Original Article

Text Neck Syndrome and Its Association with Smartphone Use Among Medical Students

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Abstract

Background & Objective: The excessive use of smartphones among medical students has been causing inimical effects on mental and physical health. Poor posture can cause musculoskeletal disorders. Therefore, it is necessary to evaluate the association between the use of mobile phones and musculoskeletal pathologies among medical students.

Methodology: A cross-sectional study was conducted using the simple random sampling technique among the medical students of Abwa Medical College, Khurrianwala, Faisalabad, from March 2024 to August 2024. The sample size was 364, calculated using the WHO Sample Size Calculator after obtaining informed consent. Medical students from the 1st year MBBS to the 5th year MBBS were included in the study. Faculty members and students of the Allied Health Sciences were excluded from the study. A pilot study was conducted to validate the questionnaire, which was subsequently distributed among medical students. The collected data were then analyzed using SPSS 22, employing the Chi-Square test.

Results. Out of 364 participants, 192 (53%) were male and 172 (47%) were female, with a mean age of 22 years. The most commonly used gadget was the smartphone, with 42% of participants reporting excessive smartphone use for more than 4 hours. A statistically significant value was reported among the medical students who used laptops for educational purposes. The pain assessment score revealed that the majority of students who hold their smartphones or laptops below eye and neck level report neck pain.

Conclusion: Neck pain has emerged as a leading cause of musculoskeletal pain among medical students. With advancements in social media and technology, students are increasingly prone to developing text neck syndrome due to excessive use of smartphones and laptops. Managing poor posture and bodily ergonomics can significantly reduce this issue. Text neck syndrome is significantly associated with the use of mobile phones. Measures should be implemented to raise awareness about mobile phone use, with a focus on postural education.

Keywords: smartphones, text neck syndrome, neck pain, medical students

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Introduction

One of the most widely used portable electronic devices worldwide is the smartphone. In this modern age of Artificial Intelligence, the use of smartphone technologies has increased among medical students.[1] The smartphone contributes not only to providing multifunctionality to implement several functions but also to solving complex problems related to learning.[2] From sending an email to sharing cash via bank transfers, everything has become possible with just a single click on a smartphone. In a nutshell, you have the whole world in your pocket. However, smartphone addiction has short- and long-term consequences, including one of the leading causes of musculoskeletal pain among adolescents.[3] A report published declares that an estimated 77% of the world's population owns a smartphone.[4]

A high preference rate of smartphone usage among university students has been noted. With the extensive

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use of smartphones, musculoskeletal pathologies have surged to an alarming extent. According to a study, the average daily mobile phone use among medical students is approximately 5.9 hours.[5] Another study published in 2019 reported that the aids standardized preference rate of neck pain was 27 per 1000 people, making it the most common cause of musculoskeletal pain among these students. [6]

The excessive use of smartphones causes addiction, which is now an emerging phenomenon in communities of different age groups. Prolonged and continuous use of a smartphone can lead to changes in posture, causing upper back pain and muscle spasms. Text neck syndrome can cause pain in the neck, shoulders, and back, as well as chronic headaches and increased curvature of the spine, which can later trigger severe inflammatory reactions involving the musculature, ligaments, and nerves. [7]

Neck pain has now become an alarming health problem. A study reports that approximately 8.2% to 90% of the musculoskeletal gain in different body parts was attributed to excessive smartphone use. [8] In Canada, approximately 84% of students who exercise using smartphones reported experiencing musculoskeletal pain, with the neck being the most commonly affected part of the body. Similar incidents of pain have been reported in other developing countries. [9]

Text neck syndrome can ultimately impact an individual's work productivity, flexibility, and overall quality of life. Moreover, it can lead to detrimental health effects due to the increasing demand and rising cost of medical treatment. The students may compromise both their health and academic performance. The frequent finger motions used for testing, combined with the lack of neck and upper limb support when using smartphones, can result in a significant static muscular load, particularly when using only one hand. Additionally, it has been determined that forward head posture while using a smartphone increases the risk of musculoskeletal pain by straining cervical tissues and perhaps causing the tearing and degeneration of neck structures. [10]

