

Prevalence and Associated Risk Factors of Tech Neck Syndrome Among Medical Students Using Digital Devices: A Cross-Sectional Study

Prevalence Of Neck Pain And Evaluate Its Association With Digital-Device Use

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ABSTRACT

Objective: To determine the prevalence of neck pain and evaluate its association with digital-device use, ergonomic practices, and Tech Neck Syndrome among undergraduate medical students.

Study Design: Descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the Anatomy Department, Rawal Institute of Health Sciences, Islamabad from 1st March 2026 till 30th May 2026

Methods: A descriptive cross-sectional study was conducted among 100 undergraduate medical students using a structured self-administered questionnaire. Information regarding demographic characteristics, digital-device use, ergonomic practices, physical activity, sleep duration, and neck-related symptoms was collected. Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics were presented as frequencies and percentages. Associations between neck pain and categorical variables were assessed using Pearson's Chi-square test or Fisher's exact test where appropriate. A p-value <0.05 was considered statistically significant.

Results: Among 100 participants, 48% reported neck pain and 51% reported no neck pain. Smartphones were the predominant device (97%). Significant associations with neck pain were observed for screen position ($\chi^2=111.102$, $p<0.001$), taking regular breaks ($\chi^2=35.015$, $p<0.001$), frequency of neck pain episodes ($\chi^2=17.921$, $p=0.001$), and neck and shoulder stiffness ($\chi^2=11.726$, $p=0.003$). No significant associations were observed for device type, daily screen time, purpose of use, posture, device position, back support, physical activity, sleep duration, mobile-phone use before sleep, or previous history of neck pain.

Conclusion: Neck pain was common among the medical students studied. Specific ergonomic factors, particularly screen position and taking regular breaks, were significantly associated with neck pain. Ergonomic awareness and healthy device-use practices should be encouraged.

Key Words: Tech Neck Syndrome, Neck Pain, Digital Devices, Ergonomics, Medical Students, Smartphone

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INTRODUCTION

The present study was conducted to determine the prevalence of neck pain and to assess its association with digital-device use, ergonomic practices and selected lifestyle factors among undergraduate medical students¹.

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Neck pain is a common musculoskeletal complaint that may affect individuals at different stages of life. Although it can begin during childhood or adolescence, its occurrence often follows a recurrent or episodic pattern throughout adulthood, similar to the clinical course observed with low back pain². Previous research among university and medical students has demonstrated a considerable burden of neck and musculoskeletal symptoms associated with digital-device use.³ Gao et al. identified multiple risk factors for neck pain among college students, highlighting the multifactorial nature of this condition in young adults.⁴ The epidemiology of neck pain is also well established in the general population, with multiple demographic, physical and psychosocial factors contributing to its occurrence.⁵ However, local evidence concerning digital-device-related neck symptoms among Pakistani medical students remains limited⁶. Ergonomic practices, including appropriate screen positioning and interruption of prolonged static activity, are potentially

modifiable factors that may be addressed through health education. Nevertheless, the relationship between individual device-use practices and neck pain may vary according to population characteristics, exposure patterns and study methodology².

Tech Neck Syndrome is commonly used to describe neck pain and musculoskeletal discomfort associated with prolonged forward-head posture during electronic-device use. Previous research has reported that Tech Neck Syndrome affects more than one-quarter of medical students, with most affected students experiencing mild degrees of neck-related disability. The same study identified significant associations between Tech Neck Syndrome and the use of multiple electronic devices, inadequate physical activity, and prolonged sedentary behavior⁷. Sustained cervical flexion may increase mechanical loading of the cervical region and place additional demands on the cervical and shoulder musculature. The frequent academic and recreational use of smartphones and other digital devices may therefore place medical students at particular risk of neck-related symptoms⁸.

The widespread use of smartphones, tablets, laptops and other digital devices has become an integral part of contemporary education, communication and entertainment. Medical students, in particular, rely extensively on digital devices for academic activities, online learning, information retrieval and social interaction⁹. Prolonged use of these devices, especially when accompanied by sustained cervical flexion and suboptimal posture, may contribute to neck pain and other musculoskeletal symptoms.

