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Exploring the Association Between Internet Addiction and Upper Cross Syndrome in University Students: A Scoping Review

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ABSTRACT

Background: The increasing prevalence of Internet Addiction (IA) among university students raises critical concerns about its physical health impacts, particularly musculoskeletal disorders such as Upper Cross Syndrome (UCS). Postural abnormalities and muscle imbalances are hallmarks of UCS, which are frequently made worse by extended usage of devices in non-ergonomic postures.

Objective: This scoping review's objectives are to provide an overview of the literature on the connection between IA and UCS, point out any gaps, and make recommendations for further study.

Methods: Using a systematic review process, Web of Science, PubMed, Scopus, and Google Scholar databases were searched. Studies that focused on university students and subjects pertaining to IA, UCS, or similar musculoskeletal disorders were chosen utilizing strict inclusion criteria.

Results: Only one of the 20 pertinent papers that the review found directly examined the connection between IA and UCS and found a significant correlation. Indirect evidence from the remaining trials connected IA to poor posture, extended periods of inactivity, and a higher risk of musculoskeletal pain. The influence of forward head posture, static postures, and psychological stress associated with IA were among the important processes found.

Conclusion: The results highlight the critical need for intervention-based and longitudinal research to investigate causal links and successful preventative measures. The review also emphasizes how crucial it is to include programs for physical exercise and ergonomic education in attempts to mitigate the negative effects of IA on physical health. Thorough studies in these fields will provide the door to focused treatments aimed at reducing UCS risks and enhancing college students' quality of life.

Keywords: *college students, cross-sectional study, internet addiction, upper cross syndrome*

1. INTRODUCTION

Internet usage has skyrocketed globally, with over 2.5 billion active users, most of whom are teens and young adults (Younes et al., 2016). Because computer networks are so widely used, individuals are using them more regularly due to the ease and amusement they provide. As a result, more and more people have developed an online addiction in recent years (Liang et al., 2022). Even though the internet is useful for socializing, learning, and entertainment, excessive or unrestricted use can result in internet addiction (Zhang et al., 2023). Excessive internet use is defined as usage that is so time-consuming, unmanaged, and excessive that it becomes permanent and significantly disrupts people's lives (Younes et al., 2016). Usually, one defines internet addiction as the incapacity to control one's Internet consumption, including any obsessive behavior related to it. This condition eventually results in significant distress and functional impairment in day-to-day functioning. A maladaptive pattern of internet use that results in suffering or impairment that is clinically substantial is what defines internet addiction. The terms "problematic internet use," "pathological internet use," and "internet addiction" are commonly used to describe internet dependency(Younes et al., 2016).

A meta-analysis of 113 epidemiologic studies, including 693,306 individuals, found that the average prevalence of internet addiction (IA) was 7.02% and increased over time (Liang et al., 2022). Compared to Western countries, East Asian countries have a greater prevalence of IA (Liang et al., 2022). India is the second-largest country after China, with an estimated 300 million Internet users as of 2014 (Internet in India INTERNET IN INDIA 2013, n.d.).

The prevalence of Internet usage among college students is directly correlated with the symptoms of Internet addiction. This is due to the fact that college students can use the Internet to meet their demands in terms of social connections, daily life, and studies. Internet addiction and psychological independence are inevitable outcomes of this fulfillment (Zhihao et al., 2024). According to Yiman Liu's (2021) meta-study analysis, the detection rate of Internet addiction among college students during the epidemic was 32.4%, whereas the detection rate between 2011 and 2018 ranged from 10.2 to 13.2% (Zhihao et al., 2024).

Similar to many other Western countries, nearly all teens in Switzerland between the ages of 12 and 19 (98%) own a mobile phone, with smartphones making up the majority of these devices (97%) (Haug et al., 2015). According to one research of 164 college students in the US, women reported using their phones for much longer than men did each day, with the most time-consuming activities being texting, emailing, and using social media (Haug et al., 2015). Furthermore, 79 young individuals in Korea participated in a study that showed a stronger correlation between smartphone addiction and frequency of use than duration of use. Furthermore, a different Korean study of 197 individuals found that those with less education had a higher likelihood of being addicted to smartphones (Haug et al., 2015). According to the most current results of a research conducted in the United States, 46% of smartphone users say they "cannot live without" their device (Ahmed et al., 2022).