According to the World Health Organization, the 4th most common cause of pathological disability or neck pain among adults is the excessive use of the mobile phone. In recent years, with the advancement of science and technology, smartphones have become increasingly popular and play a significant role in our daily lives. The average screen time for an innovative electronic device has surpassed the standard limit. These days, the primary uses for these gadgets include social media, communication, photography, e-reading, texting and emailing, research, accessing the latest news and information, creating presentations, and online banking. Many health illnesses, including eyesight issues, anxiety, melancholy, personality disorders, difficulties concentrating, mobile phone addiction, and Text Neck Syndrome, are now primarily linked to excessive usage of these electronic devices. [11] Considering all these precipitating factors, a rising trend has been observed to an alarming extent among medical students reporting musculoskeletal and neck pain. The study aims to explore the factors and the association between neck pain and the use of mobile phones among medical students.

Methodology

A cross-sectional study was conducted at Abwa Medical College, following approval from the institutional ethics committee, as per letter No. ABWA/MC/DME/833/2023 from March 2024 to August 2024. A simple random sampling technique was employed, and the sample size was determined using the WHO sample size calculator, which yielded a sample size of 500. A structured self-administered questionnaire was used as the study instrument. The questionnaire underwent content validation through expert review by three senior medical educationists. Reliability if instrument was assessed using Cronbach’s alpha. A pilot study was conducted on 20 students to assess clarity and feasibility. Students from either discipline were included in the study. However, the faculty members and staff were excluded from this process. The Questionnaire comprised Demographic details, the characteristics related to smartphone usage, and pain using the visual analogue pain score. All the data collected were analyzed in SPSS 26 using the chi-square test and P-value. The p-value <0.05 was considered significant.

Results

A total of 364 students were enrolled in the study. A total of 192 (53%) participants were male, and 172 (47%) were female.

Table I indicates the presence of pain, discomfort, and trouble with various variables, including smoking, physical activity habit, laptop use, and mobile phone use for any activity. The habit of physical activity was reported to be a significant variable, with a p-value of 0.016. The habit of smoking was found to be more

Table I: Association of Feeling of trouble, Pain & Discomfort at neck with demographic variables.

		Discomfort or Neck pain for 12 months			Chi-square (P-value)
		Yes	No	Total	
		N (%)	N (%)	N (%)	
Age (years)	≤ 20	118 (44.4%)	60 (61.2%)	178 (48.9%)	9.13* (p=0.010)
	21 - 22	108 (40.6%)	31 (31.6%)	139 (38.2%)	
	23+	40 (15.0%)	7 (7.1%)	47 (12.9%)	
Lived before joining the medical college	Urban	183 (68.8%)	75 (76.5%)	258 (70.9%)	2.08 (p=0.150) NS
	Rural	83 (31.2%)	23 (23.5%)	106 (29.1%)	
Habit of smoking	Yes	28 (10.5%)	3 (3.1%)	31 (8.5%)	5.12* (p =0.024)
	No	238 (89.5%)	95 (96.9%)	333 (91.5%)	
Habit of physical exercise	Yes	153 (57.5%)	70 (71.4%)	223 (61.3%)	5.84* (p=0.016)
	No	113 (42.5%)	28 (28.6%)	141 (38.7%)	
Use your Smartphone daily for educational purposes	Yes	249 (93.6%)	80 (81.6%)	329 (90.4%)	11.82** (p=0.001)
	No	17 (6.4%)	18 (18.4%)	35 (9.6%)	

predominant among males than among females. A statistically significant 90.4% of participants reported using smartphones for educational purposes, with a P-value of 0.001. The duration of mobile phone use is illustrated in Figure I.

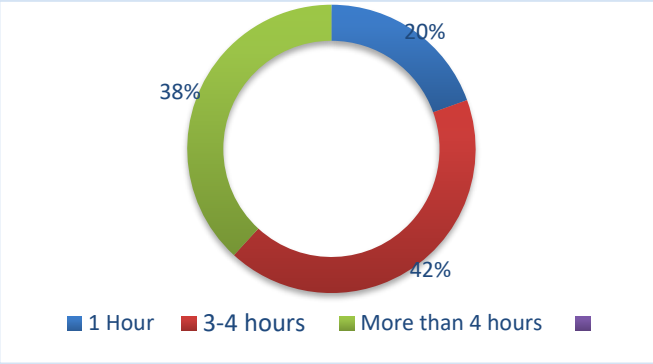

Figure 1. Distribution of usage of mobile phones in hours.

