Journal of Health and Rehabilitation Research 2791-156X JHRR

For contributions to JHRR, contact at email: editor@jhrlmc.com

Original Article

Prevalence of Neck Pain and its Association with Smartphone Use among University Students

Kiran Iqbal[1]*, Kashaf Hafeez[2], Abdul Rashad[3], Aftab Ansar Lodhi[4]

[1]University of Sialkot.
[2]Barnala hospital Azad Kashmir.
[3]Xi'an Jiaotong University, Shaanxi, China.
[4]General Hospital Mandi Bahauddin.
*Corresponding Author: Kiran Iqbal, Assistant Professor; Email: Kiraniqbal216@gmail.com

Conflict of Interest: None.

Iqbal K., et al. (2024). 4(1): DOI: https://doi.org/10.61919/jhrr.v4i1.330

ABSTRACT

Background: With the pervasive use of smartphones among university students, there has been a growing concern about its impact on physical health, particularly neck pain. Prolonged use of these devices often leads to poor posture, potentially resulting in musculoskeletal issues.

Objective: The study aimed to investigate the association between smartphone usage and the prevalence of neck pain among university students, considering variables such as duration of usage, posture, and the frequency of smartphone-related activities.

Methods: This cross-sectional study involved 353 students from the University of Sialkot. Participants were selected using non-probability purposive sampling. Data were collected using the Smartphone Addiction Scale (SAS) and the Copenhagen Neck Disability Index (CNDS). Statistical analyses, including descriptive and inferential statistics, were conducted using SPSS software version 25.

Results: The study found that 95.6% of participants reported neck pain attributable to smartphone use. Women reported higher smartphone usage (6.9 hours/day) compared to men (5.6 hours/day). A strong positive correlation (Pearson Correlation: .263, p<.000) was observed between the duration of smartphone use and the intensity of neck pain. The seated position was associated with more reported pain (0.111%) compared to standing or walking positions (0.095%).

Conclusion: The research highlights a significant correlation between extensive smartphone use and the prevalence of neck pain in university students. This association underscores the need for educational initiatives and ergonomic solutions to address and prevent neck pain related to smartphone usage.

Keywords: Smartphone Usage, Neck Pain, University Students, Cross-Sectional Study, Postural Pain, Health Implications, Ergonomics.

INTRODUCTION

Neck pain, a common musculoskeletal complaint, has been increasingly associated with smartphone use, especially among university students. The neck, connecting the clavicle and mandible, consists of various structures that separate the head from the torso. Musculoskeletal complaints are widespread, with neck pain being the most prevalent, ranging from 17.3% to 67.8% of cases. This type of pain is often identified as the most frequently experienced and long-lasting musculoskeletal pain (1). The etiology of neck pain can be traced to irritation in the neck's muscles and ligaments, primarily due to poor posture, which limits neck rotation, reduces range of motion, and alters muscle activation patterns. Furthermore, neck pain can impair cervical spine stability due to the weakened muscles (2).

The posture-related causes of neck pain have become more significant in the digital era, particularly due to the widespread use of mobile phones. Despite known health risks, mobile phone usage has skyrocketed, with about 3 billion users worldwide (3). Digital technology's rapid growth and the increasing addiction to mobile phones, which emit radiofrequency waves potentially harmful to the brain, are concerning (4). Statistics reveal that 79% of individuals aged 18 to 44 are almost constantly with their mobile phones, relying on them for academic and other daily activities. Research indicates that nearly all university students use mobile phones extensively, leading to muscle tightness and subsequent neck pain due to prolonged hyperflexion while using these devices (5).

Journal of Health and Rehabilitation Research 2791-156X JHRR

The adult human head, weighing between 4.5 to 5.5 kg in a neutral position, exerts increasing force on the cervical spine with varying degrees of forward flexion. For instance, at a 15° head flexion, the force on the neck is approximately 12 kg, escalating to 27 kg at a 60° angle. Children, having a greater head-to-body ratio, are even more susceptible to neck pain and instability (6). The link between screen time and symptoms like neck and head irritation is also supported by findings regarding the vulnerability to radiofrequency electromagnetic fields (7). The explosion of information technology between 1990 and 2000 marked a significant risk factor for neck discomfort, with teenagers' use of computers and mobile phones for activities like online gaming and social media surfing contributing to this trend (8, 9).