The Internet has developed into a vital resource for communication, education, entertainment, and information exchange. Social networking and easy access are only two of the many features of the Internet that encourage compulsive behavior. Studies conducted in both Asian and Western cultures indicate that young people are becoming more susceptible to Internet addiction. More than most other groups in society, college students are particularly susceptible to becoming dependent on the Internet. Time availability, user-friendliness, unrestricted Internet access, young adult psychological and developmental characteristics, and minimal to nonexistent parental supervision, the implicit, if not explicit, expectation of Internet/computer use—since some courses rely on the Internet for everything from homework and projects to peer and mentor communication—and the Internet's ability to provide a means of escaping exam stress are some of the factors that contribute to this, making excessive use of the Internet a major source of worry for parents and educators (Krishnamurthy & Chetlapalli, 2015).

One cross-sectional study implies that discontent with one's body could be related to the internet addiction of college students. Another study discovered a direct link between the emergence of neck disorders brought on by bad posture and smartphone addiction, which entails excessive internet use (Zhang et al., 2023). Often referred to as Cervical Crossed Syndrome or proximal/shoulder girdle cross syndrome, Upper Cross Syndrome (UCS) is a frequent muscular imbalance that affects the head, neck, and shoulder region. It displays a common postural disturbance that is typically observed in people who use laptops, desktop computers, tablets, and other comparable devices while working at a table, as well as in those who use mobile phones and sit for extended periods of time in misaligned body positions, such as when reading, driving, or watching television. It usually refers to a hypothetical "X" that is drawn through a person's shoulder and cervicothoracic region. Muscles that are short or overly facilitated are shown by one line of the cross, whereas muscles that are long or overly inhibited are indicated by the other line (Javed et al., 2022). A predictive pattern of alternative tightness and weakness of the neck's upper trapezius, pectoralis major, levator scapulae, rhomboids, serratus anterior, and deep flexors—especially the scalene muscles—caused by bad work habits, improper body ergonomics, or low self-esteem is known as Upper Cross Syndrome (UCS). Particularly at the atlantooccipital joint, C4-5 area, cervicothoracic joint, glenohumeral joint, and T4-T5 bit, this instance of unevenness results in joint brokenness (Shahid et al., 2015).

Postural abnormalities in upper crossed syndrome are caused by imbalances in the opposite set of muscles. This bad posture leads to some forward shoulder postural patterning, increased kyphosis, forward head posture, and loss of cervical lordosis. The upper portion of the body experiences general pattern changes as a result of these anomalies. This pattern alteration results in strain on the shoulder blades and shoulder muscle attachments, giving the impression of a rounded shoulder. While extended use of this position does not always result in pain, people frequently experience neck and upper back pain. A forward head position while seated results in rounded shoulders, flexion of the lower cervical area, and extension of the upper cervical region. These postures generally shorten muscle fibers, which causes extensor torque around the upper cervical region's joints. This aberrant state leads to a number of musculoskeletal problems, such as increased internal rotation, anterior tilt, and decreased scapular upward rotation, which further makes it harder to maintain upright posture. Upper crossed syndrome is what happens when forward head position and rounded shoulders occur at the same time (Chandarana et al., 2022).

In our technologically advanced society, upper cross syndrome (UCS), which causes headaches, shoulder and upper back issues, and neck pain, is more common than ever. Upper Cross Syndrome is most likely to occur in people who have sedentary lives. Headaches, typically centered around the occipital region of the head, neck or cervical pain, strained neck muscles, upper back pain and tightness, limited and somewhat restricted range of motion in the neck, cervical, or shoulders, and upper limb numbness, tingling, and pain are the most common complaints that arise. Bachelor's degree students frequently experience UCS, which may be brought on by a lot of study time, a slack lifestyle, or stress related to school. Restrictions in physical motions are directly related to the weakening and tightness of various body parts, including the upper back, shoulders, and cervical region, which connects the upper and lower sides of the body (Ahmed Khan et al., 2024).