Table II illustrates the association and effect of pain duration on the different variables. 134 (50.4%) participants were female, who reported the duration of pain being more significant than that of the male participants. Among the participants experiencing pain, 68.2% belonged to urban areas, which was reported to be statistically significant. The majority of participants reported the use of a laptop for educational purposes as one of the causes of pain among the medical students, with a P-value of 0.001

Most participants with neck pain used smartphones below eye level and commonly in lying or sitting positions; however, these associations were not statistically significant. Only the style of holding the smartphone demonstrated a significant association with neck pain (p=0.020), particularly among those using one hand, as presented in Table III.

The table IV shows that neck pain severity was lowest in the ≤20 years group, highest in the 21–22 years group, and somewhat lower in the 23+ years group. In the 23-year age group, very few respondents reported this complaint. The ANOVA table shows that the variance between groups is less than the variance within groups.

Discussion

The present study demonstrates the association between excessive smartphone usage and its impact on students' health, specifically related to musculoskeletal pain.[12] Overuse or excessive use can lead to detrimental effects on health, compromising the quality of life. Our

Table II: Effect of different demographic variables on pain duration.

		Pain duration (in hours)					Chi-square (P-value)
		<= 1 hr	1-2 hrs	2-3 hrs	> 4 hrs	Total	
		N %	N %	N %	N %	N %	
Gender	Male	61 (46.2%)	43 (53.1%)	20 (69.0%)	8(33.3%)	132 (49.6%)	7.89* (p=0.048)
	Female	71 (53.8%)	38 (46.9%)	9 (31.0%)	16 (66.7%)	134 (50.4%)	
Lived before joining the medical college	Urban	74 (56.1%)	63 (77.8%)	25 (86.2%)	21 (87.5%)	183 (68.8%)	21.02** (p <0.001)
	Rural	58(43.9%)	18 (22.2%)	4 (13.8%)	3 (12.5%)	83 (31.2%)	
Use your Smartphone daily for educational purposes	Yes	124 (93.9%)	76 (93.8%)	27 (93.1%)	22 (91.7%)	249 (93.6%)	0.194 NS (p=0.979)
	No	8(6.1%)	5 (6.2%)	2 (6.9%)	2 (8.3%)	17 (6.4%)	
Use Laptop / Tablet	Yes	83 (62.9%)	61 (75.3%)	28 (96.6%)	21 (87.5%)	193 (72.6%)	17.59** (p =0.001)
	No	49 (37.1%)	20 (24.7%)	1 (3.4%)	3 (12.5%)	73 (27.4%)	
Use a laptop or tablet for educational purposes	Yes	78 (59.1%)	53 (65.4%)	25 (86.2%)	21 (87.5%)	177 (66.5%)	13.11** (p =0.004)
	No	54 (40.9%)	28 (34.6%)	4 (13.8%)	3 (12.5%)	89 (33.5%)	

Table III: Effect of posture on neck pain.

		Posture and its association with Pain			Chi-square (P-value)
		Yes	No	Total	
		N (%)	N (%)	N (%)	
Hold the Smartphone while using it	Below eye level	184 (69.2%)	59 (60.2%)	243 (66.8%)	2.69^{NS} (P=0.261)
	At eye level	69 (25.9%)	32 (32.7%)	101 (27.7%)	
	Above eye level	13 (4.9%)	7 (7.1%)	20 (5.5%)	
Style of holding (hand in use) the Smartphone while using it	Using the right hand only	137 (51.5%)	38 (38.8%)	175 (48.1%)	7.84* (P=0.020)
	Using your left hand only	17 (6.4%)	3 (3.1%)	20 (5.5%)	
	Using both hands	112 (42.1%)	57 (58.2%)	169 (46.4%)	
Frequent posture adopted during the use of a Smartphone	Sitting	106 (39.8%)	41 (41.8%)	147 (40.4%)	5.43^{NS} (P=0.143)
	Standing	14 (5.3%)	0 (0.0%)	14 (3.8%)	
	Laying on back	137 (51.5%)	54 (55.1%)	191 (52.5%)	
	Lying on the chest	9 (3.4%)	3 (3.1%)	12 (3.3%)	

study reports that the majority of the affected age group is above 20 years, with a significantly low P value of 0.001. Literature evidence suggests that young boys are more prone to developing smartphone addiction compared to other age groups.[12] The world is becoming increasingly dependent on digital sources due to their rapid expansion. The fast-expanding digital world trend needs to be addressed since it could have adverse effects on younger people. [12]