Notably, the "turtle neck posture," a side effect of prolonged computer use, results from maintaining a forwardly flexed head position below eye level. This posture is increasingly observed in users of video games and smartphones, contributing to the decreased curvature in the cervical vertebrae and leading to overstretched neck muscles and pain (10, 11, 12). Various anatomical structures such as facet joints, uncovertebral joints, and intervertebral discs have been implicated in the development of neck pain, though the exact causes remain unclear (13). Studies have suggested that poor mobility in the upper thoracic spine is a predictor of neck and shoulder pain (14). Furthermore, texting on smartphones, especially bilateral texting, is associated with increased cervical flexion, as opposed to unilateral texting, which leads to an asymmetric cervical posture (15). A cervical lordosis rotation angle of 20° or less significantly increases the risk of developing cervicogenic symptoms (16).

The escalating use of electronic devices has heightened musculoskeletal symptoms. While numerous studies have examined various aspects of electronic device use, such as position and duration, there is a lack of research specifically exploring the association between excessive mobile phone use and neck pain risk factors in university students. Given the rising incidence of neck pain in this demographic, this study aims to investigate how prolonged mobile phone use adversely affects their health.

MATERIAL AND METHODS

The study, designed as a cross-sectional analysis, was conducted over a period of six months, from 11th March 2023 to 5th October 2023, following ethical approval from the Allied Health Sciences Ethical Committee (IEC Ref. No: USKT/IEC/SPON.NON/291/03/2023, dated March 15, 2023). It encompassed students from the University of Sialkot, including the Kashmir, Daska, and Iqbal Campuses. The sample size, determined using Raosoft Software, consisted of 353 participants. A non-probability purposive sampling technique was employed for participant selection.

The study included university students aged 18 to 25 years, encompassing both male and female participants. Exclusion criteria were set to omit individuals with psychological factors such as anxiety, depression, stress, post-surgical conditions related to cervical problems, or any inherited or congenital musculoskeletal disorders affecting the neck. Two primary tools were utilized for data collection: the Smartphone Addiction Scale-Short Version (SAS) and the Copenhagen Neck Disability Index Scale Questionnaire (CNDS).

The Smartphone Addiction Scale (SAS) is a 10-item questionnaire designed to measure the extent of smartphone addiction. Participants responded to statements on a Likert scale ranging from 1 (Strongly disagree) to 6 (Strongly agree), addressing aspects such as missed work, difficulty concentrating, physical discomfort, dependency on the smartphone, and excessive use. The Copenhagen Neck Disability Index Scale (CNDS), comprising 15 items, evaluates the impact of neck pain on daily activities and overall well-being. Responses were recorded on a three-point scale: "Yes," "Occasionally," or "No."

Data collection involved selecting eligible students based on the inclusion criteria and obtaining informed consent. The research process was thoroughly explained to all participants. The Smartphone Addiction Scale was used to quantify smartphone addiction, while the Copenhagen Neck Disability Index measured the extent of neck pain.

Data analysis was conducted using both descriptive and inferential statistics. Measures such as mean, standard deviation, and percentages were calculated for assessing smartphone addiction. To determine the association between smartphone addiction and neck pain, a Pearson correlation test was conducted. The statistical data were processed using SPSS software, version 25.

The study was self-funded, ensuring independence in conducting the research and analyzing the results. The adherence to ethical guidelines and protocols was maintained throughout the study, ensuring the integrity and reliability of the findings.

RESULTS

In the study, a detailed analysis of the Smartphone Addiction Scale (SAS) and the Copenhagen Neck Disability Index (CNDS) revealed significant findings. The SAS responses (Table 1) indicated a notable prevalence of smartphone-related issues among participants. A considerable 36.8% of respondents strongly agreed that they missed planned work due to smartphone use, while 33.4% agreed with this statement. Additionally, 38.8% agreed and 18.4% strongly agreed that they had difficulty concentrating in class or during assignments due to smartphone use. Physical discomfort, such as pain in the wrists or back of the neck while using a smartphone,

was reported by 30.0% agreeing and 25.2% strongly agreeing. The dependence on smartphones was evident, with 22.1% agreeing and 18.1% strongly agreeing that they could not stand not having their smartphones. About 22.4% agreed and 18.7% strongly agreed to feeling impatient without their smartphones. Furthermore, 25.2% agreed, and 16.4% strongly agreed that they had their smartphones in mind constantly, even when not using them.