According to a 2016 study of University of Lahore medical students, upper cross syndrome is linked to related deficits and bad posture. They found that 66.8% of participants had to adjust to a bad study posture, and 48.7% of individuals reported having neck pain. Additionally, it was noted that the UCS subjects had some connection to bad posture. They engaged in activities that caused them to adopt a high-energy posture, which led to UCS; as a result, the participants' prevalence of the corresponding ailment was determined to be 37.1%. In 2015, a second survey was created to determine the prevalence and risk factors for Upper-Crossed Syndrome (UCS) development among University of Lahore DPT students. According to the study's findings, out of the 244 participants, 30–40 had substantial thoracic area discomfort, stooped posture, prolonged shoulders, and cervical region pain. They were also at a higher risk of developing Upper Cross Syndrome (Javed et al., 2022).

Because of the necessity of maintaining an aberrant posture for lengthy periods of time, skeletal muscle pain can occur as a result of changes in muscle tone and elevated intracellular pressure. One of the factors contributing to the body's inability to maintain proper posture is the exhaustion brought on by prolonged internet use (Zhang et al., 2023).

Individuals who spend a lot of time in sedentary situations, like using computers or smartphones, are more likely to get UCS. UCS is more likely to develop among college students who rely significantly on technology for social and academic goals. Because students usually use their devices in improper ergonomic positions that place needless strain on their upper bodies, long-term poor posture from using digital devices is a significant contributing factor to the development of UCS (Chandarana et al., 2022).

The posture that people who use the internet excessively assume is the main factor contributing to the correlation between UCS and online addiction. Numerous studies have looked into the connection between musculoskeletal health and internet addiction, emphasizing how poor posture during prolonged online use contributes to the emergence of conditions like UCS.

This scoping review focus to investigate potential associations between internet addiction and the risk of UCS in college students by exploring available literature.

2. RESEARCH EVIDENCE AND STUDIES

Zhang et al. examined internet addiction (IA) and Upper Cross Syndrome (UCS) in Chinese college students in a cross-sectional study. Using standardized instruments, moderate-to-severe IA was connected to UCS risk due to poor posture, prolonged sitting, and muscular imbalances. The study recommends early screening and posture teaching, although its cross-sectional design and self-reported data are drawbacks.
In Chinese students, Liang et al. evaluated cross-sectional and prospective correlations between IA and weariness. IAT and FSS data demonstrated that IA is significantly associated with current and future weariness, influenced by interrupted sleep, sedentary activity, and mental strain. Despite self-reporting and follow-up constraints, the study recommends digital use and time management instruction.

An observational study by Chandarana et al. found that poor posture, muscle imbalances, and excessive gadget use contribute to Upper Crossed Syndrome (UCS) among college students. Many subjects had UCS symptoms, linking sedentary behavior and ergonomic ignorance to postural dysfunction. Early posture education and physiotherapy were stressed in the study.

This cross-sectional study examined smartphone addiction and upper limb musculoskeletal diseases (ULMSDs) in Saudi university students during COVID-19. Neck, shoulder, and arm pain were common due to excessive smartphone use, poor ergonomics, and static postures. Despite not being investigated, UCS symptoms matched its traits. Ergonomics and digital hygiene are recommended by the study.

Malaysian university students were investigated for MSDs and smartphone addiction by Hua et al. A cross-sectional study of 226 people found that 82.3% had an MSD, with the neck being most impacted. The study found a clear link between smartphone addiction and bodily discomfort. To lower MSD risks, it recommends ergonomic education and behavior adjustments.

Smartphone addiction and musculoskeletal discomfort in 326 college students from Bangladesh and India were examined in this cross-sectional study. The study demonstrated a strong association between higher addiction scores and neck, shoulder, elbow, and hand pain using validated scales such SAS-SF, SPADI, NDI, OES, and CHDQ. Regional differences highlighted cultural and ergonomic impacts. Authors recommend screen time moderation and posture treatments.

