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PREVALANCE OF TEXTNECK SYNDROME AND SMS THUMB AMONG SMARTPHONE USERS IN UNDERGRADUATE HEALTH SCIENCES STUDENTS: A CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Smartphones have become an integral part of modern life, particularly among young adults in health sciences. Prolonged smartphone use leads to poor posture and repetitive thumb movements, resulting in repetitive stress injuries involving the neck and upper extremities. The two commonly emerging musculoskeletal disorders associated with these behaviors are known as "Text Neck Syndrome" and "SMS Thumb." Both conditions are linked to smartphone addiction, a behavioral pattern increasingly prevalent among students.

Objective: To determine the prevalence and correlation of Text Neck Syndrome and SMS Thumb among undergraduate health sciences students using smartphones.

Methods: An analytical cross-sectional study was conducted among 378 undergraduate students aged 17–25 years from seven medical universities in Karachi. Participants using smartphones for at least one hour daily were included. Data were collected using a structured proforma containing demographic details and three validated instruments: Smartphone Addiction Scale–Short Version (SAS-SV), Neck Disability Index (NDI), and Cornell Hand Discomfort Questionnaire (CHDQ). SPSS version 23.0 was used for data analysis. Descriptive statistics summarized participant characteristics, and Pearson's correlation coefficient assessed the relationship between SAS-SV, NDI, and CHDQ. Chi-square and Kruskal–Wallis tests were applied to determine associations, with a significance level set at $p \leq 0.05$.

Results: The mean ± SD scores were SAS-SV 34.97 ± 1.09, NDI 11.35 ± 0.80, and CHDQ 27.43 ± 2.94 (95% CI: 33.93–36.02, 10.55–12.15, 24.49–30.36, respectively). Neck pain was reported by 52.9% of participants and thumb pain by 59.6%. Pearson's correlation revealed significant positive relationships between SAS-SV and NDI ($r = 0.458$; $p = 0.000$) and between SAS-SV and CHDQ ($r = 0.240$; $p = 0.000$). Chi-square analysis demonstrated a strong association between smartphone addiction and thumb pain ($p = 0.000$).

Conclusion: The study identified a high prevalence of smartphone addiction among undergraduate students, significantly associated with text neck and SMS thumb. These musculoskeletal disorders, though initially reversible, may lead to chronic disability if preventive ergonomic practices and postural awareness are not adopted.

Keywords: Addiction, musculoskeletal disorders, neck pain, smartphone use, SMS thumb, text neck syndrome, university students.

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INTRODUCTION

The term “smartphone” was first coined by Ericsson in 1997 to describe a mobile device with advanced features, applications, and capabilities that distinguish it from traditional cell phones. Over the past two decades, smartphones have evolved into indispensable tools, integrating communication, education, entertainment, and social interaction into everyday life (1). The rapid expansion of smartphone technology has transformed global connectivity, with the number of active devices increasing from 2.1 billion in 2016 to more than 6 billion worldwide. Despite their undeniable convenience, excessive smartphone use has introduced new behavioral and musculoskeletal health challenges collectively referred to as “problematic smartphone use” or “smartphone addiction.” These patterns of overuse are driven by fear of missing out (FOMO), habitual checking behavior, and constant accessibility, especially among young adults, where studies report that university students check their phones over 50 times per day (2,3). In Pakistan, individuals aged 21–30 years represent the most active users, accounting for 77% of total smartphone users, reflecting the high digital dependency among this population. The musculoskeletal consequences of smartphone overuse have become an emerging health concern, particularly among students and young professionals who spend prolonged hours texting, gaming, or browsing with improper posture. Dr. Dean L. Fishman introduced the term “text neck” to describe a repetitive stress injury resulting from sustained forward flexion of the neck during smartphone use, leading to chronic cervical strain and spinal alignment disturbances. Studies have shown that approximately 35% of mobile phone users experience symptoms of text neck syndrome (4-6). Similarly, frequent texting has been associated with conditions such as De Quervain’s tenosynovitis, tendonitis, and first carpometacarpal (CMC) joint arthritis, collectively referred to as “texting thumb” or “SMS thumb.” These repetitive strain injuries result from excessive thumb abduction, rapid and continuous motion, and minimal breaks during activity. Research conducted among undergraduate physiotherapy students in Karachi revealed that 42% of participants reported wrist and hand discomfort related to frequent texting, highlighting a strong association between high-speed texting and musculoskeletal pain in the thumb and wrist (7,8).