METHODS

A descriptive cross-sectional study was conducted among undergraduate medical students at the Rawal Institute of Health Sciences (RIHS), Islamabad, from March 2026 to May 2026. Participants were recruited using a convenience sampling technique. The study was conducted following institutional ethical approval.

Ethical approval was obtained from the Institutional Review Board (IRB) of the Rawal Institute of Health Sciences, Islamabad (Ref. No. RIHS/IRB/20/2026; dated 01 March 2026). All participants were informed about the purpose and procedures of the study, and written informed consent was obtained prior to participation. Participation was voluntary, and confidentiality of the collected information was maintained throughout the study.

Undergraduate medical students who regularly used digital devices for academic or recreational purposes and provided informed consent were eligible for inclusion. Students with a history of cervical spine trauma, congenital spinal deformities, inflammatory musculoskeletal disorders, or previous cervical spine surgery were excluded from the study.

Data were collected using a structured, self-administered questionnaire developed following a review of relevant literature, including the standardized Nordic Musculoskeletal Questionnaire framework. The questionnaire comprised sections addressing demographic characteristics, commonly used digital devices, average daily screen time, purpose of device use, sitting and working posture, screen position, ergonomic practices, level of physical activity, sleep duration, mobile phone use before sleep, previous history of neck pain, neck and shoulder stiffness, and other factors potentially associated with Tech Neck.

The primary outcome of the study was the presence of neck pain. Information regarding neck pain and other relevant musculoskeletal symptoms was obtained through participant self-report using the structured questionnaire.

The collected data were coded, entered, and analyzed using IBM SPSS Statistics, version 26. Descriptive statistics were used to summarize the study variables and were presented as frequencies and percentages. Associations between the presence of neck pain and categorical variables were assessed using Pearson's chi-square test. Fisher's exact test was applied where the assumptions for the chi-square test were not met. A two-sided p -value of <0.05 was considered statistically significant.

RESULTS

A total of 100 undergraduate medical students participated. Forty-eight percent reported neck pain and 51% reported no neck pain. Smartphones were the most commonly used devices (97%) shown in table 1. The most common daily screen-time category was 2–4 hours (40%), while social media (40%) and academic activities (38%) were the main purposes of use. Most participants reported using screens below eye level (71%), using devices while lying on the bed (43%), and using mobile phones before sleep (83%) figure 2. Neck and shoulder stiffness was reported by collecting different data 43% figure 1.

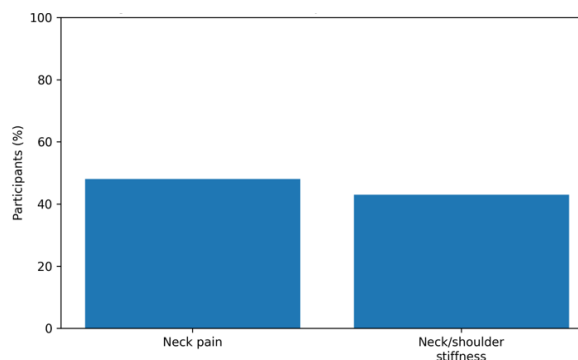
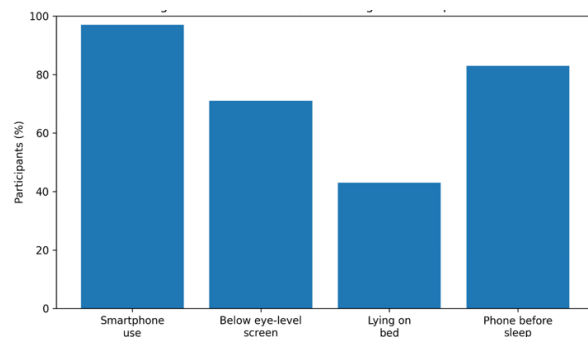


Figure No.1: Prevalence of neck pain and neck/shoulder stiffness.