P. V. and Vishwanath examined college students' Upper Crossed Syndrome (UCS) prevalence and the effects of screen usage and inactivity. They found UCS to be common by assessing postural signs, correlating bad posture and muscle imbalances to tech use. The study recommends early ergonomic education and remedial exercises to reduce long-term effects. This cross-sectional study studied smartphone addiction and musculoskeletal pain in 249 18–24-year-olds. Using the Smartphone Addiction Scale (SAS) and modified Nordic Musculoskeletal Questionnaire, addiction was connected with neck (62.2%), upper back (65.6%), and wrists/hands (61.0%) discomfort. Long-term smartphone use increased addiction and pain. Chronic pain can be prevented by improving posture and tech use, according to the study.

To analyze internet addiction prevalence and consequences, Xu et al. studied approximately 2,000 adolescents in Macau and

mainland China. About 23% were addicted, with greater proportions among men and the poor. Internet addiction was substantially associated to lower emotional, social, and physical quality of life. The study found that sedentary behavior and bad posture may increase the incidence of physical problems, but musculoskeletal effects were not investigated. The authors recommend integrated mental-physical health interventions.

Internet addiction (IA) and its psychological repercussions were examined in 550 medical students in Lebanon by Younes et al. The YIAT, ISI, DASS-21, and RSES showed that 16.8% of students were at risk for IA, with severe stress, anxiety, depression, sleeplessness, and low self-esteem. The report stresses the psychological toll of internet addiction and recommends for university health program mental health interventions.

Internet addiction (IA) prevalence and risk variables were examined in 1,200 Bengaluru college students in this cross-sectional study. Young's Internet Addiction Test (YIAT) showed that 34.7% of participants had moderate to severe IA, with greater rates among men, urban inhabitants, and those using the internet daily, especially for social media and gaming. Although the study did not assess physical results, it implies a strong link between IA and postural disorders such as Upper Crossed Syndrome (UCS) caused by sedentary behavior and poor ergonomics. The authors stressed the importance of digital wellness education, ergonomic training, and exercise breaks to reduce mental and musculoskeletal health concerns from excessive internet use.

Overview of Relevant Studies on Internet Addiction and Postural Dysfunction (Refer to Table No. 1)

Table 1: Overview of Relevant Studies on Internet Addiction and Postural Dysfunction

Author Name and Year of Publication	**Title of Paper**	**Findings**	**Gaps**
Chaowei Zhang et.al (2023)	Association between internet addiction and the risk of upper cross syndrome in Chinese college students A cross sectional study	According to this cross-sectional study, Chinese college students who had severe IA were more likely to develop UCS.	Future studies with prospective cohorts or other interventional studies will be required to investigate the causal relationships between IA and UCS.
Siyu Liang, et.al (2022)	Cross-sectional and prospective association between internet addiction and risk of fatigue among Chinese college students	According to the study's findings, Chinese college students' risk of weariness is positively correlated with their IA.	To investigate the causation behind IA's effects on weariness, more research is required.
Pratik Chandarana et.al (2022)	Prevalence of Upper Crossed Syndrome in College Going Students - An Observational Study	College students run the danger of developing bad posture, which may eventually result in upper cross syndrome.	should take action to improve postural awareness in individuals of all ages, particularly students.
Mohamed Sherif Sirajudeen et.al (2022)	Prevalence of Upper Limb Musculoskeletal Disorders and Their Association with Smartphone Addiction and Smartphone Usage among University Students in the Kingdom of Saudi Arabia during the COVID-19 Pandemic—A Cross-Sectional Study	The frequency of MSDs in the upper limb and smartphone obsession showed a clear link.	The cross-sectional aspect of the research technique applied in this study did not allow one to confirm a causal link between relevant variables and MSDs in the upper limbs.
Erna Faryz et.al (2022)	Prevalence of Musculoskeletal Disorders (MSD) and Smartphone Addictions Among University Students in	The neck area was reported to be uncomfortable by over 60% of subjects.	It is recommended that more research be done to examine the factors that are linked to both smartphone addiction and MSD.

