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Impact of Smartphone Addiction on Neck Pain Among University Students

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ABSTRACT

Background: Smartphone addiction is increasingly common among university students and has been linked to musculoskeletal issues, particularly neck pain, due to prolonged improper postures. This study aimed to investigate the impact of smartphone addiction on neck pain among university students.

Objective: To evaluate the relationship between smartphone addiction and neck pain among university students.

Methods: A cross-sectional study was conducted from January to June 2023 among 219 university students aged 18-35. Data were collected using the Smartphone Addiction Scale-Short Version (SAS-SV) and the Neck Disability Index (NDI). Convenience sampling was used, and exclusion criteria included neurological disorders, prior neck surgeries, or musculoskeletal diseases. Ethical approval was obtained following the Helsinki Declaration. Data were analyzed using IBM SPSS version 25. Chi-square tests and multivariate analysis were applied to assess associations, with a significance level of $p < 0.05$.

Results: 34.2% of participants reported neck pain related to smartphone use. Among them, 43.8% experienced mild pain while reading on smartphones. The NDI showed that 15.1% had moderate pain, while 4.1% experienced fairly severe pain.

Conclusion: Excessive smartphone use is significantly associated with neck pain among university students. Preventive strategies and ergonomic awareness are recommended to reduce neck strain.

INTRODUCTION

In the present age, the widespread use of smartphones has profoundly altered communication, entertainment, and everyday activities. As these devices become indispensable, particularly for university students, their usage patterns have led to various health concerns, with neck pain being a significant issue. The rapid rise in the number of smartphone users globally has been accompanied by an increase in the prevalence of musculoskeletal disorders associated with prolonged device usage. In 2022, more than 83% of the global population owned a smartphone, representing a substantial increase from previous years (1). Among university students, who are frequent users of smartphones for both academic and social purposes, the risk of developing neck pain, commonly referred to as "text neck" or "forward head posture," is particularly high due to prolonged screen time in static, flexed positions (2).

Several studies have highlighted the growing concern of smartphone addiction, especially in younger populations. For instance, a sharp increase in smartphone addiction among university students in Saudi Arabia was observed, with rates rising from 19.1% in 2016 to 60.3% in 2019 (3). The excessive use of smartphones, especially when adopting poor postural habits, exerts significant strain on the cervical spine and neck muscles, leading to musculoskeletal symptoms (4). This strain often results from the forward flexion of the head while looking down at the screen, increasing the load on the cervical spine and contributing to conditions such as cervical lordosis and thoracic kyphosis (5). Studies have shown that the degree of forward head flexion correlates directly with the amount of stress exerted on the cervical spine, potentially leading to early degeneration and pain (6).

Musculoskeletal symptoms, particularly in the neck, are prevalent among university students who engage in long hours of smartphone use. For instance, research has shown that 46% of college students experience musculoskeletal symptoms, with neck pain being one of the most commonly reported complaints (7). The increasing reliance on smartphones for everyday tasks such as browsing the internet, social networking, and gaming has exacerbated the issue. These activities require users to maintain awkward, static postures for extended periods, thereby increasing the risk of developing chronic musculoskeletal pain, especially in the cervical region (8). In addition, the mental health effects of smartphone addiction, including anxiety and depression, further complicate the issue, as students are often unaware of the physical strain they are placing on their bodies while using their devices (9).

In terms of the biomechanical effects, prolonged smartphone use increases neck flexion angles, leading to increased load on the cervical spine and higher muscle

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activation in the neck extensor muscles (10). 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 (11). A study conducted among university students in Ethiopia found a significant association between smartphone use and neck pain, with students who used their devices for more than four hours a day reporting higher levels of discomfort and disability (12). Another study reported similar findings among medical students in Saudi Arabia, where excessive smartphone use was linked to higher rates of musculoskeletal pain in the neck and shoulder regions (13).

Given the high prevalence of neck pain among university students, it is crucial to address the impact of smartphone addiction on musculoskeletal health. Students need to be educated on the importance of adopting proper postures when using smartphones and limiting their screen time to avoid long-term health complications (14). The association between smartphone use and neck pain underscores the need for preventive measures, such as ergonomic education and regular breaks during device use, to reduce the incidence of musculoskeletal disorders in this population (15). As smartphone usage continues to rise, further research is needed to explore effective interventions for preventing and managing neck pain among university students (16). This study aims to evaluate the relationship between smartphone addiction and neck pain among university students, contributing to the growing body of literature on the health implications of excessive smartphone use.

