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RESEARCH ARTICLE

The prevalence of neck pain in mobile gaming players among undergraduate students in Karachi

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ABSTRACT

Background: In recent years, mobile phones have become indispensable for communication and entertainment. However, the surge in mobile gaming and its diverse offerings has led to prolonged gameplay without adequate breaks. So, people often adopt flexed neck positions, leading to neck pain. This study aims to identify the prevalence of neck pain in undergraduate students addicted to mobile gaming.

Objective: The study investigates the prevalence of neck pain due to mobile gaming addiction among undergraduate students studying in Karachi.

Methods: This cross-sectional study involves 405 undergraduate male and female students aged between 18 to 24 years from different universities and institutes in Karachi after obtaining institutional ethical approval having reference number ASHEC-PT-0125/12/22. Participants completed a questionnaire that included demographic information, the NPRS scale, and NDI measures.

Results: The mean age was 21.3±1.9 years. The NPRS showed a 74.1% prevalence of neck pain, 46.9% reported mild, 23.7% reported moderate and 3.5% reported severe pain. Furthermore, 25.9% had no pain while playing mobile games on smartphones. Additionally, NDI showed 23.5% no disability, 43.7% found mild disability, 23.5% found moderate disability, 7.2% found severe disability and 2.2% found complete disability. There was a significant association between daily time spent playing games and NPRS (p-value < 0.05).

Conclusion: The study findings highlighted that 74.1% of the total participants reported neck pain and discomfort. Also, a significant association between neck pain and mobile device usage for gaming purposes was observed due to prolonged poor posture, repetitive neck movements, and excessive flexion of the neck.

Keywords: Gaming addiction, Mobile gaming, Neck disability, Neck pain, Smartphone

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Introduction:

The cervical region of the spine consists of the cervical vertebrae extending from C1-C7 i.e. most portion of the torso to the base of the skull. An intervertebral disc is located between the cervical vertebrae and the occipit and functions as a shock absorber, meditating mechanical stress. Muscles, ligaments, and bones support your head while your neck moves. Anomalies, a condition that might cause neck pain or stiffness may be caused by inflammation. Neck pain and/or discomfort are common complaints. It usually results from incorrect sleeping habits or bad posture. You may experience neck pain after a trauma.

The occurrence of pain and discomfort in the neck region often starts as a painful sensation that results in restricting neck movements often term it as a stiff neck. This discomfort is further intensified with the movement performance and body positioning. This phenomenon is called dynamic pain which sometimes radiates to other parts of the neck, shoulder, and back impinging the nerves. Furthermore, palpatory pain is a condition in which pain increases when cervical pain is physically examined. Causes for neck pain include underlying diseases, injuries, muscle strains, and bad posture. The general symptoms of pain include stiffness, numbness, or sharp shooting pain that worsens with movement and positioning. All these reported symptoms greatly vary in the presence of comorbidities and underlying conditions.(1)

The most popular and necessary device for the younger generation is the smartphone. Smartphones are

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beneficial for many reasons, like the camera, internet access, messages, GPS navigation apps, social media, etc. The risk of musculoskeletal pain has increased with the use of smartphones.(2) Smartphones and the numerous gaming apps available on the Google Play Store are accessible to both adults and children.(3)

According to new research, youngsters who use their smartphones excessively suffer from poor sleep, less physical activity, obesity, headaches, and eye strain. (4) The most popular posture for smartphone users is a flexed neck position, which could be dangerous for those using them. Smartphone use may cause neck muscle overuse, which can lead to discomfort and fatigue in extended static positions. Moreover, neck pain and musculoskeletal problems may develop because of excessive neck muscular exhaustion.(5)

Xie Y., et al conducted a research study among smartphone users, which indicates that the more use of mobile phones or prolonged gaming time spent on the phone has been associated with greater chances of causing severe muscle pain.(6)