	Malaysia		
Sohel Ahmed (2022)	Smartphone addiction and its impact on musculoskeletal pain in neck, shoulder, elbow, and hand among college going students: a cross-sectional study	Among the participants, 69.2% were moderate to severely addict to their smartphones and reported neck pain and shoulder pain	This study is conducted only in two centers in two countries that might not be the representative of whole nation. In the future, nationwide cohort study can be done to find the best results.
Mohamed Sherif Sirajudeen et. Al (2022)	Prevalence of text neck posture, smartphone addiction, and its association with neck disorders among university students in the Kingdom of Saudi Arabia during the COVID-19 pandemic	The neck disorders were more prevalent among participants who reported smartphone-addiction/overuse	The cross-sectional character of the study design followed in the present research could not prove a causal link between the related variables and neck problems.
Rustem Mustafaoglu et.al (2021)	The relationship between smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study	The duration of smartphone use on a typical day is associated with increased risk of neck, shoulder, and wrist/hand musculoskeletal pain. long-term smartphone ownership is associated with increased risk of neck and wrist/hand musculoskeletal pain.	Further study needs to be carried out on a larger cohort for more generalizable results, representing the whole population. Furthermore, attention should be directed towards the safe use of technology and increasing public awareness of the hazards of excessive and potentially problematic smartphone use.
Dan-Dan et.al (2020)	Internet addiction among adolescents in Macau and mainland China: prevalence, demographics and quality of life	IA is common in Chinese adolescents, especially in Macau. Given the negative impact of IA on health outcomes and quality of life.	Some potentially confounding factors were not examined in this study, such as physical diseases and physical exercise.
Jingyu Zhang et.al (2019)	Association between internet addiction and the risk of upper cross syndrome in Chinese college students A cross sectional study	This cross-sectional study indicates that severe IA is associated with higher risk of UCS.	In future research, it will be necessary to explore the causative links between IA and UCS with prospective cohort or other interventional studies
Farah Younes (2016)	Internet Addiction and Relationships with Insomnia, Anxiety, Depression, Stress and Self-Esteem in University Students: A Cross Sectional Designed Study	Significant correlations were found between potential IA and insomnia, stress, anxiety, depression and self-esteem	the findings observed in this study are important and warrant further investigations.
Krishnamurthy et.al (2015)	Internet Addiction: Prevalence and Risk Factors: A Cross-Sectional Study among College Students in Bengaluru, the Silicon Valley of India	Internet addiction is a prevalent public health issue, having multiple risk factors and varied patterns of Internet use, in a place where the Internet is	The need of the hour is to create awareness among the public, plan public health policies with regard to this behavioral addiction, and conduct further research to

		becoming an inclusive component of an individual's personal and social life.	support the same

3. METHODOLOGY

3.1 Research Design

The objective of this scoping review is to explore and map out the association between internet addiction (IA) and upper cross syndrome (UCS) in university students, in existing available literature.

3.2 Search strategy

Several internet databases, such as, cohrane, Web of Science, PubMed, and Scopus, were used to conduct a comprehensive literature search.
The following keywords were included in the search terms:

"Internet Addiction", "Upper Cross Syndrome", "University Students", "Postural Disorders", "Musculoskeletal Pain"

3.3 Eligibility criteria

To guarantee relevance and consistency, the selection of studies for this evaluation was driven by particular eligibility criteria. Due to their academic and lifestyle habits, university students between the ages of **18 and 26** were included in the demographic of interest since they are the most likely to suffer from postural disorders and internet addiction. The standardized **Internet Addiction Test (IAT)**, which offers a trustworthy indicator of the degree of internet dependency, was used to evaluate internet addiction, the exposure under consideration. The existence of Upper Cross Syndrome (UCS), a musculoskeletal disorder marked by **postural abnormalities** frequently associated with sedentary behavior and prolonged screen time, was the outcome assessed in the included research. Additionally, in order to preserve clarity and guarantee appropriate interpretation of results, only research **published in the English language** was taken into consideration.

