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Prevalence of Wrist Pain, Disability, and Association with Smartphone Addiction Among Undergraduate Physical Therapy Students of Hayatabad Peshawar; An Analytical Cross-Sectional Study

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KEYWORDS

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DECLARATIONS

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ABSTRACT

Background: In the modern world, smartphones have become an integral part of our daily life routine due to their extensive application in communication, entertainment, work, and study. However, excessive and prolonged use of smartphones has been linked to developing smartphone addiction, which in turn is a causative factor for many musculoskeletal problems, including wrist and hand pain as well as disabilities. **Objective:** To determine the prevalence of wrist pain, disability, and association with smartphone addiction among undergraduate physical therapy students of Hayatabad Peshawar. **Methodology:** A cross-sectional survey was conducted on 300 undergraduate physical therapy students of Hayatabad, Peshawar, using a convenience sampling technique. The nordic wrist pain scale, patient-rated wrist evaluation scale (PRWE), and smartphone addiction scale short version (SAS-SV) were used to determine the prevalence of wrist pain, its severity, and smartphone addiction level, respectively. Individuals with a history of wrist joint fracture or trauma, recent analgesic use, neurological, metabolic, and systemic diseases were excluded. The Shapiro-Wilk test was applied to assess the normality of the data for the continuous variable, which showed that our data was normally distributed ($p > 0.05$). A chi-square test was performed to examine its association with wrist pain and disability. **Results:** Out of 300 students, 168(56%) showed a high level of smartphone addiction, whereas 132(44%) showed a low level of smartphone addiction. The prevalence of wrist pain was found to be 162(54%) out of 300; the majority of the participants fell into the mild category of wrist pain and disability. A significant association was found between smartphone addiction and wrist pain, disability ($p = 0.00$). Wrist Pain and Duration of mobile phone usage were statistically significant ($p = 0.00$), 55.7% of the participants used their mobile phones more than five hours a day. **Conclusion:** There was a high prevalence of smartphone addiction among students, which was associated with increased prevalence of wrist pain. The duration of smartphone usage was also significantly associated with wrist pain and disability.

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INTRODUCTION

In today's modern technological era, smartphones have become a fundamental part of our everyday lives.¹ The total population of smartphone users worldwide has increased progressively; it was found to be 3.8 billion by the end of 2021.² Mobile Phones act as a means for communication, entertainment, work, and study, which leads to their increased usage.³ The features offered by smartphones can keep users engaged for longer periods of time, leading to dependency and harmful usage.⁴ Harmful smartphone usage is addressed by different names, e.g., smartphone addiction, smartphone dependence, and smartphone overdependence.⁵ Smartphone addiction is a type of technological addiction. Smartphone addiction is characterized by compulsive behaviors, intolerance, withdrawal effects, and functional impairments.⁶

In recent years, the phenomenon of smartphone addiction has become a prominent global issue, affecting individuals across various age groups and demographics, particularly students.⁷ Smartphone addiction among the students of the Kingdom of Saudi Arabia University rose significantly between 2016 and 2019, from 19.1% to 60.3%.⁷ However, excessive and prolonged use of smartphones can lead to musculoskeletal problems, especially in the wrist and hand regions.⁸ When using a smartphone, frequent repetitive or static wrist and thumb motions like typing, tapping, and scrolling can lead to increased strain and stress on the hand and wrist's joints, muscles, and tendons.⁹ According to the literature, smartphones have become a causative agent for many physical, mental, and psychosocial problems. They have been linked to causing physical discomfort and pain in the wrist, neck, and eyes.¹⁰

Smartphone overuse has also been associated with poor academic achievement, poor quality of sleep, musculoskeletal pain, anxiety, stress, and negative emotions among college students.¹¹ Smartphone addiction was also found to result in conditions such as carpal tunnel syndrome and repetitive strain injuries, leading to wrist tendinitis. Using a smartphone with a single hand compared to both hands increases repetitive movements and muscle work, leading to a higher risk of developing MSDs.¹¹ The size of the smartphone was also found to have a significant effect on musculoskeletal pain.¹² Smartphone ownership has consistently been on the rise, with an exponential increase from

83.3% in 2016 to 93.4% in 2021 documented. In 2016, more than 96% of individuals under the age of 50 had a smartphone, with the ownership increasing by 1-3% over the last 5 years.¹³ A study conducted in Bangladesh and India showed that 46.3% of students from selected universities were moderately addicted, while 15.3% were severely addicted to their smartphones.¹⁴