The amount of time to use a smartphone to decrease the risk of MSK problems has been shown in only one study. Kim SY. et al in their study conducted in 2016 suggested that smartphone users should not use their phone device for more than 20 minutes in case they want to reduce muscle fatigue and spasms in the neck region. Only young adults with upright head postures participated in the study. The study findings claimed that using a smartphone for even 10 minutes can cause neck pain and discomfort.(7)

According to findings from different studies; neck, and trunk flexion were amplified every 5, 10, and 15 minutes after using a smartphone. At each time point, the results of the bilateral Cervical Erector Spinae muscle, and activity status at the level of neck and trunk flexion were comparable at different points of time for evaluating neck and trunk flexion. Also, individuals reported slight neck pain after a 16-minute play suggesting that mobile gaming for hours can alter their neck posture and biomechanics.(8-12)

This study aims to identify the prevalence rate of university-going students reporting neck pain related to the use of smartphones for mobile gaming purposes.

Methods:

This cross-sectional study was undertaken in collaboration with prominent academic institutions like Hayat Institute of Rehabilitation Medicine, Dow University of Health and Sciences, Karachi University, Iqra University, Tabani's School of Accountancy, Federal Urdu University of Arts, Sciences and Technology, Hamdard University, and Indus University. The research spanned 6 months, during which 436 participants were directly involved in this study calculated using the Open EPI calculator. A total of 31 questionnaires were identified as incomplete during the study. For sampling, a non-probability convenient sampling technique was used. The study participants were undergraduate males and female aged between 18-30 years. Students from the medical and non-medical domains, spending more than four hours per day on smartphones and indulging in gaming for the past 3 months. The commonly played games included (PUBG, Free Fire, Call of Duty, Fortnite, League of Legends, Among Us, Minecraft, Apex Legends Mobile, Ludo Star, and Candy Crush). Students above the age of 25 will be excluded from the study. Also, participants have co-morbidities; a history of cervical pain due to any pathology i.e., cervical radiculopathy, cervical spondylosis, degenerative disc disease, herniated discs, whiplash, or cervical lordosis will be excluded from the study.

Institutional review board approval was attained in December 2022 with the reference number (ASHEC-PT-0125/12/22) and written consent for data collection was attained from the institutions stating all the risks and benefits of the study. The privacy of participants was ensured during the consent session. Names of the participants were not to be disclosed or used in the data. Any publications from the study would represent the result in aggregate; no participants personal information were disclosed.

NPR Scale was used as an outcome measure to find out neck pain.(13) The NPRS is a pain rating questionnaire. The patient is asked to indicate the intensity of their current pain. This self-report measure uses an 11-point numeric scale, ranging from 0 ("no pain") to 10 ("worst pain imaginable").(14) NDI is an established tool to assess neck discomfort. The questionnaire included a 10-item Likert scale ranging from 0 (no pain) to 5 (worst pain). The overall score ranges from 10 to 50 with higher values indicating more extreme neck impairment. The inter-class correlation value of the NDI ranges from 0.50 to 0.98, demonstrating the instruments' high levels of validity and dependability.

The questionnaire and the consent form were explained to the participants. Data was collected by questionnaires Numeric Pain Rating Scale (NPRS) and Neck Disability Index (NDI). Later, the data was analyzed by (SPSS version 24). Descriptive statistics

frequency and percentage were reported. The Chi-Square test was used.

Results:

The results for gender distribution indicate that 52.8% of males and 47.2% of females participated in the study. The mean age of the participants was 21.3±1.9 years. (Table 1)

The study results highlighted significant smartphone usage and gaming patterns among participants. Most participants use their smartphones for several hours daily, with a notable portion dedicating extensive time to gaming. Continuous gaming pattern sessions were common, and PUBG was noted to be the most common and popular game, followed by Ludo Star and Candy Crush. (Table 2)

The graphical representation in Fig 1 analyzes the popularity of the various mobile gaming games nowadays. The results indicated that PUBG is the most frequently played game followed by the Ludo star and Candy Crush securing the third spot.