Inclusion criteria

i. Research published in English.
ii. Studies focusing on internet addiction, upper cross syndrome or their association.
iii. Studies involving college or university students.
iv. Cross-sectional and observational studies.

Exclusion criteria

i. Studies not published or available in English language.
ii. Studies not focusing on internet addiction, upper cross syndrome or their association.
iii. Studies not involving college, university students or young adults.

Study selection procedure

The PRISMA flowchart was used to document the screening process. Studies were included if they evaluated IA and postural outcomes, excluding those focused solely on non-university populations. (Refer to Figure 1.)

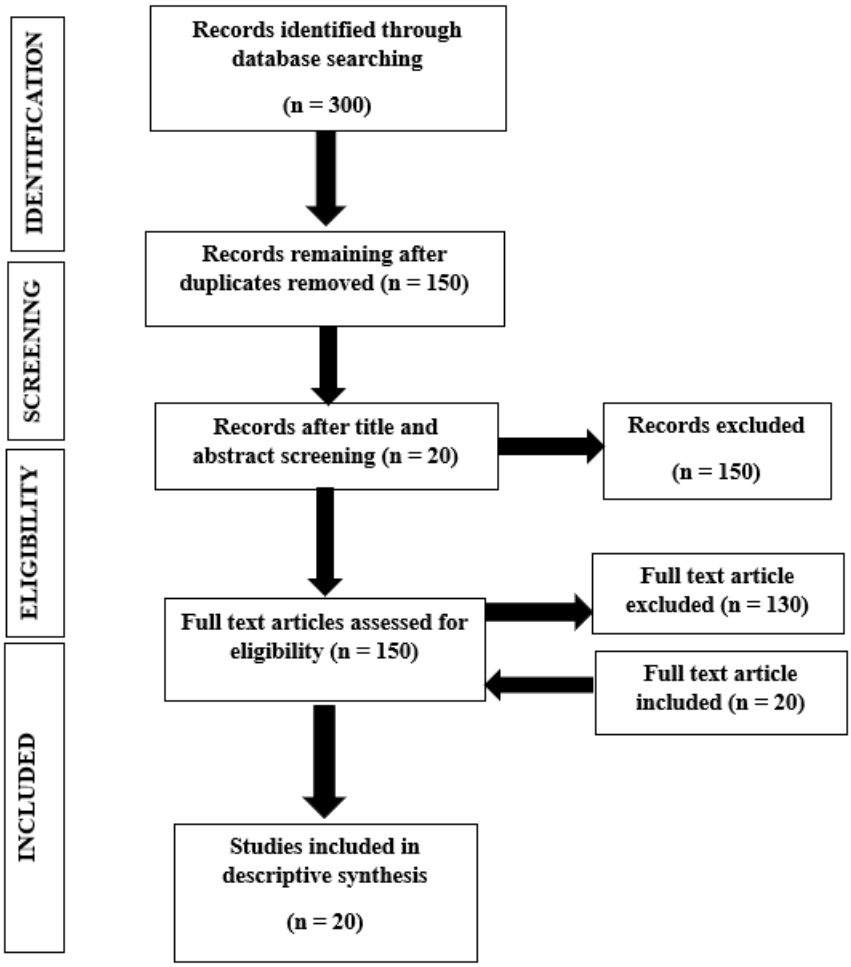

Figure 1: PRISMA Flow Diagram Representing the Selection Process of Studies Included

4. OVERVIEW OF INCLUDED STUDIES

Out of 300 initial articles, 20 met the inclusion criteria. These studies can be categorized into three themes:

4.1 Direct Association Between IA and UCS: Zhang et al.'s (2023) cross-sectional study is the most direct and important contribution to our understanding of Internet Addiction (IA) and Upper Cross Syndrome. No other study specifically explores the direct association between the two situations in college students. The researchers used the Internet Addiction Test (IAT), a recognized and popular exam that classifies people by internet use intensity, to assess online addiction. In addition, UCS-specific postural anomalies such as rounded shoulders, forward head posture, and greater thoracic kyphosis were examined.

