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PREVALENCE OF NECK PAIN AND ITS ASSOCIATION WITH SMARTPHONE USAGE AMONG DOCTOR OF PHYSICAL THERAPY STUDENTS IN PESHAWAR: A CROSS-SECTIONAL STUDY

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Abstract

Background: *Smartphone usage has been rapidly increased in Pakistan, raising concerns about musculoskeletal problems, particularly neck pain. While studies from other countries have reported associations between smartphone use and neck pain, limited data exist for Pakistani students.*

Objective: *To determine the prevalence and identify associated risk factors of neck pain among Doctor of Physical Therapy (DPT) students using smartphones.*

Material and Methods:
A cross-sectional study was conducted among 278 DPT students (111 males, and 167 females) recruited from five physical therapy institutes in Peshawar. Participants aged 18–25 years were included using convenience sampling. Data were collected through a validated self-administered questionnaire. Descriptive statistics and cross-tabulations were performed using SPSS v27.

Results: *Mean age of the study subjects was 20.57 ± 2.31 years, with the total of 45.3% prevalence of neck pain among smartphone users. The most frequently reported smartphone-related activity was social networking (48.9%), followed by internet browsing (24.8%). Common postures during smartphone use included supported sitting (37.1%) and lying down (36.7%). Neck pain was more prevalent among students aged 22 years and among those using smartphones for more than four hours daily. A significant association was observed between frequent text messaging (>20 SMS/day) and neck pain.*

Conclusion: *Nearly half of the surveyed DPT students experienced neck pain related to smartphone use. Excessive text messaging and prolonged daily smartphone use were the strongest contributors. Preventive strategies focusing on*

posture correction, moderated usage, and awareness programs may reduce the burden of neck pain in students.

INTRODUCTION

Smartphones have become an integral part of modern life and are widely used for communication, internet access, and entertainment(1). Their portability and increasing affordability have resulted in a dramatic rise in usage across all age groups, especially among students(2, 3). The growing dependence on smartphones, however, has been linked to musculoskeletal health problems, particularly neck pain, which is a common complaint in young adults and students(4). The cervical spine, being highly flexible and responsible for supporting the weight of the head, is vulnerable to strain and injuries(5). Neck pain is generally defined as discomfort or pain between the occiput and the third thoracic vertebra(6). Sustained or abnormal postures, particularly forward head posture while using digital devices, have been identified as key contributors to neck pain(5, 7, 8). Extended use of smartphones often results in muscle fatigue and discomfort due to repetitive thumb movements, prolonged flexion, and unsupported postures(9).

International studies have highlighted the scale of this problem. Smartphone use among individuals in different countries like Brazilian, Sweden, Croatia, and US aged 15–24 years reached nearly 99%, with 82% of students owning smartphones and 79% using them daily for text messaging(10-12). Text messaging, in particular, has been associated with increased flexion of the neck and repetitive upper limb movements, leading to cumulative strain(13). Similarly, a survey of more than 3,000 Chinese high school students reported that smartphone use of more than two hours daily increased the risk of developing neck pain by nearly 50%(14). A Swedish study further found a dose-response relationship between the frequency of text messaging and neck pain, indicating that higher exposure significantly increased the risk(15). Musculoskeletal pain related to digital device use has also been shown to negatively affect daily activities, quality of life, and general health perceptions(16, 17). Among students, heavy smartphone use is common and has been consistently linked to upper back and neck discomfort. Despite growing international evidence, there is limited data from Pakistan, and particularly from the province of Khyber Pakhtunkhwa.

Therefore, this study was designed to investigate the prevalence of neck pain among Doctor of Physical Therapy (DPT) students in Peshawar, Khyber Pakhtunkhwa, and to explore the relationship between smartphone use patterns and neck pain. The findings of this study may provide valuable baseline data for preventive strategies, awareness programs, and future research aimed at reducing the musculoskeletal burden associated with smartphone use.