Another cross-sectional study carried out in Jeddah at King Abdul Aziz University (KAU) in 2020 found a high prevalence of cellphone addiction. The results of the study demonstrated that out of 387 medical students, 257 (66.4%) had smartphone addiction.¹⁵ A recent research found that 76% of people aged from 18-44 had their smartphones with them at almost all times and would spend a few waking hours without having their cellphones in hand.¹⁶ A study by Parasuraman et al., reported that 70% of college-going students used smartphones longer than they intended to and that women are comparatively more prone to using their smartphones than men.¹⁷

A study by Amjad et. Al (2024) reported a significant association between duration of mobile phone usage and wrist pain/disability.¹⁸ Duration of mobile phone usage has a significant impact on musculoskeletal symptoms, with a positive association between duration of smartphone usage and wrist pain. Participants of the study who used their smartphones more than five hours a day had a high prevalence of wrist pain.¹⁹ According to Mustafaoglu et al., a high prevalence of musculoskeletal pain was reported in the upper back, neck, wrist, and hand region due to excessive smartphone usage. About 70.3% had upper back pain, 68.7% of the participants had wrist-hand pain, and 65.9% had neck pain as a result of smartphone addiction.² In 2020, Fatima et al., reported that pain and disability in the wrist joint were due to the high number of hours spent by students on their smartphones. They highlighted an important connection between movements during smartphone usage and the effects on wrist joint organization.²⁰

According to a study conducted in 2022, 23.6-37.3% of the physiotherapy students had musculoskeletal pain in various hand areas due to increased mobile phone usage.¹ Understanding the impact of smartphone addiction on wrist health is important because frequent wrist pain and disability can hinder students' ability to perform academic tasks effectively, including the practical

skills crucial for their training. As future healthcare providers, their physical health is crucial not only for their well-being but also for their professional competence. Given its significant impact on the student's ability to perform manual therapy techniques in the future, future physiotherapy practitioners need to understand the relationship between wrist pain and smartphone addiction to prevent all the potential health risks associated with it. Therefore, the purpose of the study was to determine the prevalence of wrist pain, disability, and association with smartphone addiction among undergraduate physical therapy students of Hayatabad Peshawar.

METHODOLOGY

This was an analytical cross-sectional study conducted at all physical therapy institutes in Hayatabad, comprising IPMR, Rehman College of Rehabilitation Sciences, Paraplegic Centre, Mehboob Medical Institute, Cecos University, and Iqra National University. The study was completed in six months, from June to November 2024, and a non-probability, convenience sampling technique was employed. The sample was 300 with a 95% confidence interval, calculated through OpenEpi. Undergraduate physical therapy students and Participants who gave consent were included in the study. Individuals with a history of wrist joint fracture or trauma, recent analgesic medication intake, neurological disease of the upper limb (carpal tunnel syndrome), metabolic disease (liver disease, diabetes), and systemic disease (inflammatory arthropathy) were excluded from the study. Data was collected following the approval of the research proposal by the Graduate Study Committee of RCRS.

Data collection tools included the Nordic wrist pain questionnaire, which was used to find the prevalence of wrist pain. Individuals without wrist pain were asked to skip the PRWE scale and proceed directly to the smartphone addiction scale. The patient rated wrist evaluation questionnaire (PRWE) was used to assess the level of pain and disability experienced at the wrist joint. It consists of 15 items divided into two sections: the pain section, comprising 5 items, and the function section, comprising 10 items. Each item was rated on a scale from 0 to 10, where 0 signified no pain and 10 represented the most intense pain. Scores were calculated by summing up the functional ratings, dividing them by 2, and then adding the pain ratings to derive a total out of 100 points.

Higher scores indicated greater pain and poorer function, while lower scores suggested better function and less pain. Reliability was (Cronbach's alpha >0.90), and validity was ($p<0.01$). The short version of the smartphone addiction scale questionnaire (SAS-SV) was used to assess the level of smartphone addiction. It comprises 10 questions graded on a 6-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Weakly Disagree, 4: Weakly Agree, 5: Agree, 6: Strongly Agree). The scores on the scale range from 10 to 60. Higher scores indicate higher levels of smartphone addiction. A mean cut-off value of 31 for men and 33 for women had been adopted. Reliability was (Cronbach's alpha >0.91), and validity was ($p<0.01$).

Data was analyzed using SPSS version 24. For demographic variables, the mean and standard deviation were calculated for age, while frequencies and percentages were calculated for gender, year of study, institute, duration of mobile usage, mobile phone model, level of wrist pain, and disability. The Shapiro-Wilk test was applied to assess the normality of the data for the continuous variable (smartphone addiction scale), which showed that our data was normally distributed ($p\text{-value}>0.05$). Smartphone addiction score was converted into a categorical variable, and then a Chi-square test was performed to examine its association with wrist pain and disability. Additionally, to find the association between wrist pain and the duration of smartphone usage, a Chi-square test was applied. The $p\text{-value}$ of <0.05 was considered significant.