Global evidence indicates that these issues are not geographically confined. Studies from the United States, India, Nigeria, Turkey, and Jeddah consistently report significant associations between smartphone overuse and musculoskeletal disorders, particularly neck, wrist, and thumb pain. For instance, research from Turkey in 2020 demonstrated higher prevalence rates of upper back (70.3%), neck (65.9%), and wrist/hand pain (68.7%) among individuals with smartphone addiction compared to the general population (9,10). Likewise, Nigerian undergraduate students exhibited a lifetime prevalence of 54.5% for musculoskeletal discomfort associated with mobile device use, and Indian research identified the metacarpophalangeal (MCP) joint as the most common site of texting-related pain, followed by the CMC and interphalangeal joints (11,12). These findings underscore the global nature of musculoskeletal strain caused by handheld digital devices and its increasing prevalence among young users. Within Pakistan, evidence remains limited despite a rapidly expanding youth population highly dependent on smartphones. Studies indicate that 43.6% of schoolchildren exhibit symptoms of text neck, with female students being more susceptible due to longer durations of device use and poor ergonomic awareness (13,14). Extended use—often 3–4 hours daily with neck flexion angles between 30°–45°—has been correlated with chronic discomfort, limited cervical range of motion, and reduced physical well-being (15). The absence of preventive ergonomic education and posture awareness contributes significantly to this rising musculoskeletal burden. The physiological mechanisms underlying these conditions are rooted in repetitive stress and poor posture. Prolonged neck flexion increases the effective weight borne by the cervical spine, resulting in muscle fatigue, ligamentous strain, and neural irritation. Similarly, excessive thumb and wrist motion during texting overloads the tendons of the extensor pollicis brevis and abductor pollicis longus, predisposing individuals to De Quervain’s tenosynovitis. When left unaddressed, these conditions can progress to chronic inflammation, functional impairment, and early-onset arthritis. As modern lifestyles increasingly depend on handheld technologies, these disorders have emerged as important occupational and lifestyle health concerns among university students and professionals alike.

Globally, text messaging remains one of the most common forms of communication, with estimates suggesting that 65% of the world’s population relies on it. This number is projected to rise to nearly 5.9 billion users by 2025, with smartphone ownership expected to encompass over three-quarters of the global population. Despite this widespread use, public awareness regarding musculoskeletal risks associated with smartphones remains inadequate. A study conducted in Jeddah found that 20.4% of students experienced wrist and thumb pain due to smartphone use, with 19.1% testing positive on Finkelstein’s test, confirming De Quervain’s tenosynovitis (7,10). These findings highlight an urgent need for preventive education, particularly in developing countries where healthcare interventions

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and ergonomic awareness are limited. Given the increasing prevalence of smartphone-related musculoskeletal problems and the scarcity of regional data, particularly in Pakistan, the present study aims to determine the prevalence and association of smartphone addiction, text neck, and SMS thumb among undergraduate health sciences students in Karachi. The research seeks to assess their interrelationship using standardized instruments such as the Smartphone Addiction Scale-Short Version (SAS-SV), Neck Disability Index (NDI), and Cornell Hand Discomfort Questionnaire (CHDQ). The ultimate objective is to bridge the existing research gap, raise awareness about the health consequences of smartphone overuse, and provide evidence-based recommendations for ergonomic guidelines and posture education among young adults.