Material and Methods

Study Design and Sampling: A cross-sectional study was conducted between August and December 2024 across five physiotherapy institutes in Peshawar, Khyber Pakhtunkhwa: Institute of Physical Medicine and Rehabilitation (IPM&R), Mahboob School of Physiotherapy, Rehman Medical Institute, North West Institute of Health Sciences, and National College of Science. The target population included Doctor of Physical Therapy (DPT) students aged 18–25 years. Convenience sampling was used to recruit participants. Based on a total student population of approximately 1,300 across the five institutes, a sample size of 278 was calculated using online sample size calculator “Epi Info”.

Inclusion and Exclusion Criteria: Students were eligible if they were actively enrolled in the DPT program, within the age range of 18–25 years, and willing to participate. Students were excluded if they reported a history of traumatic or non-traumatic neck injury, vertebrobasilar insufficiency, degenerative spinal disease, or systemic inflammatory conditions.

Ethical Considerations and Data collection: Ethical approval was obtained from the respective institutional authorities, and written informed consent was secured from all participants prior to data collection. Participants were informed of the voluntary nature of the study and their right to withdraw at any stage without penalty. Data were collected using a self-administered questionnaire adapted from a validated tool developed from the

studies of Wahid E. et. al.(3) and Gustafsson et. al. in Sweden in 2017(13). The questionnaire included demographic details (age, gender, institute), smartphone usage patterns (duration, purpose, posture, frequency of SMS), and the presence, severity, and duration of neck pain. A pilot study was conducted on 10 students to confirm clarity and validity of the tool before administering it to the whole population. After obtaining permission from institutional heads, questionnaires were distributed during class sessions. The researchers explained the purpose of the study and provided an information sheet to ensure transparency. Completed questionnaires were collected on the same day. Data were entered and analyzed using SPSS v. 27. Descriptive statistics were used to calculate frequencies, percentages, and mean values. Cross-tabulations were performed to examine associations between smartphone usage variables and the prevalence of neck pain.

Results

A total of 278 DPT students participated in the study, comprising 111 males (39.9%) and 167 females (60.1%), with a mean age of 20.57 ± 2.31 years (See Table 1). The majority of students (68.3%) reported their lifestyle and physical activity level as being moderately active, while 20.9% were very active, and 10.8% were sedentary.

Variable	Category	Frequency	Percent (%)
Age	Mean	20.57 ± 2.31 years	
Gender	Male	111	39.9
	Female	167	60.1
Total		278	100.0

Table 1 Demographic distribution of the participants (n = 278)

Among the sample, 274 (98.6%) students owned a mobile phone, among them, 258 (92.8%) used smartphones. The age of first mobile phone use was most frequently 15–18 years (52.2%). Regarding duration of use, 87 students (31.3%) reported 3–4 years of use, and 96 students (34.5%) reported daily use exceeding 4 hours. Text messaging was common, with 122 (43.9%) students sending/receiving more than 20 SMS per day, 49 (17.6%) reporting 11–20 per day, and 41 (14.7%) reporting 6–10 per day. Social networking was the most frequent activity (48.9%), followed by internet browsing (24.8%). The most commonly adopted postures during smartphone use were supported sitting (37.1%) and lying down (36.7%). (See Table 2)

Variable	Category	Frequency (n)	Percent (%)
Smartphone ownership	Yes	258	92.8%
	No	20	7.2%
Daily usage duration	≤2 hours	90	32.4%
	3–4 hours	92	33.1%
	>4 hours	96	34.5%
SMS sent/received per day	>20	122	43.9%
	11–20	49	17.6%
	6–10	41	14.7%
	≤5	66	23.8%
Main activities (apart from calls/SMS)	Social networking	136	48.9%
	Internet browsing	69	24.8%
	Multimedia/music	73	26.3%

Table 2 Smartphone usage patterns among participants (n = 278)

Association of Symptoms and Health Perceptions

Nearly half of the students (45.3%) reported neck pain related to smartphone use, while 54.7% did not (See Figure 1). 57.6% of students reported no numbness/tingling in hands and fingers, 29.1% experienced symptoms for less than one week.

