Research Article

Smartphone Addiction and Wrist Pain in Brazilian Medical Students

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Abstract

Objective: This study aims to determine the prevalence of smartphone addiction among medical students and investigate if there is an association of this dependence with the occurrence of wrist pain.

Methods: This study was carried out from April 2020 to August 2020 to collect data from a population of medical students from Fortaleza, Brazil. The survey was conducted using a Google form sent via online communication to 505 medical students. The smartphone addiction scale-short version (SAS-SV) divided participants into the smartphone addict and non-addict groups. Both groups completed the self-administered patient-rated wrist evaluation (PRWE) questionnaire, in which higher scores indicate worse function and more pain.

Results: 505 medical students from four different universities in Fortaleza-CE from the first to the eighth period, with an average of 60 students/period were enrolled, including 294 (58.2%) women. The mean age was 21.65±3.44 years. According to the SAS-SV results, 235 (46.5%) participants were smartphone addicts, and 276 (54.7%) used smartphones for more than 5 hours daily. There was a significant association between smartphone addiction and PRWE total score (Addict group:15.81±13.63 vs Nonaddict group: 13.43±12.86, p=0,004), pain subscale (Addict group:12.70±10.26 vs non-addict group: 10.34±10.15, p=0,006), and functional subscale (Addict group:9.71±6.22 vs non-addict group: 9.59±5.05, p=0,006). There were no differences regarding wrist pain and sex, age, or dominant hand.

Conclusion: The present study found a significant association between smartphone overuse and wrist pain. Further research is necessary to develop guidelines for the wise use of mobile phones to prevent such symptoms.

Keywords: Addiction; Smartphone; Musculoskeletal disorder; Pain; Medical students

Introduction

Smartphones are increasingly integrated into people's daily activities, offering a wide range of mobile applications with different purposes: communication, education, internet browsing, and gaming [1,2]. The number of smartphone users has increased in the last decade in many countries, especially among young adults [3]. In the United States, in 2016, 92% of citizens between 18 and 34 years old reported having at least one smartphone. The number goes even higher in Australia, with 95% of the population owning the device [4].

Smartphone addiction is an emerging phenomenon categorized as a behavioral addiction, such as Internet addiction [5]. People with this problem encounter psychological, social, and health problems, including depression, sleep disorders, and musculo-skeletal complaints [6-8].

The repetitive use of smartphones and the repeated movement of the hands in a specific posture proved to be the main factors contributing to musculoskeletal symptoms1. Usually, the typical posture when manipulating smartphones involves holding the tool with one or two hands below eye level, looking at the device with flexion of the neck, and using the thumb to touch the screen, embracing a harmful body posture maintained for long periods [9]. The body parts most commonly affected by pain complaints are fingers, wrists, neck, back, and shoulders [10-12].

Many smartphone users experience pain in the thumb and

wrist. However, few researchers have evaluated whether those who develop pain are addicted to smartphones. A single study carried out by Baabdullah and colleagues with medical students in Saudi Arabia found a correlation between smartphone dependence and hand pain, indicating that heavy use of these devices can cause subclinical effects on the human hand [13]. Previous studies have shown that the use of electronic devices that involve frequent movement of the thumb leads to an increased load on the thumb and, therefore, to a greater risk of pain in the hand or wrist [10,11,14].

The smartphone's functions represent a great potential for applications in medical education since they allow the access of doctors and medical students to high-quality information materials to support better therapeutic decision-making13. Medicine is constantly changing: different diseases and treatments are discovered all the time, medical knowledge is getting updated frequently, the current primary research source of new information has become the internet, in which articles, video classes, apps, and websites can be more updated than traditional books. Although its benefits, electronic devices users must be aware of the several physical effects, such as musculoskeletal pain, discomfort, and numbness that they can cause [15].

In Brazil, it is not of our knowledge that studies associate smartphone addiction with wrist pain. The present study aims to determine the prevalence of smartphone addiction among medical students in Brazilian universities and investigate the possible association of this dependence with the occurrence of wrist pain, using a questionnaire with internationally validated scales.

Methods

This study, a cross-sectional survey, was carried out from April 2020 to August 2020 to collect data from a population of university students from four Medicine Schools in Fortaleza, Brazil, two of which are governmental universities and the other two are private universities. The survey was conducted using a Google form sent online to all medical students between the first and fourth year of college. The Google form was adjusted to prevent submitting answers more than once. Any participant who was not willing to answer could decline at his or her discretion.

The smartphone addiction scale-short version (SAS-SV) divided participants into the smartphone addict and non-addict groups according to their scores. It consists of 10 questions based on a self-reporting system with a Likert scale of 6 points (1: strongly disagree, 2: disagree, 3: weakly disagree, 4: weakly agree, 5: agree, 6: strongly agree). The cut-off value adopted was 31 for men and 33 for women [16,17].

Both groups completed the self-administered patient-rated wrist evaluation (PRWE) questionnaire, in which higher scores indicate worse function and more pain, which also is a self-reported questionnaire. It consists of 15 items divided into two subscales, the pain subscale (5 items) and function subscale (10 items); both scored 0-10, where 0 means no pain and ten means the worst pain ever felt in the pain subscale. The scoring system is calculated by dividing the functional scores by two then adding the pain scores to give 100 points. Lower scores

point to better function and less pain [18,19].