In this study, we evaluated the prevalence of neck pain through the NPRS (Numeric Pain Rating Scale). Among the participants, the prevalence of neck pain is 74.1%, however among them 46.9% were with mild pain, 23.7% were with moderate pain and 3.5% were with severe pain on the other hand 25.9% had no pain while playing mobile games on smartphones. (Fig 2)

In this study, we also evaluated neck disability through the NDI (Neck Disability Index). The reason to assess it was to identify whether it was one of the confounding factors causing neck pain among the participants. The result suggested that 23.5% found no disability, 43.7% found mild disability, 23.5% found moderate disability, 7.2% found severe disability and 2.2% found complete disability. (Fig 3)

The study reveals a significant association between daily playtime of the game and NPRS, as determined by the Chi-Square test. Participants spending over 5 hours daily on games reported 47.5 % incidence of neck pain, compared to 46.7% among those playing 1-5 hours daily. The association between the incidence of neck pain and daily gaming time is statistically significant, indicating a strong relationship between prolonged gaming time and the occurrence of neck pain.

Discussion:

The widespread use of smartphones in this digital era cannot be disregarded, as these devices have become ubiquitous across all generations.(10) The increasing popularity of smartphone gaming, particularly among healthy young individuals, has brought attention to potential health impacts associated with the activity. Existing literature strongly co-relates smartphone gaming addiction) with neck pain and disability.(11-13) Till today, the debate continues regarding the beneficial outcomes versus the adverse consequences of smartphone use, impacting both overall health and well-being.(7)

Several studies have documented the incidence of musculoskeletal symptoms associated with excessive and compulsive smartphone use for gaming purposes. It was found that incorrect bodily movements, inappropriate body weight distribution, and poor posture habits result from excessive smartphone use leading to neck pain and disability.(11-13) Despite the known negative implications, smartphone usage

Table 1: Demographic Information

Gender	n	percent
Male	214	52.8
Female	191	47.2
University & Institute		
HIRM	48	11.9
Karachi University	47	11.6
Iqra University	21	5.2
TSA	51	12.6
Hamdard University	52	12.8
DOW University of Health Sciences	80	19.8
Federal Urdu University	61	15.1
Indus University	45	11.1

Table 2: Questions Related to Mobile Usage and Gaming

Daily Smartphone Usage Time (Hours)	**N**	**Percent**
1 – 7	230	56.8
7 – 14	175	43.2
Daily Time Spent Playing Games (Hours)		
1 – 5	285	70.4
5 Above	120	29.6
Smartphone Gaming Without Break (Hours/Minutes)		
Less Than 30 Minutes	61	15.1
1-4 Hours	302	74.6
Above 5 Hours	42	10.0
Which Game Do You Play The Most?		
Pubg	200	29.3
Free Fire	56	8.2
Call Of Duty	39	5.7
Fortnite	11	1.6
League of Legends	18	2.6
Among Us	32	4.7
Minecraft	16	2.3
Apex Legends Mobile	6	0.9
Ludo Stars	94	13.8
Candy Crush	85	12.5
Others	125	18.3

