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Association of Prolonged Smartphone Use with Neck Posture, Pain, and Functional Disability in Young Adults

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KEYWORDS

Bubble inclinometer
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DECLARATIONS

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ABSTRACT

Background: In the contemporary digital era, smartphones have become indispensable tools for communication, education, and entertainment. However, their excessive and prolonged use has given rise to behavioral dependency, particularly among students and young adults who are frequent users. Extended use of smartphones often involves maintaining forward head or flexed neck postures, which may gradually lead to musculoskeletal strain, posture alterations, and functional limitations. **Objective:** To examine the association between prolonged smartphone use and its impact on neck posture, pain intensity, and functional disability among young adults. **Methodology:** This analytical cross-sectional study was conducted from March to August 2025 at the Department of Rehabilitation Sciences, Shifa Tameer-e-Millat University, Islamabad. A sample of 400 participants was enrolled utilizing a non-probability purposive sampling. Eligible participants were healthy males and females aged 18 to 25 years. Patients with a history of cervical trauma, fractures, or any neurological or vascular pathology were excluded. Ethical clearance for the study protocol was secured from the Institutional Review Board and Ethics Committee of Shifa International Hospital. The primary outcome measures included cervical range of motion, the Numeric Pain Rating Scale for pain intensity, the Neck Disability Index for functional status, and the Occiput-to-Wall Distance test for posture. Participants self-reported their average daily smartphone usage duration. Postural assessment was conducted via the Occiput-to-Wall Distance test, while cervical range of motion was evaluated using a bubble inclinometer. The pain score and Neck Disability Index were employed to quantify neck pain and its impact on daily activities, respectively. For statistical analysis, Spearman's correlation test was applied. **Results:** The findings revealed a weak but statistically significant positive correlation between smartphone use and both neck posture ($p=0.01$, $r=0.11$) and functional disability ($p=0.00$, $r=0.13$). However, no significant association was found with neck pain intensity ($p=0.31$, $r=0.05$). **Conclusion:** The study underscores that extended smartphone use is associated with postural deviations and functional impairment of the neck, though its direct link to neck pain remains statistically inconclusive. These findings highlight the need for awareness and preventive strategies to mitigate posture-related complications among young adults.

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INTRODUCTION

In the modern digital era, the widespread use of smartphones has become deeply embedded in the daily routines of university students. The dependency on smartphones has raised some serious concerns about their physical impact on users. However, the increased reliance on such technology has also introduced a range of health concerns, particularly concerning musculoskeletal disorders, most notably neck pain.¹ One of the most common problems seen is nomophobia, which is a feeling of anxiety when the smartphone is not nearby, as most individuals have become habituated to keeping their phones in their hands almost all the time.² The young adults have become addicted in such a way that they cannot keep their eyes away from their devices, even while walking or commuting from one place to another, which can pose even more stress on the cervical region.³ This leads to an increased flexed position of the head, which is consistent with the increased stress on the cervical spine.⁴ Ultimately, it causes more pressure on ligaments, tendons, and muscles, leading to long-term musculoskeletal issues and chronic pain.

Prolonged smartphone usage and poor neck posture faulty proprioception.⁵ As the cervical spine is the most mobile segment of the vertebral column, it is more prone to injuries.⁶ Long-term use of a mobile phone in a flexed neck posture causes forward head posture, which can lead to “text neck syndrome”, which is a condition that arises from the habitual practice of looking down at a device for prolonged periods, causing an imbalance in the natural alignment of the cervical spine.⁷ Poor body mechanics due to bad posture may also lead to intervertebral disc problems and may impact the spinal cord or vascular structures as well.⁸ Furthermore, increasing dependence on smartphones is contributing to a sedentary lifestyle, which has been associated with a higher risk of various serious health conditions.⁹

In terms of the biomechanical effects, prolonged flexion of the neck leads to increased load on the cervical spine and higher muscle activation in the neck extensor muscles. This can result in various degrees of discomfort, ranging from mild neck pain to more severe conditions such as cervical disc herniation and spinal degeneration.¹⁰ Most individuals use their smartphone with one hand, which poses more stress on one side of the body, leading to unilateral problems, hence adapting an asymmetrical posture. Moreover, poor neck