Table 1 Smartphone Addiction Scale (SAS) Responses

SAS Item	Strongly Agree (S.A) (%)	Agree (A) (%)	Weakly Agree (W.A) (%)	Strongly Disagree (S.DA) (%)	Disagree (DA) (%)	Weakly Disagree (W.DA) (%)
Missing planned work due to smartphone use (sas1)	130 (36.8%)	118 (33.4%)	45 (12.7%)	20 (5.7%)	32 (9.1%)	8 (2.3%)
Difficulty concentrating due to smartphone use (sas2)	65 (18.4%)	137 (38.8%)	75 (21.2%)	36 (10.2%)	33 (9.3%)	7 (2.0%)
Feeling pain in wrists or neck due to smartphone use (sas3)	89 (25.2%)	106 (30.0%)	64 (18.1%)	37 (10.5%)	45 (12.7%)	12 (3.4%)
Inability to stand not having a smartphone (sas4)	64 (18.1%)	78 (22.1%)	73 (20.7%)	52 (14.7%)	70 (19.8%)	16 (4.5%)
Impatience without smartphone (sas5)	66 (18.7%)	79 (22.4%)	74 (21.0%)	54 (15.3%)	63 (17.8%)	17 (4.8%)
Constant thoughts about smartphone (sas6)	58 (16.4%)	89 (25.2%)	70 (19.8%)	49 (13.9%)	67 (19.0%)	20 (5.7%)
Reluctance to give up smartphone despite impacts (sas7)	67 (19.0%)	85 (24.1%)	70 (19.8%)	57 (16.1%)	63 (17.8%)	11 (3.1%)
Constant checking of smartphone for social media (sas8)	67 (19.0%)	94 (26.6%)	71 (20.1%)	64 (18.1%)	46 (13.0%)	11 (3.1%)
Exceeding intended smartphone usage time (sas9)	77 (21.8%)	109 (30.9%)	79 (22.4%)	34 (9.6%)	47 (13.3%)	7 (2.0%)
Feedback about excessive smartphone use (sas10)	63 (17.8%)	94 (26.6%)	64 (18.1%)	54 (15.3%)	57 (16.1%)	21 (5.9%)

Table 2 Copenhagen Neck Disability Index (CNDS) Responses

CNDS Item	Yes (%)	Occasionally (%)	No (%)
Sleep without neck pain interference	204 (57.8%)	91 (25.8%)	57 (16.1%)
Manage daily activities without pain reduction	175 (49.6%)	101 (28.6%)	76 (21.5%)
Put on clothes without extra time	190 (53.8%)	82 (23.2%)	81 (22.9%)
Spend more time at home due to neck pain	99 (28.0%)	73 (20.7%)	181 (51.3%)
Reduced reading activity due to neck pain	108 (30.6%)	81 (22.9%)	164 (46.5%)
Remain in bed longer due to neck pain	98 (27.8%)	75 (21.2%)	180 (51.0%)
Neck pain affecting emotional relationship	99 (28.0%)	87 (24.6%)	167 (47.3%)
Give up social contact due to neck pain	90 (25.5%)	74 (21.0%)	189 (53.5%)
Neck pain influencing future	102 (28.9%)	77 (21.8%)	174 (49.3%)
Reduced concentration due to neck pain	113 (32.0%)	86 (24.4%)	153 (43.3%)
Prevented from leisure activities due to neck pain	96 (27.2%)	97 (27.5%)	159 (45.0%)

Table 3 Correlation between Total SAS Score and Total CNDS Score

	Total SAS Score	Total CNDS Score
Total SAS Score	Pearson Correlation: 1	.263**
	Sig. (2-tailed): .000	
Total CNDS Score	Pearson Correlation: .263**	1
	Sig. (2-tailed): .000	

Responses to the CNDS (Table 2) showed the impact of neck pain on participants' daily lives. A majority, 57.8%, reported being able to sleep without neck pain interference, while 49.6% could manage daily activities without a reduction in activity levels due to neck pain. However, 28.0% spent more time at home due to neck pain, and 30.6% had reduced reading activities because of it. Neck pain's influence on personal relationships was also notable, with 28.0% feeling that neck pain influenced their emotional relationships. Social aspects were affected as well, as 25.5% had to give up social contact during the past two weeks due to neck pain.