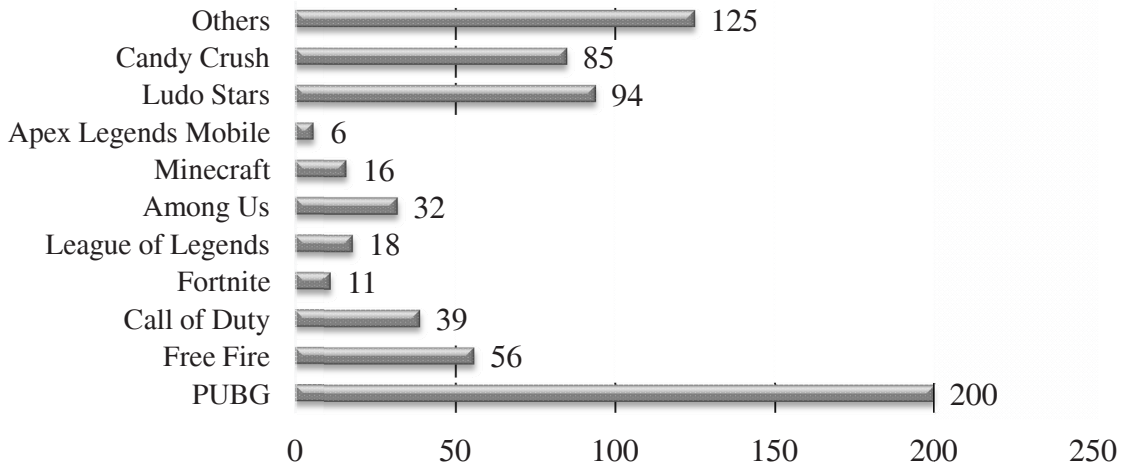

Figure1: Games Played

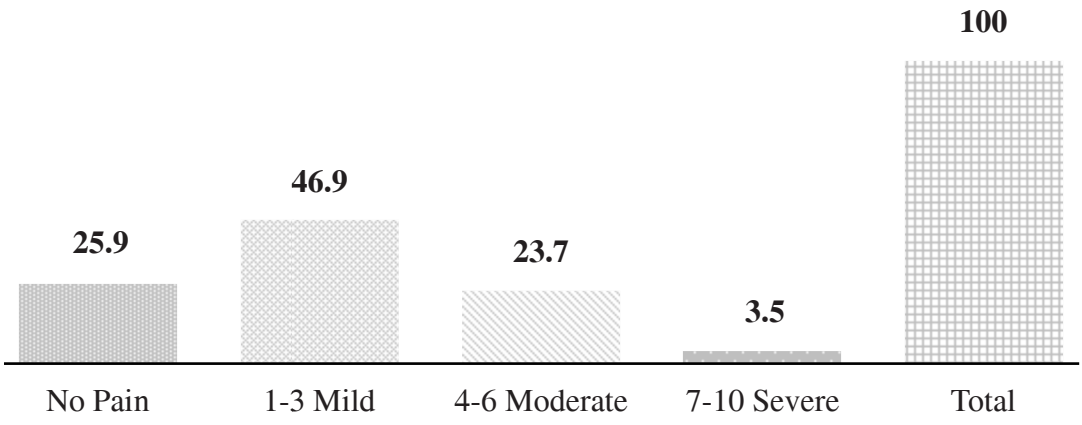

Figure 2: Graphical Representation of Numeric Pain Rating Scale (NPRS) Result

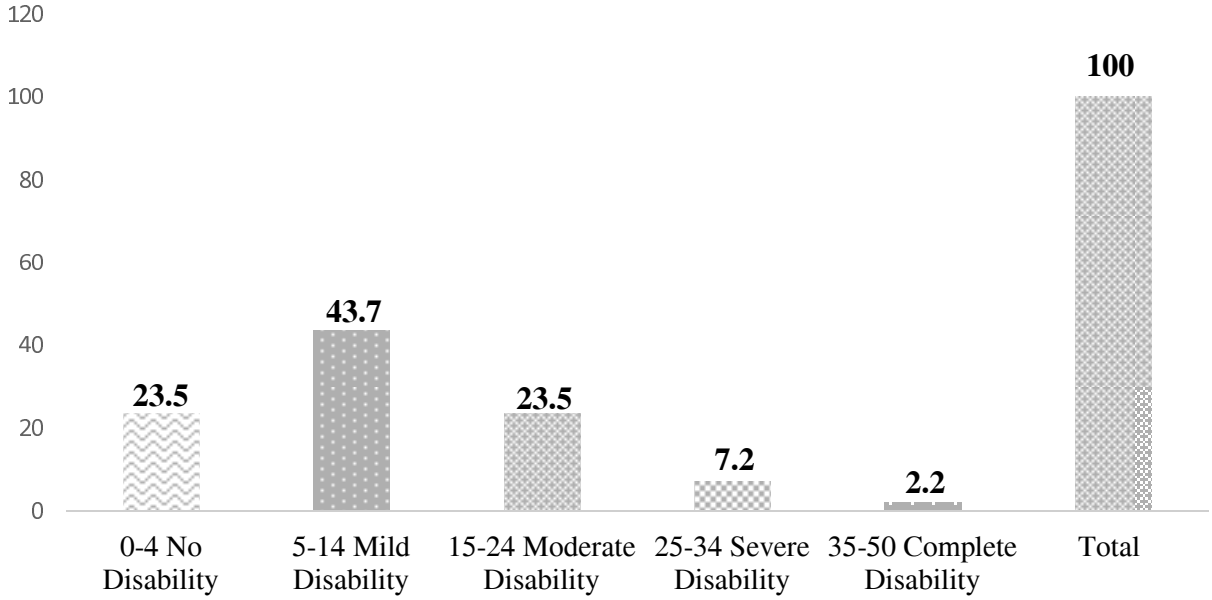

Figure 3: Graphical Representation of Neck Disability Index (NDI) Result

Table 3: Association of Daily Time Spent Playing Games with NPRS

Numeric Pain Rating Scale	Daily Time Spent Playing Games		p-value
	1-5 Hr	Above 5 Hr	
No Pain	88(30.9)	17(14.2)	
Mild Pain	133(46.7)	57(47.5)	
Moderate Pain	56(19.6)	40(33.3)	0.01
Severe Pain	8(2.8)	6(5.0)	
Total	285	120	

continues to increase with each passing day.(14)

A cross-sectional survey highlighted that the growing concern over neck pain caused by prolonged mobile device use, especially for gaming purposes.(10) The study underscores the need for further investigation into potential adverse effects on health, particularly focusing on neck pain. The findings suggested a significant association between neck pain and the duration of smartphone usage for gaming purposes.

In addition to previous studies, the present study found that a majority of 76.1 percent of the participants experienced neck pain but was not associated with any disability, indicating a significant correlation between neck pain and smartphone use duration. This finding was similar to another study which identified varying proportions of pain severity based on the usage of the phone.(15) This discrepancy in results might be due to the difference in the population characteristics, selection criteria, pain perception, and threshold.

Many studies emphasize the critical role of understanding the escalating use of smartphones as a contributing factor to musculoskeletal symptoms. (6,14) Numerous studies have examined the impact of smartphone gaming on neck pain. These studies revealed a significant increase in neck discomfort