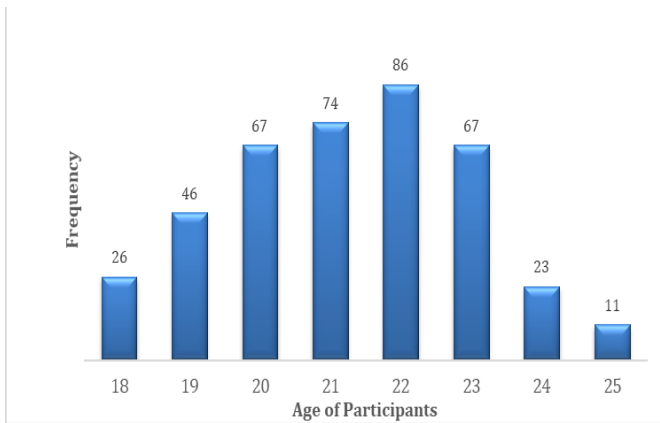
posture, such as straightening of the cervical spine, can affect focus and productivity, which can lead to stress and poor performance. Due to the increasing advancement of technology, children are growing up using smart devices earlier, which may lead to pain and postural complaints at even younger ages. These problems may accumulate and may lead to serious deformities with the passing time.¹¹

While the smartphone offers numerous benefits, it also presents potential risks, especially related to neck problems that cannot be overlooked. Smartphone users often experience pain and discomfort due to prolonged usage, yet they are frequently unaware of the underlying causes or preventive measures. Users prefer the position of comfort that the body has adapted, which is affecting the body negatively. Therefore, it is crucial to investigate the effects of prolonged smartphone use on the neck and develop effective preventive strategies to reduce these risks. These strategies may help prevent pain, discomfort, text neck syndrome, forward head posture, functional disability, and even radiculopathy. This study aims to address the association of prolonged smartphone use to evaluate the association of prolonged smartphone with neck posture, pain intensity, and functional disability among young adults.

METHODOLOGY

This analytical cross-sectional study was designed to examine the relationship between extended smartphone use and cervical health parameters, including posture, pain, and functional disability, in young adults from the Twin Cities. Data collection occurred over six months from March to August 2025 at the Department of Rehabilitation Sciences, Shifa Tameer-e-Millat University, Islamabad. A sample of 400 participants was enrolled utilizing a non-probability purposive sampling approach. Eligible participants were healthy males and females aged 18 to 25 years. Exclusion criteria encompassed a history of cervical trauma, fractures of the cervical spine, or any diagnosed neurological or vascular pathology affecting the cervical region.

Ethical clearance for the study protocol was secured from the Institutional Review Board and Ethics Committee of Shifa International Hospital (Reference: IRB #117-25). Before enrollment, all participants were fully briefed on the study's aims and procedures, after which they provided written

Figure 1: Age statistics of participants

informed consent in both Urdu and English. Data was gathered through a self-structured questionnaire. The primary outcome measures included cervical range of motion (ROM), the Numeric Pain Rating Scale (NPRS) for pain intensity, the Neck Disability Index (NDI) for functional status, and the Occiput-to-Wall Distance Test (OWD) for posture. Participants self-reported their average daily smartphone usage duration. Postural assessment was conducted via the OWD test, while cervical ROM was evaluated using a bubble inclinometer. The NPRS and NDI were employed to quantify neck pain and its impact on daily activities, respectively. For statistical analysis, Spearman's correlation test was applied using SPSS software, version 27. Bar charts were drawn for descriptive statistics. The p -value ≤ 0.05 was considered significant.

RESULTS

A total of 400 participants (200 males and 200 females) were included in the study. The mean age of participants was 21.24 ± 1.73 years (Figure 1). The mean BMI of participants was 22.81 ± 6.73 kg/m^2 , suggesting that most participants maintained a healthy weight. The average smartphone usage time was 6.41 ± 2.39 hours per day, reflecting considerable daily engagement with smartphones. The Kolmogorov-Smirnov test indicated that all study variables violated the assumption of normality ($p < 0.05$). Consequently, non-parametric statistical tests (Spearman's rank correlation) were used to analyze associations between smartphone usage and the measured variables. A weak but statistically significant positive correlation ($r = 0.11$, $p = 0.01$) was observed between smartphone usage duration and occiput-to-wall distance, an indicator of altered neck posture. This finding suggests that participants used smartphones for longer hours exhibited a

slightly greater forward head posture.

The analysis revealed a very weak positive correlation ($r = 0.05$, $p = 0.31$) between smartphone usage and neck pain scores (NPRS), but the relationship was not statistically significant. A weak but statistically significant positive correlation was found between smartphone usage and neck functional disability ($r = 0.13$, $p = 0.00$). This indicates that longer smartphone use was related to higher scores on the NDI. Correlation analysis revealed no significant association between smartphone usage and cervical ROM in flexion ($r = -0.00$, $p = 0.90$), extension ($r = 0.00$, $p = 0.91$), right bending ($r = -0.02$, $p = 0.68$), left bending ($r = -0.04$, $p = 0.40$), right rotation ($r = 0.06$, $p = 0.23$), or left rotation ($r = -0.01$, $p = 0.74$). This suggests that "the amount of time spent using a smartphone had no measurable effect on cervical ROM (Table 1).