Table No.I: Selected digital-device, ergonomic and lifestyle characteristics (n=100)

Characteristic	Category	n (%)
Frequently used device	Smartphone	97 (97. ⁰)
	Tablet	2 (2. ⁰)
	Laptop	1 (1. ⁰)
Daily screen time	<2 h	18 (18. ⁰)
	2–4 h	40 (40. ⁰)
	4–6 h	28 (28. ⁰)
	>6 h	14 (14. ⁰)
Purpose	Academic study	38 (38. ⁰)
	Social media	40 (40. ⁰)
	Watching videos	16 (16. ⁰)
	Gaming	6 (6. ⁰)
Posture	Sitting upright	28 (28. ⁰)
	Slouched sitting	26 (26. ⁰)
	Lying on bed	43 (43. ⁰)
	Standing	3 (3. ⁰)
Screen position	At eye level	21 (21. ⁰)
	Below eye level	71 (71. ⁰)
Physical activity	None	15 (15. ⁰)
	Occasional	70 (70. ⁰)
	Regular	15 (15. ⁰)
Sleep duration	<5 h	18 (18. ⁰)
	5–7 h	64 (64. ⁰)
	>7 h	18 (18. ⁰)
Mobile phone before sleep	Yes	83 (83. ⁰)
	No	17 (17. ⁰)
Neck/shoulder stiffness	Yes	43 (43. ⁰)
	No	57 (57. ⁰)

**Figure No.2: Prevalence of selected digital device practice**

Chi-square analysis showed significant associations between neck pain and screen position ($\chi^2=111.102$, $p<0.001$), taking regular breaks during device use ($\chi^2=35.015$, $p<0.001$), frequency of neck pain episodes ($\chi^2=17.921$, $p=0.001$), and neck and shoulder stiffness ($\chi^2=11.726$, $p=0.003$). No significant associations were observed for frequently used device, average daily screen time, purpose of use, posture, neck flexion during phone use, device position, back support,

ergonomic workstation setup, pillow use, physical activity, sleep duration, mobile-phone use before sleep, or previous history of neck pain (all $p>0.05$).

DISCUSSION

Despite these limitations, the study provides local information regarding neck pain and digital-device-related practices among medical students. The significant associations observed with screen position and regular breaks identify potentially modifiable behaviors that may be addressed through ergonomic education. Larger studies using objective posture assessment, standardized neck-disability measures and prospective designs are recommended.

The study has several limitations. The sample consisted of 100 undergraduate medical students recruited by convenience sampling, which limits generalizability. Exposure and symptom information was self-reported and may therefore be subject to recall or reporting bias. The cross-sectional design prevents assessment of temporal or causal relationships. In addition, several exposure categories were markedly unequal, particularly device type, which may have reduced statistical power. Other potentially relevant factors, including psychosocial stress and academic workload, were not comprehensively assessed.

Our findings are consistent with previous studies reporting musculoskeletal symptoms among university, medical and nursing students who use smartphones and other electronic devices. Differences in study populations, definitions of exposure, assessment methods and patterns of digital-device use may account for variations in reported prevalence and associations between studies.

Compared with other major contributors to pain and disability, the evidence base for the management of neck pain remains relatively limited, with comparatively few randomized controlled trials available to support treatment decisions. Consequently, clinical recommendations for neck pain are frequently informed by evidence derived from related musculoskeletal conditions⁵. Further well-designed clinical trials are required to evaluate the efficacy and comparative effectiveness of existing treatment approaches, with particular attention to interventions for neuropathic neck pain and surgical management of mechanical causes.

Neck pain represents a substantial global health burden and is among the important causes of disability worldwide. Although acute neck pain commonly improves spontaneously over several weeks to months, a considerable proportion of individuals may develop persistent or recurrent symptoms. Current evidence suggests that available treatments have limited influence on the natural progression of acute neck pain.⁵ A careful clinical history and physical examination remain important for identifying potential

underlying causes and guiding appropriate management.