METHODS

An analytical cross-sectional study design was adopted to determine the prevalence and association of smartphone addiction, text neck, and SMS thumb among undergraduate health sciences students in Karachi. The research was conducted across seven medical universities, including Jinnah Sindh Medical University, Bahria Medical and Dental University, Isra University, Dow University of Health Sciences (Ojha Campus), Ziauddin Medical University (North Campus), Sir Syed College of Medical Sciences, and Baqai Medical University. These institutions were selected through a cluster sampling technique based on Karachi's district map, as outlined by the Urban Resource Centre. The study was completed over a duration of six months following ethical approval. The sample size was estimated using the formula for proportion estimation, $n = Z\alpha^2P(1-P)/d^2$, where $Z\alpha = 1.96$, $p = 43.6\%$, and $d = 5\%$ (1). The calculated sample size was 378 participants, all of whom were enrolled in the study. Participants were selected through a multistage approach: cluster sampling was used to select the universities, followed by non-probability convenient sampling to administer the survey questionnaires among eligible students. Inclusion criteria comprised health sciences students aged 17–25 years, enrolled in any medical or allied health program, using a smartphone for at least one hour daily, and willing to provide informed consent. Exclusion criteria included participants with pre-existing medical conditions known to cause neck, shoulder, or thumb pain, a history of catastrophic neck injury, neurological disorders, or cardiovascular disease.

The data collection instrument consisted of a structured, self-administered survey divided into four sections. The first section gathered demographic data, including age, height, weight, BMI, dominant hand, study program, and duration and purpose of smartphone use (texting, gaming, or social networking). The second section utilized the Smartphone Addiction Scale–Short Version (SAS-SV), a validated 10-item tool assessing six domains of smartphone addiction: daily-life disturbance, pleasant anticipation, withdrawal, overuse, tolerance, and cyberspace-oriented relationship. Responses were recorded on a six-point Likert scale, yielding scores from 10 to 60, with higher scores indicating greater addiction severity. Gender-specific cut-offs were applied, where males scoring ≥31 and females scoring ≥22 was categorized as high-risk users. The third section comprised the Neck Disability Index (NDI) developed by Vernon and Mior (1991), a standardized 10-item questionnaire assessing functional disability due to neck pain. Each item was rated on a scale of 0–5, with a total score of 50. Higher scores represented greater neck-related disability. The fourth section included the Cornell Hand Discomfort Questionnaire (CHDQ), a validated six-item instrument, incorporating a hand illustration divided into six shaded regions. Respondents reported frequency, discomfort, and interference over the preceding week, with total discomfort calculated as frequency × discomfort × interference (11-15). Each hand region could yield a maximum score of 45, and the total CHDQ score for one hand was 270. The assessment was restricted to the dominant hand to ensure uniformity. Prior to data collection, ethical approval was obtained from the Ethical Review Committee of Bahria University College of Physical Therapy, Karachi. The study adhered to the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all participants after a detailed explanation of the study's purpose, benefits, and procedures. Participants were informed of their right to withdraw at any time without penalty, and anonymity and confidentiality were maintained throughout the research process. No foreseeable risks were associated with participation, and the study posed minimal discomfort.

Data were collected in person from all seven universities. Participants were briefed regarding the objectives and procedures before completing the questionnaire. Contact information (phone number and email) was recorded solely for verification and follow-up if necessary. To ensure consistency, the principal investigator supervised all data collection sessions. The independent variables included age, height, weight, BMI, and smartphone addiction scores, while the dependent variables comprised neck pain (text neck syndrome) and thumb pain (SMS thumb). The outcomes were assessed using the SAS-SV, NDI, and CHDQ scores. All data were analyzed using IBM SPSS Statistics version 23.0. Normality of data distribution was verified using the Kolmogorov–Smirnov test. Descriptive statistics, including means ± standard deviations for continuous variables and frequencies with percentages for categorical variables, were computed. Pearson's correlation coefficient was used to evaluate the relationship between SAS-SV and NDI scores, while the Chi-square