DISCUSSION

The present study sought to investigate the correlations between prolonged smartphone use and several cervical health metrics, including posture, pain intensity, functional disability, and range of motion in young adults. Our findings indicate a statistically significant, though weak, association between smartphone usage duration and forward head posture as quantified by the OWD test. Similarly, a weak but significant positive correlation was found with functional disability measured by the NDI. In contrast, the relationship with neck pain, assessed via the NPRS, was very weak and statistically nonsignificant. No significant association was observed between smartphone use and any direction of cervical ROM.

The mean smartphone usage time in this study was six hours per day, indicating high engagement, consistent with global trends showing increased screen time among young adults. A study reported that 52.1% of university students use smartphones for 7 hours or more daily. This pattern of prolonged use supports previous literature suggesting that sustained flexed neck posture during smartphone use may contribute to postural changes over time.¹² The finding of only a weak positive correlation, which was not statistically significant, suggests that the relationship between smartphone use and neck pain is not straightforward. This highlights the complex and subjective nature of pain. This study used the NPRS, which measured pain at a single point in

Table 1: Spearman's correlation between Smartphone use and other variables

Variables	Spearman's correlation	Sig (2-Tailed)
OTW	0.11	0.01
NPRS	0.05	0.31
NDI	0.13	0.00
Flexion	-0.00	0.90
Extension	0.00	0.91
Right Bending	-0.02	0.68
Left Bending	-0.41	0.40
Right Rotation	0.06	0.23
Left Rotation	-0.01	0.74

time, which may not address low-grade discomfort. However, a previous study used a multi-time-point assessment and found a stronger association.¹³ Pain is also influenced by an individual's pain threshold, psychosocial stressors, and activity patterns, which are not controlled in this study.

A study conducted in Jeddah, Saudi Arabia, in 2024, involving 421 participants, also reported no significant relationship between smartphone use and neck pain. They found that pain history, demographics, and the position in which the phone is used are more predictive of neck pain outcomes.¹⁴ The homogeneity of the study population also influences the results. A study was conducted in which students from health care faculties were sampled, who are more aware of posture and may self-correct during smartphone use, while the sample in this study includes individuals who might not have awareness about ergonomics and may have poor posture, so they represent a more realistic pattern. This explains the greater impact on posture and functional disability.¹⁵

This study showed no statistically significant relationship between smartphone use and cervical range of motion. A study in contrast to this study reported a reduction in ROM due to prolonged poor posture and muscle tightness linked to smartphone use.¹⁶ This difference could be due to many reasons, such as using different measuring tools, exposure of participants to poor posture, and reduced mobility. The divergence between previous studies and this study can be due to methodological, confounding factors, and the

homogeneity of the population. Studies that used different tools tend to have different results. A study conducted in 2021, among 238 medical students, reported there is no statistically significant relationship between smartphone use, neck posture, pain, and functional disability, as they used objective measurement tools such as cervical range of motion, visual analogue scale, and neck disability index. Whereas our study showed a significant association. This disagreement may be due to differences in measurement tools.¹⁷

A study on the prevalence of musculoskeletal disorders among smartphone users found a strong association between smartphone use and musculoskeletal pain, including neck pain. This study does not show a significant relation with neck pain. The difference is due to differences in the use of measuring tools, as they used broader tools such as the Nordic Musculoskeletal Questionnaire, whereas this study used the NPRS for pain.¹⁸ Research into the effects of mobile phone usage revealed that prolonged use is a significant risk factor for several physical issues. The investigation correlated longer usage times with an increased probability of developing a forward head posture, elevated scores on the Disabilities of the Arm, Shoulder, and Hand scale, and a decrease in the grip strength of the dominant hand.¹⁹

Future studies should adopt longitudinal designs, multi-point pain assessments, and broader measurement tools to better understand these relationships. Including more diverse populations and activity profiles may provide stronger evidence and guide targeted interventions for neck health in the digital age.

CONCLUSION

The study concludes that prolonged smartphone use is significantly associated with postural alterations and functional limitations, though its link with neck pain and cervical range of motion remains inconclusive. The weak pain correlation suggests that discomfort is influenced by multiple factors, including posture habits, individual pain thresholds, and activity patterns. These findings emphasize the need for early preventive measures as smartphone use continues to rise among young adults. Educating users on proper ergonomic practices, encouraging regular posture breaks, and promoting stretching exercises can help reduce musculoskeletal strain.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None