Screen position demonstrated a statistically significant association with neck pain in the present study. Most participants reported using screens below eye level. A lower screen position may encourage sustained cervical flexion and forward-head posture, thereby increasing the mechanical demands placed on the cervical and shoulder musculature. This finding supports the inclusion of appropriate screen positioning in ergonomic education.¹⁰ However, because of the cross-sectional design, a causal relationship cannot be established.

Previous research has reported that tech neck syndrome is relatively common among medical students, with more than one-quarter of students meeting the criteria for the condition. Among those affected, mild neck disability was the most frequently observed level of functional impairment. The occurrence of tech neck syndrome was significantly associated with the use of multiple digital devices, lower levels of physical activity, and prolonged sitting, particularly for more than three hours per day. These findings indicate that frequent digital device use combined with sedentary behavior and insufficient physical activity may be important factors associated with neck-related dysfunction among medical students.⁷

An important distinction should be made between the prevalence of potentially unfavorable behaviors and their statistical association with neck pain. A behavior may be common in a population without demonstrating a significant association with the outcome in a particular sample.¹¹

Ergonomic measures show prevention of work-related neck and upper-limb musculoskeletal disorders.¹² Nevertheless, ergonomic education emphasizing neutral cervical posture, appropriate screen positioning and regular movement breaks remains a reasonable preventive approach.¹³

In contrast, no statistically significant associations were observed between neck pain and frequently used device, average daily screen time, purpose of device use, posture, neck flexion during phone use, device position, back support, ergonomic workstation setup, pillow use, physical activity, sleep duration, mobile-phone use before sleep or previous history of neck pain. These negative findings should be interpreted cautiously. In particular, the very high proportion of smartphone users in the sample resulted in very small comparison groups for tablet and laptop users, limiting meaningful comparisons. Similarly, the absence of a significant association with screen time may reflect the sample size and distribution of exposure categories rather than the absence of a relationship.

The frequency of neck pain episodes and the presence of neck and shoulder stiffness were also significantly associated with neck pain.¹⁴ These findings suggest that

recurrent neck symptoms and adjacent shoulder discomfort commonly coexist in this population.¹⁵ They should be interpreted as associated clinical characteristics rather than as independent causal factors. Taking regular breaks during device use was also significantly associated with neck pain. Interrupting prolonged static activity may permit changes in posture.¹⁶ Regular break for the continuous activity on digital device may reduce sustained cervical loading.¹⁷ Evidence-based recommendations for the assessment and management of neck pain by doing proper exercise helps to decrease the effect.¹⁸ Research established the reliability and validity of the Neck Disability Index for assessing functional disability associated with neck pain.

The present study found that 48% of the participating medical students reported neck pain, while 43% reported neck and shoulder stiffness. Smartphones were the predominant digital device used by participants (97%). Potentially unfavorable ergonomic practices, including below-eye-level screen positioning, use of devices while lying on the bed and mobile-phone use before sleep, were also common. These findings demonstrate that neck-related symptoms and potentially modifiable device-use behaviors are prevalent among medical students.

CONCLUSION

Neck pain was reported by 48% of the medical students studied. Significant associations were observed with screen position, taking regular breaks, frequency of neck pain episodes, and neck and shoulder stiffness. Other assessed digital-device, ergonomic and lifestyle variables were not statistically significantly associated with neck pain. These findings support the need for ergonomic awareness among medical students and further prospective research into modifiable factors related to Tech Neck Syndrome.

Study Limitations: The study was limited by its small convenience sample, self-reported exposure and symptom measures, cross-sectional design and unequal distribution across some exposure categories. The findings therefore should not be generalized beyond comparable student populations or interpreted causally.

Ethical Approval: Ethical approval was obtained from the Institution Review Board (IRB), Rawal Institute of Health Sciences Islamabad, under Ref. No. RIHS/IRB/20/2026, dated 01-03-2026. The approval letter authorizes conduct and publication of the research "Prevalence and Risk Factors of Tech Neck Syndrome among Students Using Digital Devices" and is valid for one year.