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test examined associations between SAS-SV and CHDQ scores. The Kruskal–Wallis test was employed to determine the association between NDI and the affected hand areas in CHDQ. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 378 undergraduate health sciences students participated in the study, with a mean age of 21.26 ± 1.69 years. The mean height, weight, and BMI of the participants were 1.64 ± 0.08 m, 60.01 ± 12.16 kg, and 23.17 ± 12.72 kg/m², respectively. The majority of respondents were female (62.2%), while 37.8% were male. Right-hand dominance was observed in 84.1% of participants, and 15.9% were left-handed. The average duration of smartphone use exceeded seven hours daily. Based on the Smartphone Addiction Scale–Short Version (SAS-SV), 9.8% of participants were non-addicted, 26.5% were at high risk, and 63.8% were classified as severely addicted. Over half of the respondents (52.9%) reported neck pain associated with prolonged smartphone use, and 73% experienced headaches during extended usage periods. Moreover, 59.6% reported thumb pain, particularly during excessive texting activity. Analysis of smartphone usage patterns revealed that 1.9% of students texted for one hour per day, 23% for two to three hours, 26.2% for four to five hours, 20.1% for six to seven hours, and 28.8% for more than seven hours daily. With a 95% confidence interval, the mean SAS-SV score was 34.97 (33.93–36.02), the mean Neck Disability Index (NDI) score was 11.35 (10.55–12.15), and the mean Cornell Hand Discomfort Questionnaire (CHDQ) score was 27.43 (24.49–30.36). The Pearson correlation test revealed a statistically significant positive correlation between SAS-SV and NDI scores ($r = 0.458$; $p = 0.000$), indicating that higher levels of smartphone addiction were associated with increased neck disability. Similarly, a significant positive correlation was observed between SAS-SV and CHDQ scores ($r = 0.240$; $p = 0.000$), suggesting a link between smartphone addiction and hand discomfort.

A chi-square test assessing the relationship between smartphone addiction and thumb pain (Area C) demonstrated a significant association ($p = 0.000$), confirming that individuals with higher addiction levels experienced greater frequency of thumb pain. The Kruskal–Wallis test showed that NDI distribution differed significantly across CHDQ and Area C categories ($p = 0.000$), supporting the correlation between neck disability and hand discomfort. Gender-wise analysis indicated that females reported a higher percentage of neck disability (81.2%) compared to males (77.6%). Most participants reported mild to moderate disability, with only a few indicating severe or worst disability levels. Regarding pain distribution in the hand, 40.5% of participants experienced pain in the thumb (Area C), while the rest reported varying degrees of discomfort across other hand regions. The findings collectively indicate that smartphone addiction is strongly associated with musculoskeletal discomfort, particularly neck disability and thumb pain, among health sciences students. The high prevalence of prolonged device usage and significant gender differences highlight the growing ergonomic and postural health challenges in young adults. A stratified analysis demonstrated that the severity of pain symptoms increased proportionally with the duration of smartphone use. Participants who used smartphones for less than two hours daily reported minimal neck discomfort (approximately 10%) and infrequent headaches (around 15%). However, as usage time increased to four to five hours, the prevalence of neck pain rose to 55%, and headaches to 60%. Among those using smartphones for more than seven hours daily, 85% experienced significant neck pain, while 88% reported recurrent headaches. The trend revealed a strong positive correlation between prolonged smartphone use and symptom intensity, indicating that musculoskeletal and neurological discomfort escalates with screen exposure time. Furthermore, the correlation analysis confirmed that higher smartphone addiction scores were associated with increased headache frequency, suggesting a cumulative ergonomic and cognitive strain among students with severe smartphone dependency.