Table IV: Analysis of variance for pain severity regarding the age of the respondents.

(a) Descriptive statistics

Age (years)	N	Mean	SD	Std. Error	Min	Max
<= 20	118	1.94	1.515	0.139	1	8
21 - 22	108	2.80	1.823	0.175	1	8
23+	40	2.38	1.644	0.260	1	5
Total	**266**	**2.35**	**1.705**	**0.105**	**1**	**8**

(b) ANOVA table

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.304	2	20.652	7.45**	0.001
Within Groups	729.478	263	2.774		
Total	770.782	265			

The habit of smoking was found to be a statistically significant factor in triggering the muscle pain.[13] In a study conducted by James Robert et al, an excessive use of mobile phones related to text messages and invoice calls was the leading factor in causing musculoskeletal pain among males and females.[14] The use of smartphones for daily educational activities was found to be statistically significant. A meta-analysis revealed no association between physical activity and academic performance. In contrast, a study in China suggests a connection between excessive mobile phone use, musculoskeletal pain, academic performance, and quality of life.

In the current study, the association of self-reported depression and nervousness was found to be significantly elevated with total mobile overuse and, in particular, long calls. This was consistent with the results of several studies. As observed in Frey's study, mobile overuse was associated with mental overload, disturbed sleep, a sense of being constantly occupied, role conflicts, and feelings of guilt due to the inability to respond to all calls and messages.[14] All these factors may result in unfavorable mental outcomes, particularly depression and nervousness. Interestingly, the association with fatigue was observed to be significantly higher among individuals who used their mobile phones heavily, as well as those who placed their phones under their pillows or beside their beds.[15] Several studies have found that fatigue is a predominant symptom among excessive mobile phone users, which might be related to the electromagnetic radiation emitted from the phone. According to a study, the most common area affected in the body was the neck region, which is consistent with our research findings. [14]

In our study, participants who reported neck pain were the majority of those who used a laptop for their work, with a statistically significant P-value of P = 0.004. A regional study reported that 76% of the students complained of pain in the neck, shoulder, arm, and hand. However, neck pain was the most common among all. Poor posture and prolonged use of electronic devices are the triggering factors involved in causing this pain; however, physical therapy was shown to be effective in treating the next neck spasm.[16] Enhanced timespan using the mobile phone was also the main predictor of the pain's severity. In a study conducted at the medical college in Saudi Arabia, it was reported that the most common complaint, reported by 71.2% of the participants, was neck pain. [17]

In our study, the position of the eye and the standing or sitting position, along with holding the phone either in the right, left, or both hands, were also assessed. Participants who kept the phone below eye level and in their right hand were reported to be statistically significant. Another study concluded that using a phone at eye level and holding it with thumbs adds substantial benefits in reducing back pain. [18] The posture of holding phones was also reported to be the triggering cause for developing musculoskeletal pain among the participants.

Conclusion

The majority of the medical students have been identified as smartphone addicts. The most common region affected by musculoskeletal pain was the neck. The majority of the affected population were adolescents, resulting in severe health consequences and negatively impacting quality of life. The compelling motivation of medical students to adopt a healthy lifestyle can significantly address the issue. The cross-sectional study design has limitations, as it cannot establish causal associations between smartphone use and neck pain. Text neck syndrome is significantly associated with the use of mobile phones. Measures should be adopted to raise awareness about mobile phone use, with an emphasis on postural education.

Limitations: The cross-sectional study design has limitations, as it cannot establish a causal association between smartphone use and neck pain. As the data collected was self-reported, there is an inherent risk of recall bias. The sampling technique may limit the generalization of the results.

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