Author's Contribution:

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Drafting or Revising Critically:	Alizeh Ejaz Pasha, Iqra Awan, Zarmeen Nadeem
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

1. Elvan A, Cevik S, Vatansever K, Erak I. The association between mobile phone usage duration, neck muscle endurance, and neck pain among university students. *Scientific Reports* 2024;14(1):20116.
2. Hoy D, Protani M, De R, Buchbinder R. The epidemiology of neck pain. *Best Pract Res Clin Rheumatol* 2010;24(6):783-92.
3. Phuyal N, Pandey N, Pandeya A, Mishra AK. Smartphone overuse and its impact on musculoskeletal pain in the neck and wrists/hands in medical and nursing undergraduate students: a cross-sectional study. *Scientific Reports* 2025;15(1):44945.
4. Gao Y, Chen Z, Chen S, Wang S, Lin J. Risk factors for neck pain in college students: a systematic review and meta-analysis. *BMC Public Health* 2023;23(1):1502.
5. Cohen SP. Epidemiology, diagnosis, and treatment of neck pain. *Mayo Clin Proc* 2015;90(2):284-99. doi: 10.1016/j.mayocp.2014.09.008.
6. Briggs AM, Woolf AD, Dreinhöfer K, Homb N, Hoy DG, Kopansky-Giles D, et al. Reducing the global burden of musculoskeletal conditions. *Bulletin World Health Organization* 2018;96(5):366.
7. Salameh MA, Boyajian SD, Amaireh EA, Jamal B, Alrfooh H, AbuKhalaf K, et al. Prevalence of text neck syndrome, its impact on neck dysfunction, and its associated factors among medical students: A cross-sectional study. *Work* 2024;79(3):1111-9.
8. Ariëns GA, van Mechelen W, Bongers PM, Bouter LM, van der Wal G. Psychosocial risk factors for neck pain: a systematic review. *Am J Industrial Med* 2001;39(2):180-93.
9. Organization WH. WHO guidelines on physical activity and sedentary behaviour: World Health Organization; 2020. <https://www.who.int/publications/i/item/9789240015128>
10. Riebe D, Ehrman JK, Liguori G, Magal M. ACSM's guidelines for exercise testing and prescription: American College of Sports Medicine; 2018. https://library-search.imperial.ac.uk/discovery/fulldisplay/alma9956102497801591/44IMP_INST:ICL_VU1
11. Hogg-Johnson S, van der Velde G, Carroll LJ, Holm LW, Cassidy JD, Guzman J, et al. The burden and determinants of neck pain in the general population. *J Manipulative Physiological Therapeutics* 2009;32(2S):S46-S60.
12. Buckle P, Devereux J. European Agency for Safety and Health at Work. Work-related neck and upper limb musculoskeletal disorders Luxemburgo [Consultado el 10 de abril del 2013].
13. Organization IL. Safety and Health at the Heart of the Future of Work: Building on 100 Years of Experience. International Labour Organization Geneva, Switzerland; 2019. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_686645.pdf
14. Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. *Eur Spine J* 2006;15(6):834-48.
15. Schenk R, Donaldson M, Parent-Nichols J, Wilhelm M, Wright A, Cleland JA. Effectiveness of cervicothoracic and thoracic manual physical therapy in managing upper quarter disorders—a systematic review. *J Manual Manipulative Therapy* 2022;30(1):46-55.
16. Organization WH. Rehabilitation 2030: meeting report, Geneva, Switzerland, 10-11 July 2023: World Health Organization; 2024. <https://www.who.int/publications/i/item/9789240087392>
17. Black NL, Neumann WP, Noy I. 21st Congress of the International Ergonomics Association (IEA 2021). DOI:10.1007/978-3-030-74614-8.
18. Côté P, Wong JJ, Sutton D, Shearer HM, Mior S, Randhawa K, et al. Management of neck pain and associated disorders: a clinical practice guideline from the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration. *Eur Spine J* 2016;25(7):2000-22.