There was a statistically significant correlation between internet addiction and UCS-like postural dysfunctions. Students moderately to profoundly hooked to the internet had greater cervical and shoulder muscular imbalances. UCS biomechanical alterations include weakening of the deep neck flexors and lower scapular stabilizers and rigidity of the pectoral and upper trapezius muscles, which are consistent with postural problems.

Zhang et al. found that excessive internet use and screen time induce poor ergonomics and stagnant sitting postures, which led to musculoskeletal strain and UCS. The study found that teenagers with severe IA rarely exercise and spend a lot of time in the same position, which increases joint strain and muscular imbalance. In conclusion, the study underlines the importance of early detection and intervention for young people with internet addiction symptoms and the dangers of digital device reliance.

This study proves IA has physical health repercussions, not just behavioral or psychological ones. A multidisciplinary strategy involving mental health, ergonomics, and physiotherapy is needed to treat internet addiction and postural anomalies such Upper Cross Syndrome (Zhang et al., 2023).

4.2 IA and Musculoskeletal Disorders: Recent research has shown how smartphone addiction affects students' musculoskeletal health. Mustafaoglu et al. (2021) examined smartphone addiction with neck and shoulder musculoskeletal discomfort. Smartphone addicts reported greater shoulder girdle and cervical spine pain, strain, and

discomfort. The researchers attributed these symptoms to prolonged smartphone use, which often causes a forward-head posture, rounded shoulders, and static hand positioning, which leads to joint tension, muscular fatigue, and poor postural alignment (Mustafaoglu et al., 2021).

Hua et al. (2022) examined the postural impact of musculoskeletal disorders in smartphone-dependent students, supporting similar findings. The study evaluated how daily smartphone use affects young people's posture and body mechanics. Smartphone-addicted pupils had extended shoulders, forward head posture, and increased thoracic kyphosis, all signs of early postural disorders. These structural changes may be caused by prolonged sitting or slouching when using mobile devices, typically without exercise or ergonomic awareness (Hua et al., 2022).

The two studies show that young digital gadget addiction is a major public health issue. They emphasize how smartphone addiction impacts mental and physical health, particularly the musculoskeletal system. Smartphone use repeatedly strains muscles, especially the upper body, increasing the risk of Upper Cross Syndrome (UCS) and producing persistent pain and weariness. These findings emphasize the importance of early physiotherapeutic intervention, digital health, and posture teaching in schools to prevent musculoskeletal issues.

4.3 Posture and gadget Usage: Digital technology's growing use and sedentary lifestyles have raised concerns about college students' musculoskeletal health. Chandarana et al. (2022) discovered that college students had high rates of Upper Cross Syndrome (UCS). The study found that long periods of sedentary behavior, notably using laptops, tablets, and telephones, were substantially linked to UCS. The study found that students who spent a lot of time slouching, especially while working or using screens, had UCS symptoms like rounded shoulders, forward head posture, and pectoral and upper trapezius muscle tightness. Long-term postural alterations cause structural stress and muscular imbalances in UCS (Chandarana et al., 2022).

According to Sirajudeen et al. (2022), students who used smartphones excessively had "text neck posture" more often. Long times spent staring at handheld devices with the head forward and downward is called "text neck," which strains the cervical spine and raises UCS risk. The survey found that students who use smartphones frequently had text neck posture. Along with musculoskeletal pain, many students had UCS-like postural abnormalities. The study found that extended neck flexion and lack of postural rest when using a smartphone may change cervical and thoracic structures (Sirajudeen et al., 2022).

Overall, these data suggest a substantial and disturbing relationship between sedentary digital activities and postural problems like UCS. They stress the importance of teaching college students correct posture, physical activity, and digital hygiene. These findings underline the need for early screening and preventative physiotherapy to limit the musculoskeletal risks of modern sedentary lifestyles, especially as smartphone and gadget use rises.