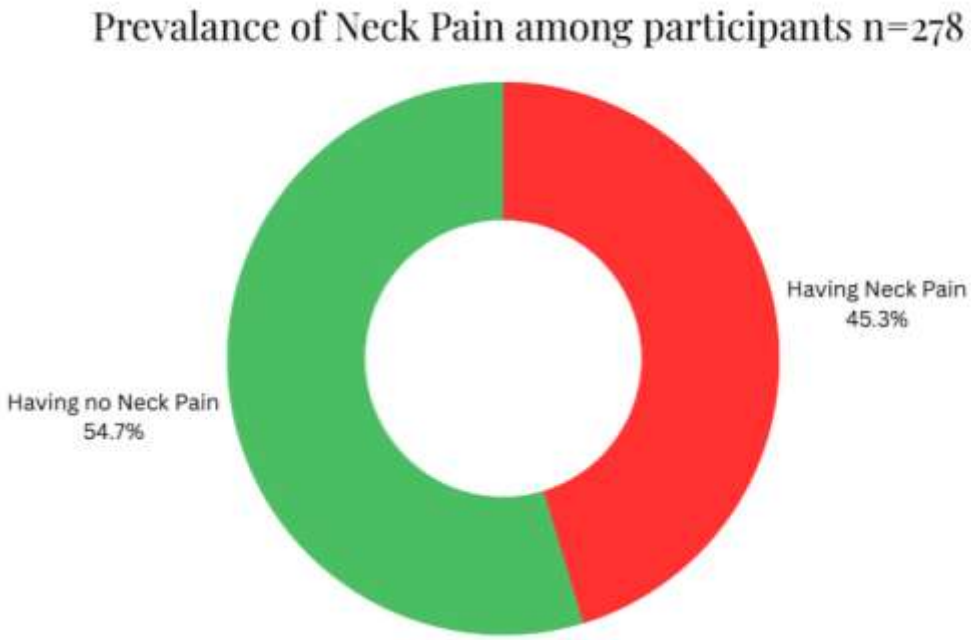

Figure 1 Prevalence of Neck Pain among study subjects (n=278)

The prevalence of neck pain increased with longer duration of smartphone use. Students using smartphones for more than 4 years reported a higher frequency of neck pain compared to those with shorter usage history (Please refer to Table 3, and Figure 2).

Duration of mobile use	No pain	<1 week	1 week–1 month	1–3 months	>3 months	Total
<2 years	47	16	4	2	0	69
3–4 years	39	34	6	7	1	87
5–6 years	37	18	5	4	0	64
7–8 years	17	15	2	2	0	36
>8 years	12	8	1	1	0	22
Total	152	91	18	16	1	278

Table 3 Association between duration of mobile phone use and neck pain (n = 278)