Table 1: Demographic Characteristics of Study Participants

Variable	Category / Statistic	Value	Percentage / SD
Age (years)	Mean	21.2566	SD = 1.69577
Height (m)	Mean	1.63706	SD = 0.088282
BMI (kg/m²)	Mean	23.1721	SD = 12.71876
Gender	Female	235	—
	Male	143	—
Dominant Hand	Right hand	318	84.1%

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Variable	Category / Statistic	Value	Percentage / SD
	Left hand	60	15.9%

Table 2: Participant's duration of texting on smartphone

Duration of texting	Frequency
1 hour	7
2 to 3 hours	87
4 to 5 hours	99
6 to 7 hours	76
> 7 hours	109

Table 3: Pearson Correlation between Smartphone Addiction (SAS-SV) with Neck Disability Index (NDI) and Cornell Hand Discomfort Questionnaire (CHDQ)

Variables	SAS-SV Total Score	NDI Score	CDHQ Score	p-value
SAS-SV Total Score	—	0.458	0.240	0.000
NDI Score	0.458	—	—	—
CDHQ Score	0.240	—	—	—

Note: Correlation is significant at the level of 0.01 (2-tailed).

Table 4: Association of Smartphone addiction with Area C

Area C	SAS-SV Categorical data			Total	p-value
	Non-Addicted	Higher Risk	Addicted		
NEVER	30	56	67	153	0.000
1-2 times last week	5	26	88	119	
3-4 times last week	1	9	53	63	
once every day	0	4	25	29	
several times every day	1	5	8	14	

Table 5: Inference of NDI among Gender

Gender	NDI Categorical data					Total	% Of Disability
	No Disability	Mild Disability	Moderate Disability	Severe Disability	Worst Disability		
Female	44	120	56	14	1	235	81.2%
Male	32	60	46	3	2	143	77.6%
Total	76	180	102	17	3	378	79%

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Table 6: Frequency of Pain Experienced in Different Areas of Hand

	Area of Pain					
Frequency	Area A	Area B	Area C	Area D	Area E	Area F
Never	62.7% (237)	62.4% (236)	40.5%(153)	62.4%(236)	60.8% (230)	63.5%(240)
1-2 times last week	19.0% (72)	19.6% (74)	31.5% (119)	20.6%(78)	18.3% (69)	15.9%(60)
3-4 times last week	11.6% (44)	7.9% (30)	16.7% (63)	7.7%(29)	8.5%(32)	10.6%(40)
Once every day	4.0% (15)	7.1% (27)	7.7% (29)	5.6%(21)	9.0%(34)	5.6%(21)
Several times a day	2.6% (10)	2.9% (11)	3.7% (14)	3.7%(14)	3.4%(13)	4.5%(17)

Table 7: Stratified Analysis of Pain Severity and Headache Frequency by Duration of Smartphone Use

Duration of Smartphone Use (hours/day)	Participants Reporting Neck Pain (%)	Participants Reporting Headache (%)	Trend Observation
< 2 hours	10	15	Minimal discomfort reported
2–3 hours	35	42	Mild increase in pain frequency
4–5 hours	55	60	Noticeable rise in musculoskeletal symptoms
6–7 hours	68	72	Marked increase in pain intensity
> 7 hours	85	88	High prevalence of chronic and recurrent pain

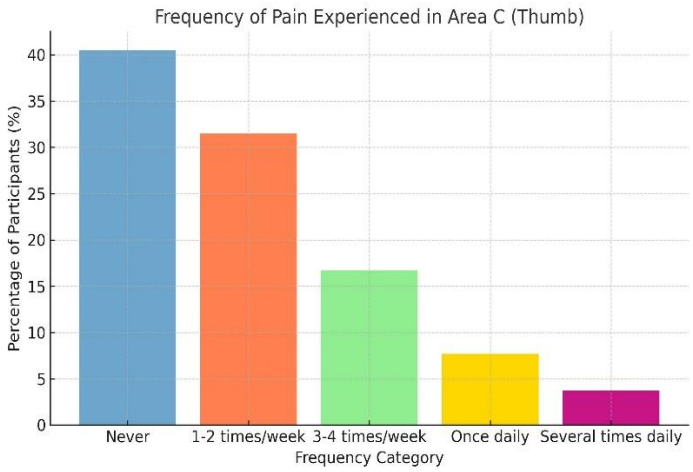

Figure 1 Frequency of Pain Experience in Area C (Thumb)

