these risk factors in our cohort. UCS diagnosis was confirmed through neck range of motion (ROM) measurements, wall-and-ruler assessment for forward head posture, and the thumb test for rounded shoulders. Approximately 50.8% of students reported neck tension, 85% experienced mild pectoral muscle stiffness, and 46% demonstrated forward head posture. The prevalence of forward head posture was slightly lower than Shahid et al. (2016) [11], who reported 56%, possibly due to differences in participant behavior and posture awareness.

Rounded shoulders were present in 44.4%, and 43.7% experienced neck pain, with 34.1% showing ROM restrictions in flexion, lateral flexion, and rotation. These values are comparable but slightly higher than those reported by Javed (2022) [13], possibly due to increased sedentary behaviors and poor posture over time. Our data also revealed that 73.8% experienced headaches related to study or electronic device use, 69% reported intermittent

pain, and 89.7% associated pain with poor posture during study sessions. Despite these symptoms, 57.7% did not seek treatment, 30.2% took painkiller medication, and only 11.1% underwent physiotherapy, which is concerning given the high prevalence of symptoms and the potential benefits of early intervention.

The high prevalence of symptoms—such as headaches (73.8%) and pain associated with studying in inappropriate postures (89.7%)—highlights the clinical significance of UCS in this population. Despite the notable symptom burden, 57.7% of participants did not seek any form of treatment, and only 11.1% utilized physiotherapy services. Furthermore, 67.5% of students reported the need to support their neck, head, or upper back while studying or using electronic devices. This low rate of engagement with therapeutic interventions is concerning, as early physiotherapeutic management is crucial for preventing the progression of UCS to more serious musculoskeletal deformities.

A comparative study by Mubeen et al. (2016) [10], conducted among medical students at the University of Lahore, reported that 52.1% of participants experienced difficulty stabilizing their necks and expressed a need to support their heads and upper backs during academic activities. Additionally, 66.8% of the students adopted poor and ergonomically inappropriate study postures. These findings are consistent with the current study, in which 67.5% of participants reported the need for neck, head, or upper back support while studying or using electronic devices, and 89.7% experienced pain associated with poor posture. The higher prevalence observed in the present study may reflect changes in academic demands, increased reliance on digital devices, and the intensification of sedentary behaviors in recent years. However, methodological considerations should be noted. The reliance on self-reported questionnaires may have introduced response bias, with symptomatic students potentially more likely to participate or overestimate their symptoms. Moreover, Cultural and environmental factors, such as limited ergonomic awareness, heavy reliance on smartphones and laptops, and restricted access to preventive physiotherapy services, may further contribute to the elevated rates of UCS.

To assess statistical associations between behavioral and physical factors, Chi-square tests were employed. A significant association was observed between the type of frequently used electronic device and the type of pain experienced during study or device use ($\chi^2 = 9.961$, df = 4, p = 0.041), as shown in table 5. This implies that certain devices may contribute more significantly to pain symptoms, likely due to differing postural demands or viewing angles. Furthermore, as shown in table 6, a strong association was found between neck tightness and pain type ($\chi^2 = 12.796$, df = 2, p = 0.002), suggesting that muscular tension in the cervical region is a key predictor of intermittent or persistent discomfort.

These findings align with those reported by Javed et al. (2022) [13], who found high rates of smartphone use (83.9%) and neck pain (36.07%) among medical students at the Women Medical College in Abbottabad. However, our study reports a slightly higher rate of neck pain and forward head posture, potentially due to increased digital device dependence, educational workload, or differences in ergonomic awareness. Notably, our use of inferential statistics adds an important dimension to the literature, providing evidence-based links between digital behavior and musculoskeletal symptoms.

The present study reveals a high prevalence of UCS among physiotherapy students at the University of Tripoli underscores the influence of multiple interrelated behavioral and physical factors. Chief among these are prolonged smartphone use, extended study durations, and sustained static postures—especially those adopted during periods of academic stress. These habits contribute to muscle imbalances, including tightness in the pectoral and cervical muscles, forward head posture, and rounded shoulders, which are hallmark features of UCS. Furthermore, the lack of ergonomic awareness, limited engagement in physical activity, and insufficient access to or utilization of physiotherapy services exacerbate the development and persistence of symptoms such as neck pain, headaches, and range of motion limitations. The significant associations observed between device type, pain patterns, and neck tightness further affirm the role of modern lifestyle and academic practices in predisposing students to UCS. These findings highlight the urgent need for targeted preventive measures, including ergonomic training, awareness campaigns, and early physiotherapeutic interventions, to address the root causes and reduce the burden of UCS in academic environments. Educational training programs on proper posture and ergonomic study habits should be included in university curricula to help reduce the prevalence of Upper Cross Syndrome among students.

CONCLUSION.

This study demonstrates a high prevalence of Upper Cross Syndrome among physiotherapy students at the University of Tripoli during the data collection period, which is associated with prolonged smartphone use and extended study hours. Common postural deviations included forward head posture, rounded shoulders, and neck-related symptoms, yet most students did not seek treatment. These findings highlight the urgent need for preventive strategies, particularly through structured ergonomic training. Such training should combine awareness workshops, practical sessions on posture correction and strengthening exercises, and integration of ergonomic education into the

undergraduate curriculum. Future research should employ more objective assessment tools and address broader biopsychosocial factors to improve diagnostic accuracy and intervention planning.

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