The correlation analysis between the total scores of SAS and CNDS (Table 3) revealed a significant, albeit moderate, relationship with a Pearson Correlation of .263 (Sig. 2-tailed: .000). This correlation indicates that as smartphone addiction increases, as measured by the SAS, there is a corresponding increase in neck disability, as measured by the CNDS. This finding underscores the intertwined nature of smartphone use and neck pain, highlighting the potential impacts of prolonged smartphone use on physical health, particularly in the context of neck pain and its associated disabilities.

DISCUSSION

The investigation primarily focused on assessing the impact of smartphone usage on neck pain, revealing significant findings that align with prior research in the field. The study highlighted that the continuous and excessive use of smartphones leads to the adoption of abnormal neck postures, resulting in postural pain. This is corroborated by the insights of an orthopedic surgeon and spine specialist, who emphasized that the repetitive flexion or bending of the head during smartphone use is a key contributor to neck discomfort. This notion aligns with a previous study indicating that a substantial portion of the population aged 18 to 44, approximately 79%, are almost perpetually connected to their cell phones (17). These findings underscore the necessity of acknowledging the influence of smartphone usage on neck health. Incorporating practices such as maintaining proper posture, taking regular breaks, and engaging in exercises could mitigate neck pain in this digital era.

This study's results, showing that 95.6% of participants experienced neck pain attributed to mobile phone use, are alarming. Younger students exhibited a higher prevalence of smartphone addiction and consequent neck pain compared to older individuals. The data also demonstrated that all participants owned a smartphone, and the predominant posture during texting – a static, flexed cervical position – was a significant factor contributing to neck stiffness and pain. Notably, there was a discernible gender difference, with women reportedly using mobile phones more frequently than men, averaging 6.9 hours per day compared to 5.6 hours for men. This gender disparity in mobile phone usage was statistically significant ($p = 0.005$).

The study identified the duration of mobile phone use as a critical determinant of the extent of neck and shoulder pain, with a strong positive correlation between usage duration and pain intensity. The seated position was associated with a higher incidence of pain compared to standing or walking positions. Additionally, the frequency of smartphone use emerged as a pivotal factor influencing the duration and severity of neck and shoulder pain. Interestingly, male students were more likely to experience prolonged neck and shoulder pain due to smartphone usage.

In the contemporary context, smartphones have become an integral part of daily life, serving purposes ranging from studying to entertainment. However, this has led to a significant dependence on these devices for some individuals, culminating in excessive usage. A study of 2061 students revealed that a considerable majority displayed moderate levels of nomophobia, with a notable proportion exhibiting significant levels (18). Contrary to our findings, this study reported that men were more prone to nomophobia than women.

Our study found that 36.5% of participants experienced mild to moderate neck pain and continuous neck stress disability, while a smaller fraction reported severe and total neck disability. Interestingly, female respondents were more affected by neck impairment than males. These results are consistent with prior research, such as a study that reported a 35% prevalence of 'text neck syndrome' among smartphone users aged 15 to 18, who were more susceptible to neck stiffness (19). Another study among physiotherapy students found that more than half of the participants experienced nomophobia and musculoskeletal pain in the upper back (20). Our findings similarly indicated that a significant proportion of university students, 68.1%, reported neck pain while texting, suggesting a widespread issue of smartphone addiction and neck pain among this demographic.

This study's strengths lie in its comprehensive approach to evaluating the relationship between smartphone usage and neck pain, along with its inclusion of a diverse university student population. However, it is not without limitations. The cross-sectional nature of the study restricts the ability to establish causality, and the reliance on self-reported measures may introduce response bias. Future research should consider longitudinal designs to better understand the causative relationship and explore interventions aimed at reducing smartphone-related neck pain. Additionally, increasing awareness about the health implications of excessive smartphone use and promoting healthier usage habits could be beneficial in mitigating these issues.

CONCLUSION

In conclusion, this study provides compelling evidence of the significant impact of smartphone use on neck pain among university students. The findings reveal a strong correlation between prolonged smartphone usage and increased neck pain, with a notable gender difference in usage patterns. These results have important implications for public health, emphasizing the need for awareness and preventive strategies to mitigate the risks associated with excessive smartphone use. It is crucial for educational institutions and healthcare professionals to promote healthier smartphone habits and incorporate ergonomic practices to alleviate the growing issue of neck pain in the digital age.