MATERIAL AND METHODS

The study employed a cross-sectional design to evaluate the impact of smartphone addiction on neck pain among university students. It was conducted from January 2023 to June 2023, targeting students enrolled in HEC-registered universities. A total of 240 students were initially selected, of which 219 participants met the inclusion criteria and were included in the final analysis. The sample size was determined using Cochran's formula, where $n = z^2 \times [p \times (1 - p)]/e^2$, with a Z-score of 1.96, a confidence interval of 95%, a margin of error of 5%, and a sample proportion (p) of 50%.

Participants were selected using a convenience sampling technique. The inclusion criteria involved university students between the ages of 18 and 35 years who were regular smartphone users. Exclusion criteria included students with congenital diseases, neurological disorders, terminal illnesses, trauma, fractures, long-term pathologies, malignancies, musculoskeletal diseases, or anomalies, as well as those who had undergone previous neck surgeries. Ethical approval was obtained from the institutional review board in accordance with the Declaration of Helsinki. All participants provided informed consent prior to their participation in the study.

Data collection was carried out using two validated instruments. The Smartphone Addiction Scale-Short Version (SAS-SV) was used to assess the level of smartphone addiction. This scale consists of six Likert-scale questions ranging from 1 (strongly disagree) to 6 (strongly agree). A higher score indicated a higher degree of smartphone addiction. Additionally, the Neck Disability Index (NDI) was used to assess neck pain and disability. The NDI consists of 10 items scored on a 5-point Likert scale, where 0 represents no disability and 5 represents the worst possible disability. Both tools have been widely used and validated in previous studies to assess smartphone addiction and neck-related musculoskeletal issues (1).

Data were analyzed using IBM SPSS version 25. Descriptive statistics, including frequencies and percentages, were used to summarize the demographic characteristics of the participants. Inferential statistics, including chi-square tests, were applied to assess the association between smartphone addiction and neck pain. The level of significance was set at $p < 0.05$. Additionally, multivariate analysis was performed to adjust for potential confounders, including age, gender, and the duration of smartphone use (2).

Throughout the study, all ethical guidelines were followed, and the confidentiality of the participants' data was ensured. Data were stored securely, and access was limited to the research team. Participants were informed of their right to withdraw from the study at any time without any consequence. The results of the study are expected to contribute valuable insights into the relationship between excessive smartphone use and musculoskeletal health, particularly among vulnerable university students.

RESULTS

The results of the study provide insights into the relationship between smartphone addiction and neck pain among university students.

Table 1: Neck Disability Index (NDI) Scores Among University Students

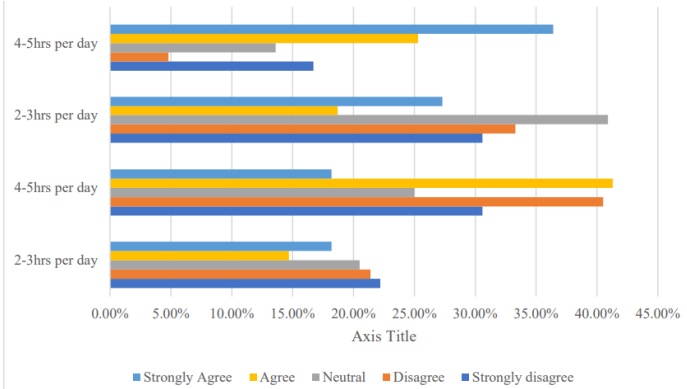
Variables	None (%)	Mild (%)	Moderate (%)	Fairly Severe (%)	Very Severe (%)	Worst (%)
Pain intensity	106 (48.4)	65 (29.7)	33 (15.1)	9 (4.1)	2 (0.9)	4 (1.8)
Personal care	182 (83.1)	22 (10.0)	4 (1.8)	6 (2.7)	4 (1.8)	1 (0.5)
Lifting	119 (54.3)	57 (26.0)	12 (5.5)	9 (4.1)	22 (10.0)	0 (0.0)
Reading	76 (34.7)	96 (43.8)	21 (9.6)	18 (8.2)	5 (2.3)	3 (1.4)
Headache	60 (27.4)	91 (41.6)	31 (14.2)	19 (8.7)	7 (3.2)	11 (5.0)
Concentration	84 (38.4)	87 (39.7)	23 (10.5)	14 (6.4)	8 (3.7)	3 (1.4)
Work	132 (60.3)	55 (25.1)	24 (11.0)	4 (1.8)	3 (1.4)	1 (0.5)
Driving	113 (51.6)	35 (16.0)	10 (4.6)	5 (2.3)	3 (1.4)	38 (17.4)
Sleeping	126 (57.5)	47 (21.5)	23 (10.5)	9 (4.1)	5 (2.3)	9 (4.1)
Recreation	118 (53.9)	74 (33.8)	15 (6.8)	4 (1.8)	4 (1.8)	4 (1.8)