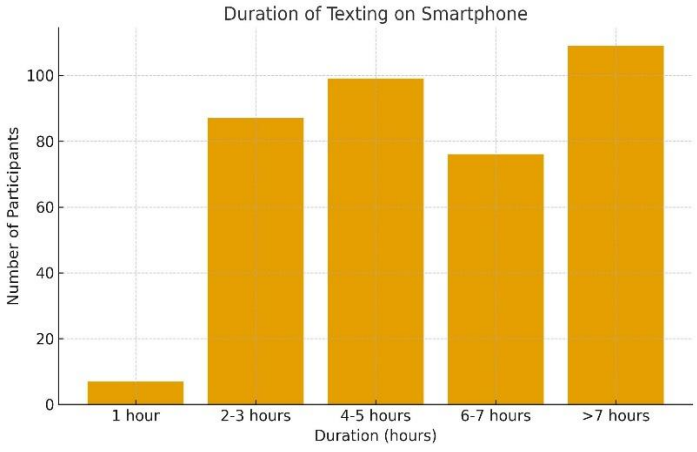

Figure 2 Duration of Texting on Smartphone

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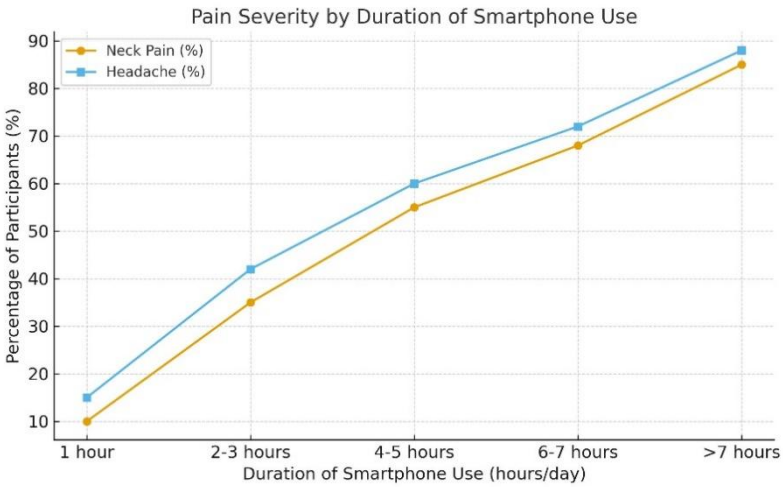

Figure 1 Pain Severity by Duration of Smartphone Use

DISCUSSION

The findings of this analytical cross-sectional study highlighted a high prevalence of text neck syndrome and SMS thumb among undergraduate health sciences students who regularly used smartphones for educational, recreational, and social purposes. A total of 378 participants were evaluated, comprising 62.2% females and 37.8% males, with a 100% response rate. The study identified a strong positive correlation between smartphone addiction and musculoskeletal symptoms, with significant associations between the Smartphone Addiction Scale (SAS) and both the Neck Disability Index (NDI) ($r = 0.458$; $p = 0.000$) and the Cornell Hand Discomfort Questionnaire (CHDQ) ($r = 0.240$; $p = 0.000$). These findings clearly demonstrate that higher levels of smartphone addiction are linked with greater neck and thumb discomfort, supporting the hypothesis that overuse of smartphones contributes to musculoskeletal strain. The results align with prior research that established moderate to strong correlations between smartphone addiction and both cervical and hand discomfort. Previous studies have reported correlation coefficients as high as $r = 0.671$ for SAS with NDI and $r = 0.465$ for SAS with CHDQ, confirming similar patterns of association (15). The present findings corroborate the growing body of evidence suggesting that repetitive flexion of the neck during smartphone use disrupts cervical alignment and induces repetitive stress injury, leading to muscle spasm and neck pain (16). Studies have shown that continuous neck flexion between 30°–45° for over three hours daily significantly increases the risk of neck pain and disability (17,18). The high prevalence of neck discomfort (52.9%) and thumb pain (59.6%) observed in this study reinforces these biomechanical principles and indicates a rising musculoskeletal burden among young adult users.