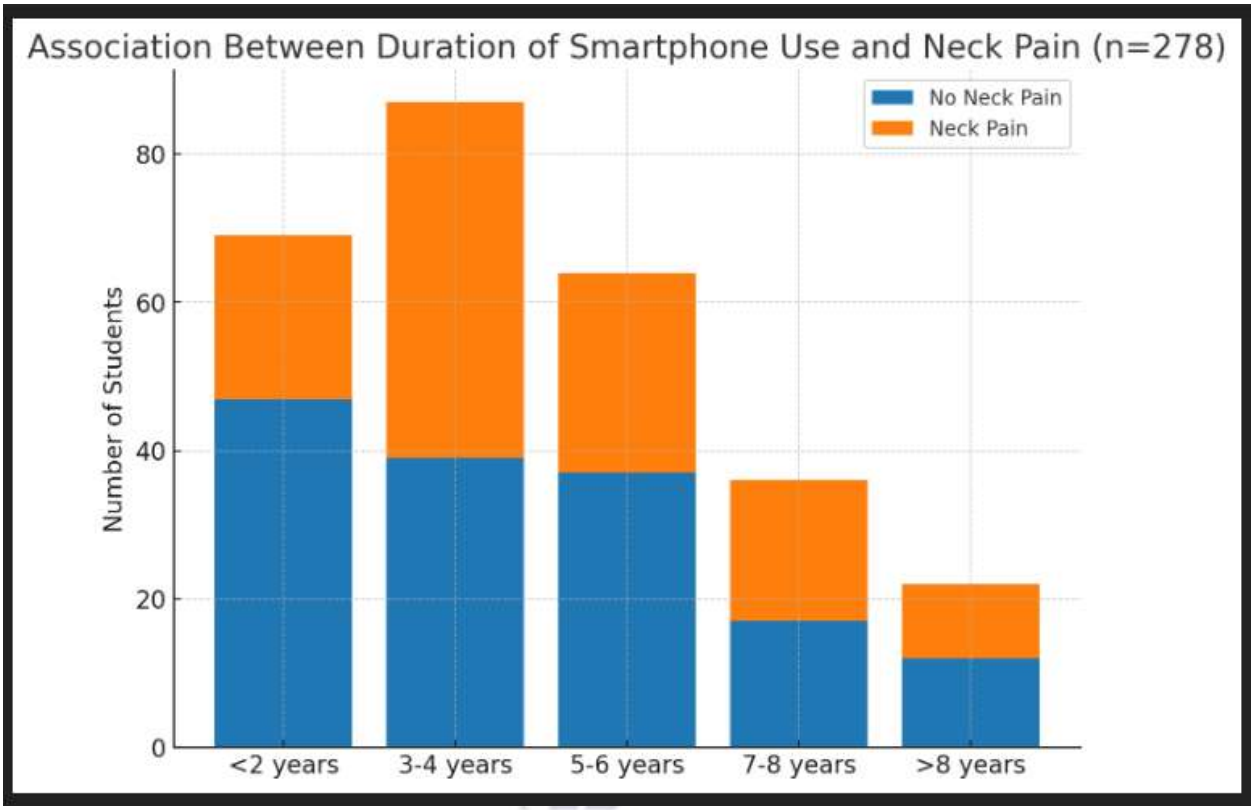

Figure 2 Association between duration of phone use and prevalence of neck pain (n = 278)

Table 4 summarizes the pattern of pain onset in a given posture, which was occurred in 25% of the participants within 10 minutes 29.9% within 20 minutes, and about 20.5% after more than 60 minutes. Most students reported their general health as good (49.6%) or very good (25.2%). Neck pain prevalence was highest in students aged 22 years. Longer daily smartphone use (>4 hours) and frequent SMS activity (>20 per day) were associated with higher prevalence of neck pain.

Time until pain onset	Frequency	Percent (%)
<10 minutes	71	25.5
20 minutes	61	29.9
30 minutes	32	11.5
60 minutes	57	20.5
>60 minutes	57	20.5

Table 4 Onset of neck pain in relation to posture duration (n = 278)

Discussion

This study investigated the prevalence of neck pain and its association with smartphone use among Doctor of Physical Therapy (DPT) students in Peshawar, Pakistan. The findings showed that 45.3% of students experienced neck pain, indicating that nearly half of this population is affected. This prevalence is consistent with previous studies reporting musculoskeletal complaints associated with smartphone use among young adults(18-21).

The analysis revealed that excessive smartphone use (>4 hours daily) and frequent text messaging (>20 SMS/day) were strongly associated with neck pain. These findings align with prior international studies. Gustafsson et al. reported that high-frequency texting significantly increased the risk of neck and shoulder pain, with a dose–response relationship between the

number of messages and pain prevalence(13). Similarly, Shan et al. found that daily smartphone use of more than two hours increased the risk of neck pain by nearly 50% among adolescents(4, 22). In terms of posture, supported sitting (37.1%) and lying down (36.7%) were the most common positions during smartphone use. Prolonged neck flexion and unsupported posture have been highlighted as risk factors for musculoskeletal strain(22). Our results support these findings, emphasizing that poor ergonomic practices contribute to neck pain in student populations. The study also found that neck pain was most prevalent at age 22, which may reflect the cumulative effect of longer exposure to smartphone use. Previous research has suggested that younger adolescents and students are particularly vulnerable to smartphone-related musculoskeletal complaints due to higher usage rates and prolonged exposure(23, 24). Another important finding was the high percentage of students (29.1%) who reported numbness and tingling in hands and fingers for short durations. Our study findings are also consistent with the evidence from a five-year cohort study by Gustafsson, E., et al. and a cross-sectional survey by Ahmad et. al. showed that text messaging was associated not only with neck and back pain but also with hand/finger symptoms, particularly in the short term(13, 25). Our findings are consistent with this evidence.