RESULTS

Table 1 shows the results of the findings, a total of 300 physical therapy students from Hayatabad, Peshawar, with a 100% response rate. The participants' age was between 17 and 27 years, with a mean age of (21.64 ± 1.81) years. Gender distribution among the participants showed that 127 (42.3%) were males and 173 (57.7%) were females. A breakdown of the participants by college revealed that the majority of the students were from IPMR 87 (29%), followed by INU 75 (25%), RCRS 50 (16.7%), Cecos 35 (11.7%), Paraplegic 28 (9.3%), and MMI 25 (8.3%). The number of students who participated in the first year was 61 (20.3%), second year 61 (20.3%), third year 61 (20.3%), fourth year 62 (20.7%), and fifth year 55 (18.3%). In the present study, 168 (56%) participants exhibited high levels of

smartphone addiction, while 132(44%) participants exhibited low levels of smartphone addiction.

Out of 300 participants, majority of the participants accounting for 167 (55.7%) reported spending more than 5 hours on mobile phone, followed by the duration of 3-5 hours accounting for 78 (26%), 2-3 hours accounting for 34 (11.3%) and only 21 (7%) participants spent 1-2 hours on mobile phone (Figure 1). A significant number of participants experienced wrist pain, accounting for 162 (54%) individuals, with a notable prevalence of 115 (38.3%) individuals experiencing pain in the right wrist or hand. Few people reported having pain in the left wrist or hand, accounting for 21 (7%) individuals. Moreover, 26 (8.7%) participants reported having pain in both wrists and hands. While 138 (46%) individuals reported experiencing no wrist pain (Table 2).

Severity of wrist pain and disability was assessed based on Patient Rated Wrist Evaluation Scale, indicating the significant proportion of respondents, accounting for 138 (46%) participants, having no wrist pain and disability, followed by 77 (25.7%) participants having mild pain and disability, 44 (14.7%) participants having minimal pain and disability, 28 (9.3%) respondents having moderate pain and disability, 12 (4%) participants having severe pain and disability while only 1 (0.3%) participant lie in the very severe category of wrist pain and disability.

The chi-square test was used to determine the association between wrist pain/disability and smartphone addiction. This study found a significant association (p-value of 0.00) between these variables. It indicates that participants who have a high level of smartphone addiction have more wrist pain, and students who have low smartphone addiction have no wrist pain. Chi-square test was further used to find the association of wrist pain/disability and smartphone addiction with duration of mobile phone usage, which also showed a significant association with a p-value of 0.03 and <0.01, respectively, indicating that the higher the use of mobile phone, the more the addiction is. Moreover, the association of smartphone addiction with gender was also assessed, which showed a significant association with a p-value <0.01.

DISCUSSION

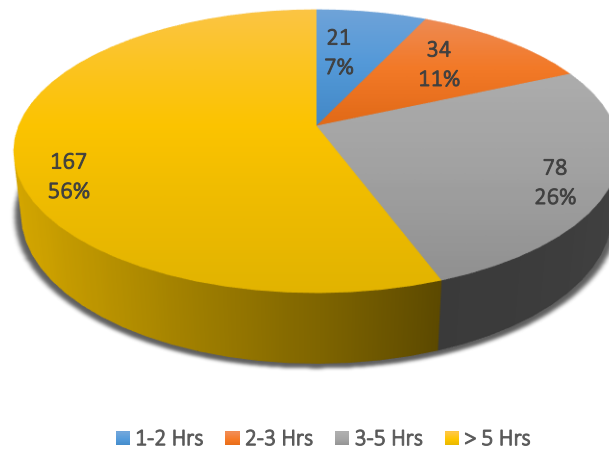
In this study, the total sample size of

undergraduate physical therapy students was 300, which included 127 (42.3%) male and 173 (57.7%) female participants. In the current study, a high prevalence of smartphone addiction was seen among the participants. Out of the sample of 300 participants, 168 (56%) participants exhibited high levels of smartphone addiction, whereas 132 (44%) participants depicted low levels of smartphone addiction. A similar survey was carried out by Ahmed et al., in 2022, which showed that out of 326, 69.2% participants had a high level of smartphone addiction. However, the findings of this study are different from a survey conducted in that students were observed to have a low level of