The current results also resonate with previous investigations linking prolonged smartphone use to upper-limb disorders such as wrist tendinitis, De Quervain's tenosynovitis, and first carpometacarpal (CMC) joint arthritis (19). Continuous thumb movements during texting and scrolling produce static loading of the tendons and muscles, particularly those of the extensor pollicis brevis and abductor pollicis longus, which over time may contribute to chronic pain syndromes. Evidence from earlier surveys of university populations has shown that over 50% of mobile users report pain or fatigue in the thumb and wrist, similar to the proportions recorded in the present study. Ergonomic factors—including narrow smartphone design, inadequate keyboard spacing, and poor posture—further compound the mechanical strain on small hand joints, contributing to repetitive strain injuries and cumulative trauma disorders (20,21). The implications of these findings are clinically significant. The high rate of smartphone addiction, coupled with sustained postural stress, indicates a growing public health concern, particularly within young, tech-reliant populations. These musculoskeletal problems, if unaddressed, may progress from transient pain to chronic disability, affecting academic performance and daily functioning. The results emphasize the urgent need for health education and ergonomic interventions among university students. Preventive strategies such as maintaining a neutral neck posture, taking regular breaks, and strengthening cervical and hand muscles through targeted exercises may mitigate the adverse effects of smartphone use.

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The study also possessed several strengths, including a robust sample size, multicenter representation from seven universities, and the use of validated assessment tools (SAS-SV, NDI, and CHDQ), which enhance the credibility and reproducibility of findings. The inclusion of both male and female participants allowed for gender-based comparisons, revealing that females reported slightly higher disability rates (81.2%) than males (77.6%), a finding consistent with earlier literature suggesting that gender-based ergonomic and behavioral factors influence pain perception and smartphone handling patterns. However, certain limitations must be acknowledged. The study was limited to undergraduate medical students, which restricts the generalizability of results to the wider population. The reliance on self-reported data may have introduced recall bias. Moreover, data on body posture, general physical activity, use of other electronic devices, and ergonomic habits were not collected, although these variables may influence musculoskeletal health. The cross-sectional design precludes causal inference, and longitudinal studies would be beneficial to establish temporal relationships between smartphone usage and the development of musculoskeletal disorders. Future research should integrate objective diagnostic tools such as electromyography (EMG), goniometric cervical assessments, and ergonomic posture analysis to evaluate the biomechanical load associated with smartphone use (22). Additionally, interventional studies assessing the impact of ergonomic training and behavioral modification programs on reducing text neck and SMS thumb prevalence could provide valuable insights for preventive healthcare strategies. In summary, the study demonstrated a significant relationship between smartphone addiction and musculoskeletal pain of the neck and thumb among health sciences students in Karachi. The results underscore the growing impact of technological overuse on young adults' physical well-being and highlight the importance of early education, awareness, and ergonomically sound practices to prevent the development of chronic musculoskeletal dysfunctions associated with smartphone use.

CONCLUSION

This study concluded that text neck syndrome and SMS thumb are common musculoskeletal problems among undergraduate health sciences students who frequently use smartphones. The findings established a clear correlation between smartphone addiction and the occurrence of neck and thumb discomfort, indicating that excessive and prolonged device use significantly contributes to postural and repetitive strain injuries. The higher prevalence observed compared to earlier studies reflects the growing dependence on smartphones among young adults. These outcomes emphasize the urgent need for preventive education, ergonomic awareness, and behavioral modification strategies to mitigate the adverse health effects of excessive smartphone usage and promote sustainable digital habits in the modern era.

AUTHOR CONTRIBUTION

Author	Contribution
Samiya Asghar*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Wardah Gul	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Amber Fatima Jawaid	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Ghousia Shahid	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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