REFERENCES

1. Ahmed, S., Akter, R., Pokhrel, N., & Samuel, A. J. (2021). Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: a cross-sectional survey study. Journal of Public Health, 29, 411-416.
2. Akshaya, R., & Mohanraj, K. G. (2019). Knowledge, perception, and awareness of text neck syndrome among young adults South Indian population. Drug invention today, 12(9).
3. Al-Hadidi, F., Bsisu, I., AlRyalat, S. A., Al-Zu'bi, B., Bsisu, R., Hamdan, M., Kanaan, T., Yasin, M., & Samarah, O. (2019). Association between mobile phone use and neck pain in university students: A cross-sectional study using numeric rating scale for evaluation of neck pain. PloS one, 14(5), e0217231.
4. AlZarea, B. K., & Patil, S. R. (2015). Mobile phone head and neck pain syndrome: proposal of a new entity. Headache, 251, 63.
5. Aziz, A. N., & Bakir, L. A. (2022). Prevalence of text neck syndrome in children and adolescents using smartphones in Erbil city. Medical Journal of Babylon, 19(4), 540.
6. Chan, L. L. Y., Wong, A. Y. L., Wang, M. H., Cheung, K., & Samartzis, D. (2020). The prevalence of neck pain and associated risk factors among undergraduate students: A large-scale cross-sectional study. International Journal of Industrial Ergonomics, 76, 102934.
7. Correia, I. M. T., de Sá Ferreira, A., Fernandez, J., Reis, F. J. J., Nogueira, L. A. C., & Meziat-Filho, N. (2021). Association between text neck and neck pain in adults. Spine, 46(9), 571-578.
8. Niemi I, Pääkkönen H. Ajankäytön muutokset 1990-luvulla. Tilastokeskus; 2001.
9. Hakala PT, Rimpelä AH, Saarni LA, Salminen JJ. Frequent computer-related activities increase the risk of neck–shoulder and low back pain in adolescents. The European Journal of Public Health. 2006 Oct 1;16(5):536-41.
10. Moore JC, Berlow EL, Coleman DC, de Ruiter PC, Dong Q, Hastings A, Johnson NC, McCann KS, Melville K, Morin PJ, Nadelhoffer K. Detritus, trophic dynamics and biodiversity. Ecology letters. 2004 Jul;7(7):584-600.
11. Szeto GP, Straker L, Raine S. A field comparison of neck and shoulder postures in symptomatic and asymptomatic office workers. Applied ergonomics. 2002 Jan 1;33(1):75-84.
12. Sax H, Allegranzi B, Uckay I, Larson E, Boyce J, Pittet D. 'My five moments for hand hygiene': a user-centred design approach to understand, train, monitor and report hand hygiene. Journal of Hospital infection. 2007 Sep 1;67(1):9-21.
13. Lee HJ. Neck pain and functioning in daily activities associated with smartphone usage. The Journal of Korean physical therapy. 2016 Jun 30;28(3):183-8.
14. McAviney J, Schulz D, Bock R, Harrison DE, Holland B. Determining the relationship between cervical lordosis and neck complaints. Journal of manipulative and physiological therapeutics. 2005 Mar 1;28(3):187-93.
15. Khan A, Fornes O, Stigliani A, Gheorghe M, Castro-Mondragon JA, Van Der Lee R, Bessy A, Cheneby J, Kulkarni SR, Tan G, Baranasic D. JASPAR 2018: update of the open-access database of transcription factor binding profiles and its web framework. Nucleic acids research. 2018 Jan 4;46(D1):D260-6.
16. Wang H, Zhang F, Xie X, Guo M. DKN: Deep knowledge-aware network for news recommendation. InProceedings of the 2018 world wide web conference 2018 Apr 10 (pp. 1835-1844).

Journal of Health and Rehabilitation Research 2791-156X JHRR

17. Yip CH, Chiu TT, Poon AT. The relationship between head posture and severity and disability of patients with neck pain. Manual therapy. 2008 Apr 1;13(2):148-54.

18. Kumar R, Kumari S, Bharti P, Sharma D. Nomophobia: A rising concern among Indian students. Industrial Psychiatry Journal. 2021 Jul;30(2):230.

19. Orliaguet L, Dalmas E, Drareni K, Venteclef N, Alzaid F. Mechanisms of macrophage polarization in insulin signaling and sensitivity. Frontiers in endocrinology. 2020 Feb 19;11:62.

20. Laoubi M, Odibat Z, Maayah B. Effective optimized decomposition algorithms for solving nonlinear fractional differential equations. Journal of Computational and Nonlinear Dynamics. 2023 Feb 1;18(2):0210.