Out of 219 participants, 48.4% reported no pain, while 29.7% experienced mild pain, 15.1% reported moderate pain, 4.1% had severe pain, and 1.8% experienced the worst possible pain. These findings indicate that neck pain is prevalent among university students, with varying levels of intensity. The detailed results of the Neck Disability Index (NDI) are presented in Table 1. The results of the Smartphone Addiction Scale-Short Version (SAS-SV) revealed that 36.1% of the students used their smartphones for longer than intended, while 34.2% reported experiencing neck pain while using their smartphones. Additionally, 22.4% of the students admitted to constantly checking their smartphones, and 19.2% acknowledged that others had warned them about excessive smartphone use. The detailed results are presented in Table 2.

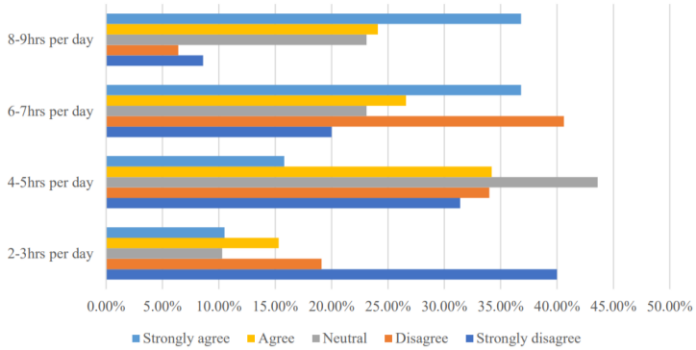
Table 2: Smartphone Addiction Scale (SAS-SV) Responses Among University Students

Variables	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Difficulty concentrating in class	34 (15.5)	44 (20.1)	76 (34.7)	18 (8.2)
Feeling pain in neck	36 (16.4)	42 (19.2)	75 (34.2)	22 (10.0)
Cannot bear being without a smartphone	62 (28.3)	62 (28.3)	38 (17.4)	11 (5.0)
Feeling impatient without phone	57 (26.0)	67 (30.6)	44 (20.1)	13 (5.9)
Smartphone constantly on my mind	60 (27.4)	68 (31.1)	41 (18.7)	10 (4.6)
Never give up using my smartphone	43 (19.6)	72 (32.9)	41 (18.7)	9 (4.1)
Constantly checking my smartphone	49 (22.4)	59 (26.9)	49 (22.4)	13 (5.9)

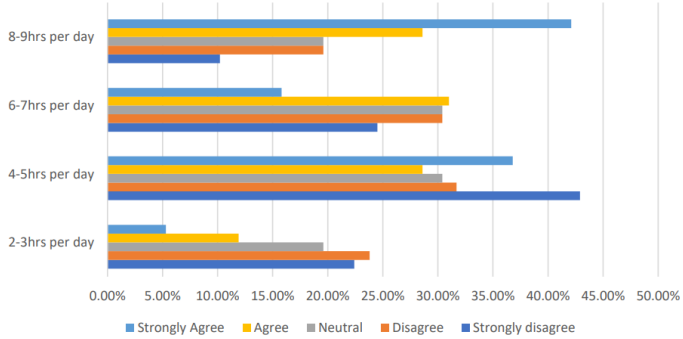
In terms of smartphone addiction and its impact on daily life, 36.1% of the participants admitted to using their smartphones longer than expected, and 34.2% reported neck pain during usage. Additionally, 22.4% acknowledged that they check their phones constantly, and 19.2% had been warned by others about their excessive use. Graphical representations of the relationships between smartphone use and neck pain, smartphone use duration, and addiction are shown in Graphs 1-3. These graphs illustrate the direct correlation between prolonged smartphone usage and reported neck pain.