post-gaming sessions, highlighting the note-worthy impact of gaming activities on neck pain occurrence and its intensity. They also provided insights into the relationship between smartphone use, gaming, and neck pain, with studies reporting similar findings. (3,14) A couple of other studies also investigated these associations, though their studies were conducted on a smaller scale, limiting the generalizability of their findings.(5,7)

Overall, the present study results align with some previous research while contradicting others. This highlights the need for further research with diverse research designs and a multidisciplinary approach to gain a comprehensive understanding of the potential health impacts of smartphone use, particularly regarding gaming and the occurrence of neck pain.

Conclusion:

In this study, the prevalence of neck pain among university-going students related to smartphone use for gaming purposes was found to be 74.1%. Also, PUBG was the most played game on smartphones. A significant association was observed between neck pain and mobile device usage particularly related to gaming, which can be attributed to prolonged poor posture, repetitive movements, and excessive flexion of the neck. The findings underscore the importance of addressing ergonomic practices and posture to mitigate the risk of neck pain among the young population.

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Conflict of Interest: None to declare

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Authors Contribution:

Zaveri M: Research concept and design and Final approval of the article.

Khan B: Collection and/or assembly of data.

Faiz A: Research concept and design and Final approval of the article.

Afzal M: Writing the article and critical revision of the article.

Rakha SA: Data analysis and interpretation.

Khan A: Data analysis and interpretation.