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REFERENCES

- Othman SQ, Sabr BN. Association between electronic device use and neck pain among students at the College of Education, Shaqlawa. *Asian Journal of Advanced Research and Reports* 2025; 19(6): 491–506.
<https://doi.org/10.9734/ajarr/2025/v19i61074>
- Yildirim C, Correia A-P. Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior* 2015; 49: 130–7.
<https://doi.org/10.1016/j.chb.2015.02.059>
- Yoon W, Choi S, Han H, Shin G. Neck muscular load when using a smartphone while sitting, standing, and walking. *Human Factors* 2020; 63(5): 868–79.
<https://doi.org/10.1177/0018720820904237>
- Hansraj K. Assessment of stresses in the cervical spine caused by posture and position of the head. *Surgical Technology International* 2014; 25: 277–9.
- Smith DL, Haug MJ, Walsh MS. The effect of posture on neck proprioception and head/neck stabilization in asymptomatic participants. *Journal of the Canadian Chiropractic Association* 2019; 63(2): 100–110.
- Okereke IA-O, Mmerem K, Balasubramanian D. The management of cervical spine injuries - a literature review. *Orthopedic Research and Reviews* 2021; 13: 151–162
<https://doi.org/10.2147/ORR.S324622>
- Tsantili AR, Chrysikos D, Troupis T. Text neck syndrome: disentangling a new epidemic. *Acta Medica Academica* 2022; 51(2): 123–127.
<https://doi.org/10.5644/ama2006-124.380>
- Lee HJ, Jeon DG, Park JH. Correlation between kinematic sagittal parameters of the cervical lordosis or head posture and disc degeneration in patients with posterior neck pain. *Open Medicine* 2021; 16(1): 161–168.
<https://doi.org/10.1515/med-2021-0219>
- Nambirajan MK, Vidusha K, Kailasam JG, et al. Association between smartphone addiction and sedentary behaviour amongst children, adolescents and young adults: A Systematic Review and meta-analysis. *Journal of Psychiatric Research* 2025; 184(21): 128–39.
<https://doi.org/10.1016/j.jpsychires.2025.02.049>
- Mustafaoglu R, Yasaci Z, Zirek E, Griffiths MD, Ozdincler AR. The relationship between smartphone addiction and musculoskeletal pain prevalence among the young population: a cross-sectional study. *The Korean Journal of Pain* 2021; 34(1): 72–81.
<https://doi.org/10.3344/kjp.2021.34.1.72>
- Saeed A, Shahed A, Liaqat M, et al. Prevalence of forward head posture and its association with smartphone use among university students: prevalence of forward head posture and association with smartphone use. *Pakistan BioMedical Journal* 2024; 7(10): 13–18.
<https://doi.org/10.54393/pbmj.v7i10.1141>
- Sirajudeen MS, Alzhirani M, Alanazi A, et al. 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. *PeerJ* 2022; 10: e14443.
<https://doi.org/10.7717/peerj.14443>
- Chen Y-J, Hu C-Y, Wu W-T, et al. Association of smartphone overuse and neck pain: a systematic review and meta-analysis. *Postgraduate Medical Journal* 2025; 101(1197): 620–6.
<https://doi.org/10.1093/postmj/qgae200>
- Hakami I, Sherwani A, Hadadi M, et al. Assessing the Impact of Smartphone Use on Neck Pain and Related Symptoms Among Residents in Jeddah, Saudi Arabia: A Cross-Sectional Study. *Cureus* 2024; 16(7): e64299.
<https://doi.org/10.7759/cureus.64299>
- Maayah MA-O, Nawasreh ZH, Gaowgzeh RAM, Neamatallah Z, Alfawaz SS, Alabasi UM. Neck pain associated with smartphone usage among university students. *PLoS One* 2023; 18(6): e0285451.
<https://doi.org/10.1371/journal.pone.0285451>
- Kim MS. Influence of neck pain on cervical movement in the sagittal plane during smartphone use. *Journal of Physical Therapy Science* 2015; 27(1): 15–7.
<https://doi.org/10.1589/jpts.27.15>
- Bertozzi L, Negrini S, Agosto D, et al. Posture and time spent using a smartphone are not correlated with neck pain and disability in

young adults: A cross-sectional study. *Journal of Bodywork and Movement Therapies* 2021; 26: 220-226.

<https://doi.org/10.1016/j.jbmt.2020.09.006>

18. Ramalingam V, Subramaniam A. Prevalence and Associated Risk Factors of Forward Head Posture among University Students. *Indian Journal of Public Health Research & Development* 2019; 10(7): 775.

<https://doi.org/10.5958/0976-5506.2019.01669.3>

19. Bashir U, Noor R, Shoukat H, Ali ML, Javed MT, Hassan Z. Correlation of mobile phone usage on grip strength, disabilities and posture in young adults. *The Rehabilitation Journal* 2023; 7(1): 495-8.

<https://doi.org/10.52567/trj.v7i01.210>