Graph 1: Relationship Between Smartphone Use and Neck Pain



Graph 2: Duration of Smartphone Use and Intended Period of Use



Graph 3: Participants Informed of Excessive Smartphone Use

The results suggest a significant association between increased smartphone use and the prevalence of neck pain among university students. The data indicate that prolonged smartphone use, particularly for more than 4 hours per day, leads to increased musculoskeletal strain and discomfort in the neck region.

DISCUSSION

The findings of this study highlight the significant association between excessive smartphone use and the prevalence of neck pain among university students. These results align with previous studies that have reported similar patterns of musculoskeletal discomfort, particularly in the cervical region, among young adults due to prolonged smartphone use. The present study found that 34.2% of students reported neck pain while using smartphones, a figure that is consistent with previous research showing that long hours of smartphone use, often in a flexed neck posture, contribute to musculoskeletal disorders (1). These findings corroborate earlier studies conducted in Saudi Arabia and other regions, where smartphone addiction was linked to an increased prevalence of neck pain among university students (3, 4).

The results are in line with other research suggesting that the forward head posture commonly adopted while using smartphones places excessive strain on the cervical spine, resulting in pain and discomfort (5). In this study, 43.8% of

participants reported experiencing mild neck pain while reading on their smartphones, a finding that aligns with previous studies that have indicated a direct relationship between prolonged neck flexion and musculoskeletal pain (6). The "text neck" or forward head posture that is frequently observed in smartphone users leads to increased loading on the cervical spine, which in turn increases the risk of developing chronic neck pain (10).

One of the strengths of this study was the use of validated instruments, such as the Smartphone Addiction Scale-Short Version (SAS-SV) and the Neck Disability Index (NDI), which provided reliable measures of smartphone addiction and neck pain, respectively. These tools have been widely used in similar studies and allowed for an accurate assessment of the variables under investigation (1). However, there were certain limitations that must be acknowledged. The use of a cross-sectional design means that causality cannot be established, and it is difficult to determine whether smartphone use directly leads to neck pain or if individuals with pre-existing neck pain are more likely to use smartphones excessively. Additionally, the sample size, although adequate, was drawn from a convenience sample, which may limit the generalizability of the findings to the wider university student population (2).

Another limitation is the reliance on self-reported data, which may introduce bias, as participants could have underreported or overreported their smartphone use and neck pain. This method of data collection, while common in similar studies, poses inherent challenges to accuracy and reliability (9). Furthermore, the study did not account for other factors that may contribute to neck pain, such as physical activity levels, pre-existing musculoskeletal conditions, or ergonomic habits, which may have influenced the results.

Despite these limitations, the study provides important insights into the growing issue of smartphone addiction and its impact on neck pain among university students. Given the increasing reliance on smartphones for both academic and personal use, it is essential to address this issue through preventive measures. Universities and health professionals should focus on educating students about the risks associated with prolonged smartphone use, emphasizing the importance of adopting proper postures and taking regular breaks to alleviate musculoskeletal strain (7). Future studies should explore the long-term effects of smartphone addiction on musculoskeletal health, incorporating longitudinal designs that allow for the examination of causal relationships. Additionally, interventions aimed at reducing smartphone addiction and promoting healthy technology use should be developed and tested for their effectiveness in mitigating neck pain and other related disorders.

CONCLUSION

In conclusion, this study supports the growing body of evidence that excessive smartphone use is associated with neck pain among university students. The findings underscore the need for increased awareness and preventive strategies to reduce the prevalence of musculoskeletal disorders in this population. By promoting healthier smartphone usage habits and educating students on proper ergonomic practices, the negative impact of smartphone addiction on neck health can potentially be minimized (8). Further research should aim to address the limitations of the current study and investigate the broader implications of smartphone addiction on physical and mental health.

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