The data were exported to the Statistical software package for the Social Sciences (SPSS) version 20.0 for Windows. The analyzes were performed with a 95% confidence interval. The study expressed each variable's absolute and percentage frequencies in the form and connecting with smartphone addiction, weight, height, and BMI, using Fisher's exact test or Pearson's chi-squared test and Mann-Whitney to compare smartphone addiction and PRWE scores.

Results

Five hundred and five medical students from four different universities in Fortaleza-CE from the first to the eighth period, with an average of 60 students/period were enrolled, including 294 (58.2%) women and 211 (41.8%) men. The mean age was 21.6±3.4 years.

According to the SAS-SV results, 235 (46.5%) participants were considered smartphone addicts, of which 43,5% of the women and 50,7% of the male group considered themselves addicts (p=0,1) **(Table 1)**. The majority of participants (54.7%) used a smartphone for more than 5 hours daily. There were no significant differences between average time spent daily on a smartphone and PRWE scores **(Table 2)**.

There was a significant association between smartphone addiction and high PRWE total score (15.8±13.6 vs 13.4±12.8, p=0,004), high pain subscale (12.7±10.2 vs 10.3±10.1, p=0,006), and high functional subscale (9.7±6.2 vs 9.5±5.05, p=0,006) **(Table 3)**. No differences were observed regarding wrist pain and sex, age, or dominant hand.

Discussion

This study aimed to determine the prevalence of smartphone dependence among medical students from Brazilian universities and investigate the association of this dependence with the occurrence of wrist pain, using a questionnaire with internationally validated scales. Our survey showed a high percentage of smartphone dependents (46.5%). These results are greater than those seen in young populations in other countries. In Switzerland, smartphone addiction among adolescents was reported as 16.9% using the smartphone addiction scale-short version (SAS-SV) [20]. Furthermore, a German study of medical residents found that 27.1% were addicted to smartphones [20].

Our study also showed that the majority of smartphone addicted participants complained of hand/wrist pain in the last of 12 months (54.9%), but without statistical significance. Elsewhere, a study conducted with Chinese university students showed that 43.4% of participants had thumb/wrist pain due to the use of different electronic devices [11]. In a study from Pakistan, 42% of adolescents reported thumb/wrist pain due to smartphone use [14].

Once the severity of thumb/wrist pain correlated with smartphone addiction was clarified, we compared our results with a similar study using the PRWHE scale performed with medical students. In our study, a significant correlation was found between high PRWHE scores and smartphone addiction (p=0.036) [13].

Table 1: Characteristics of participants with and without smartphone addiction.

	Total	Non-addict group	Addict group	P-value
Sex				
Total	505	270	235	
Female	294 (58.2)	166 (61.5)	128 (54.5)	0,111
Male	211 (41.8)	104 (38.5)	107 (45.5)	
Age				
≤ 21	295 (58.4)	147 (54.4)	148 (63.0)	0,052
>21	210 (41.6)	123 (45.6)	87 (37.0)	
BMI (kg/m²)				
<=30	461 (91.3)	245 (90.7)	216 (91.9)	0,641
>30	44 (8.7)	25 (9.3)	19 (8.1)	
Hand/wrist complaints in the last 12 months				
No	232 (45.9)	126 (46.7)	106 (45.1)	0,726
Yes	273 (54.1)	144 (53.3)	129 (54.9)	
Hand dominance				
Right-handed	460 (91.1)	246 (91.1)	214 (91.1)	0,639
Left-handed	44 (8.7)	23 (8.5)	21 (8.9)	
Ambidextrous	1 (0.2)	1 (0.4)	0 (0.0)	

*p<0,05 Fisher's exact test or Pearson's chi-squared (n, %). BMI, body mass index. Data are expressed as frequency (%)".

Table 2: Analysis of association between average time spent daily on a smartphone, PRWE scores and sex.

	Less than 2h	2-3h	3-4h	4-5h	More than 5h	p-Value
PRWE Score						
Pain Score	17.1±13.5	8.3±10.4*	10.0±8.3	11.1±9.4	12.2±10.7	0,04[a]
Function Score	6.2±9.2	4.4±8.4	5.7±10.5	5.5±10.3	5.7±9.3	0,94[a]
Total Score	20.2±17	10.5±13	12.8±12	13.9±13	15.1±14.1	0,14[a]
Sex						
Female	2 (25.0%)	18 (40.9%)	43 (53.1%)	56 (58.3%)	175 (63.4%)	0,01[b]
Male	6 (75.0%)	26 (59.1%)	38 (46.9%)	40 (41.7%)	101 (36.6%)	

*p<0,05, [a] Kruskal-Wallis/Dunn test; [b] Fisher's Exact test or Pearson's chi-squared test (n, %). h, hour. PRWE, patient-rated wrist evaluation.

Table 3: Analysis of association between smartphone addiction and PRWE scores.

PRWE score	Non-addict group	Addict group	p-Value
Pain score	10.3±10.1	12.7±10.2	0,006
Function score	5±9.5	6.2±9.7	0,006
Total score	12.8±13.4	15.8±13.6	0,004

p<0,05, *Mann-Whitney test. PRWE, patient-rated wrist evaluation

Conclusion

Our study found a significant association between overuse of smartphone and PRWHE scores. Further research is necessary to develop guidelines for wise use of mobile phones, in order to prevent such symptom.

Compliance with Ethical Standards: The present research has been approved by the Research Ethics Committee of Centro Universitário Christus (Unichristus) in May 27, 2020 (31578420.5.0000.5049).

Conflict of interest: All authors declare that they have no conflicts of interest.

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