5. KEY FINDINGS

- **a.** IA raises the risk of UCS by promoting bad posture and extended periods of inactivity.
- **b.** Students' musculoskeletal problems are made worse by a lack of physical activity and ergonomic awareness.
- **c.** IA-related psychological stress may make physical health issues worse.

6. DISCUSSION

University students' growing dependence on digital gadgets has led to extended periods of sedentary behavior, which frequently causes people to hold still positions for extended periods of time. Muscle fatigue and stiffness brought on by this prolonged immobility foster the development of postural syndromes such as Upper Crossed Syndrome (UCS). One of the main features of UCS is the muscular imbalance, where some muscles, like the upper trapezius and pectorals, grow weaker and underactive while others, like the deep neck flexors and lower trapezius, get shorter and overactive. The forward head posture and rounded shoulder positions commonly used when using a computer or smartphone for lengthy periods of time aggravate these imbalances by continuously straining the cervical and thoracic spine. Students frequently neglect correct ergonomics because they are preoccupied with schoolwork or social media, which hastens the start of these postural issues. Furthermore, internet addiction (IA), which has grown more common in this demographic, has an indirect impact on musculoskeletal problems in addition to its effects on mental health. Increased muscle rigidity and persistent tension, especially in the neck and shoulder areas, are physical manifestations of the psychological effects of IA, which include anxiety, stress, and emotional tiredness. The chance of developing UCS is increased by this extra muscle strain as well as the mechanical stress caused by bad posture. Postural health is further deteriorated by students with high IA's propensity to avoid physical activity as a result of psychological burnout. Although these correlations point to an expanding public health issue, there are a number of issues with the existing research that must be resolved. First, it is difficult to prove a causal link between IA and UCS because the majority of the research that are currently available are cross-sectional in nature. To better understand the course and long-term effects of IA on musculoskeletal health, longitudinal studies that track students' postural changes and internet usage patterns over time are required. Second, despite the well-established detrimental effects of extended gadget use, relatively little research has been done on intervention techniques. To find workable alternatives, research on the efficacy of posture correction exercises, planned physical activity, ergonomic training, or computerized

reminders that trigger posture improvements is desperately needed. Third, despite data indicating that males and females may experience and react to IA and postural stress differently due to anatomical and behavioral differences, gender-specific analysis is frequently absent from the research currently in publication. For example, women could experience musculoskeletal pain at higher rates and might profit from specialized treatment. Future studies must thus take a thorough and multifaceted strategy that explores specific management and prevention techniques in addition to assessing the psychological and physical effects of IA. This will be crucial for creating student-centered health initiatives that try to lower the prevalence of UCS and encourage better digital practices in classroom settings.

7. CONCLUSION

The purpose of this scoping review is to advance our growing knowledge of the connection between university students' Upper Crossed Syndrome (UCS) and Internet Addiction (IA). Although early research offers important insights, the relationship between these two illnesses is still a relatively new field of study and is still quite fragmented and narrowly focused. There is a substantial study gap that directly connects IA to the onset or aggravation of UCS. Current studies have mostly concentrated on the psychological impacts of internet addiction and general physical postural problems linked to excessive screen usage. According to the reviewed research, IA, which is typified by extended durations of online activity and decreased physical activity, can result in bad postural habits such rounded shoulders and forward head posture, which are characteristics of UCS. Nevertheless, nothing is known about how much IA influences the severity or course of UCS. Without longitudinal data that may paint a more complete picture of cause and effect, the majority of research that are currently available are either cross-sectional or anecdotal. Closing these gaps is essential to creating all-encompassing preventative and intervention plans. Future study can better clarify the underlying mechanisms connecting IA to musculoskeletal disorders like UCS by carrying out more thorough and methodical investigations. The development of focused awareness campaigns, physiotherapy regimens, and ergonomic standards aimed at reducing the risks to one's physical health that come with internet addiction could be influenced by such study. In the end, closing these gaps will be crucial for legislators, educators, and healthcare professionals who want to encourage university students to adopt healthier lifestyles.

Abbreviations: IA = internet addiction, IAT = internet addiction test, UCS = upper cross syndrome.

Conflict of Interest: None to declare

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