While multiple international researches have consistently linked smartphone use to musculoskeletal complaints, there has been a lack of local data, particularly among healthcare students who themselves are future health professionals. This study adds important evidence to the growing body of literature linking smartphone use with musculoskeletal health problems. By identifying that nearly half of DPT students in Peshawar report neck pain associated with smartphone use, this study provides baseline evidence that can inform both academic institutions and policymakers. The results highlight that neck pain is not only a localized discomfort but also a potential barrier to academic performance, concentration, and overall quality of life among students. Importantly, this study was conducted among physiotherapy students, a group expected to have greater awareness of posture and musculoskeletal health than the general student population. The fact that nearly half of them reported neck pain underscores the pervasiveness of the problem and suggests that the prevalence in the wider youth population could be even higher. By capturing usage patterns, posture habits, and symptom distribution, the study provides a comprehensive profile of risk factors that can inform both clinical practice and preventive interventions.

On a broader scale, the findings are significant because they reflect lifestyle changes in younger generations globally, where prolonged digital engagement is becoming the norm, especially in the younger population. Neck pain and related musculoskeletal complaints linked to smartphones represent an emerging public health concern that could increase the burden on healthcare systems if left unaddressed. The study therefore contributes not only to local evidence but also to the international dialogue on digital health risks, supporting the case for early preventive strategies, ergonomic education, and the integration of technology-use guidelines in student health and wellness programs. Furthermore, as physiotherapy students are both high smartphone users and future advocates for musculoskeletal health, addressing this issue early could have a multiplier effect, improve their personal well-being and equip them to counsel future patients on safe technology use. In this way, the study not only highlights a pressing student health concern but also contributes to the broader public health agenda in Pakistan.

Limitations

This study has certain limitations. The sample was drawn from students of selected physiotherapy institutes in Peshawar, which may limit the generalizability of results to the wider student or general population. Convenience sampling may have introduced selection bias. The study relied on self-reported questionnaires, which are subject to recall bias and may not capture the severity or exact duration of pain accurately. Additionally, due to time and resource constraints, the study did not include objective physical or postural assessments.

Implications

Despite these limitations, the study provides valuable baseline data on the prevalence and risk factors of neck pain associated with smartphone use among

students in Pakistan. The findings underscore the need for awareness programs targeting posture correction, moderated smartphone use, and healthy lifestyle practices among university students. Incorporating ergonomic education and preventive strategies into student health programs may help reduce the burden of musculoskeletal complaints. Future research should include objective clinical assessments, larger populations beyond students, and interventional studies to evaluate the effectiveness of posture training and exercise programs.

Conclusion

This study demonstrated that nearly half of DPT students in Peshawar experience neck pain associated with smartphone use. Excessive daily usage (>4 hours) and frequent text messaging (>20 SMS/day) were identified as key contributors. Common postures such as supported sitting and lying down further increase the risk. These findings highlight the growing musculoskeletal health burden among young adults due to smartphone use. Preventive strategies focusing on ergonomic education, posture correction, moderated use, and incorporation of physical activity may help reduce the risk of neck pain in students.

Conflict of interest: The authors declare no conflict of interests.

Source of funding: The authors received no fundings from any organization for the study.

Ethical Consideration: The study was conducted in accordance with the ethical standards of Khyber Medical University, Peshawar. Approval was obtained from the institutional authorities of the participating institutes. Written informed consent was taken from all participants prior to data collection.

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