Table 1: Demographics of the participants

Variables	Category	Frequency (f)	Percentage (%)
Gender	Male	127	42.3
	Female	173	57.7
Institute	RCRS	50	16.7
	MMI	25	8.3
	Paraplegic	28	9.3
	IPMR	87	29.
	CECOS	35	11.7
	INU	75	25
Year of study	1 st year	61	20.3
	2 nd year	61	20.3
	3 rd year	61	20.3
	4 th year	62	20.7
	5 th year	55	18.3
Severity of wrist pain	None	138	46
	1-20 (Minimal)	44	14.7
	21-40 (Mild)	77	25.7
	41-60 (Moderate)	28	9.3
	61-80 (Severe)	12	4
	81-100 (Very Severe)	1	0.3

Figure 1: Duration of smartphone usage



smartphone addiction, with a percentage of 29.8%.²¹

According to the previous research findings, the prevalence of smartphone addiction is high because daily smartphone usage and dependence have evolved exponentially in the past few decades, as we are dependent on it in many aspects of daily life. Based on the present study's results, A significant association (p -value of $0.03 < 0.05$) was found between wrist pain and duration of mobile phone use, indicating that with the increased usage of smartphones, the participants experienced increased wrist pain. The majority of students in our study (55.7%) reported spending more than 5 hours on mobile phones. Similar results have been found by a study in 2020, Bartwal et al., which reported that 62.1% students use smartphones for more than 3 hours.²² Another study, Al-Dhafer et al., in 2023, demonstrated that 58.6% of the respondents were using smartphones between 5 and 9 hours per day.⁷ The reason is that smartphones offer a large variety of features that keep the users captivated for longer periods of time, such as entertainment, study, work, etc.

The current study found that the participants had a high prevalence of wrist pain, out of 300 students, 138 (46%) individuals reported having no wrist pain whereas 162 (54%) students reported having increased wrist pain, out of which 38.3% participants experienced pain in their right wrist or hand, 7% participants had pain in their left hand or wrist while 8.7% participants reported having pain in both wrist and hands. The results are consistent with a study conducted by Al-Dhafer et al., in 2023, which also demonstrated a high level of wrist and hand pain. The findings of the study

reported that 56.6% respondents had pain in their wrist or hand, among them 60.6% experienced pain in their right hand, while 15% experienced pain in their left hand.⁷

In contrast to the above studies, a study by Baabdullah et al., in 2020 demonstrated a low level of wrist pain; in their study, only 20.4% of participants reported having pain in their wrist and thumb.¹⁵ Repetitive movements, static abnormal postures, traumas, and pathology are some of the factors involved in wrist pain and discomfort. In the current study, participants were classified into different categories of wrist pain and disability based on the PRWE scale classification. A significant proportion of the participants (25.7%) had mild pain, 14.7% had minimal pain, 9.3% had moderate pain, and 4% had severe pain.

A study conducted in 2022, which used the PRWE scale to find out wrist pain and disability among the participants, found that the majority of the participants (72.4%) had moderate pain, and 22.97% had mild pain.²³ The current study found a significant association between wrist pain and smartphone addiction (p -value of 0.00), indicating that participants who had high smartphone addiction experienced increased pain in their wrist and hand. The results of the current study are consistent with many previous studies, such as A study by Mustafaoglu et al., 2021 also found strong correlation between smart phone addiction and wrist pain with p -value of 0.00.² Another study done in 2023 result are in favor of our study reported a statistically significant association between wrist pain and smart phone addiction with the p -value ($p < 0.00$)⁷ this indicates that the excessive usage of mobile phone can result in

detrimental effects on the wrist and hand. A study in 2020 results are also consistent with our study results, which show a notable association (p-value of 0.03) between smartphone addiction and wrist pain.¹⁵

In our current study, there was a strong association between smartphone addiction and gender, with a p-value of 0.00. Similar results were found by Renuka K et al., which also showed a significant association between gender and smartphone addiction; male participants had a higher prevalence of smartphone addiction as compared to the female participants.²⁴ While, in contrast, a study by Alhassan et al., showed no significant association between gender and smartphone addiction.²⁵ The limitations of our study were that a cross-sectional design was selected due to time limitations, and the findings of this study cannot be generalized to all undergraduate physiotherapy students and all other medical students of Pakistan. A longitudinal study design with a probability sampling technique will increase the rigor of the research. Further researchers are advised to conduct the study with a larger sample and population size.

CONCLUSION

From this study, we conclude that there was a high prevalence of smartphone addiction among students. Students with high levels of smartphone addiction were found to have a high prevalence of wrist pain. A significant association was found between smartphone addiction and wrist pain/disability. The duration of smartphone usage was also significantly associated with wrist pain and disability. Smartphone addiction was found to be more widespread among males than among females.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None

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