



EFFECTS OF SMARTPHONE USAGE ON WRIST FUNCTION AMONG COMPUTER ENGINEERING STUDENTS

Physiotherapy

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ABSTRACT

Smartphones unite the normal mobile phone features with alternative personal digital assistant functions, together with internet browsing, accessing email etc. Nowadays, the usage of the smartphone among students has been drastically increased due to study purposes and to perform daily activities. Several smartphone users feel thumb/wrist pain. This pain will occur due to many types of hand injuries as well as inflammation of the extensor pollicis brevis and the abductor pollicis longus tendon sheaths. Thus this study aims to find the Effects of Smartphone usage on the wrist function among computer engineering students. This cross-sectional study was conducted on 150 students using smartphone addiction scale-short version (SAS-SV) and the patient-rated wrist and hand evaluation (PRWHE) questionnaire.

KEYWORDS

Smartphone, Wrist Function, SAS-SV, Computer engineering students, PRWHE.

INTRODUCTION

Smartphone devices have developed rapidly in both function and reproduction in the past 2 decades.¹ Smartphones combine the additional personal digital assistance functions, including internet browsing, accessing email, GPS navigation, desktop synchronization, capturing high-quality photos, touchscreen, large displays, motion sensor, voice recognition, and third-party applications known as “apps” with normal mobile phone features.²

Ample use of smartphone can be associated with physical health-related problems, such as pain in the wrist and neck,³ and it also puts hands to intense stresses that may lead to pain and musculoskeletal disorders of the hand and thumb.⁴ Given the mobile description of smartphones, users often hold the device with a single hand, which forces only the thumb to use the keys.^{5,6} In addition, it has been described that university students spend on average >3.5 hours/day for texting, emailing, internet browsing on their mobile phones, they frequently have pain at the base of the thumb.⁷ Single-hand-held smartphone use urges individuals to engage in repetitive flexion/extension of the wrist.⁶

Many smartphone users undergo pain in the thumb or wrist, but whether those who initiated pain are smartphone addicts, has not been evaluated. Previous studies showed that frequent repeated movements and use of the thumb while using electronic devices will lead to increasing load on the thumb, and therefore a higher prevalence of musculoskeletal disorders.^{8,9,10}

Many students feel bored by theory part of computer science course and by some projects they are asked to evolve. Faculty make them work on real world and game projects to motivate and interest students. Recently, increase in smartphone use, especially with computer science students, more courses are being prepared in smartphone development or included into a project-based computer science course. Despite of their benefits, excessive use can have physical and mental effects such as wrist or neck pain and may be associated with disturbance of sleep and anxiety.^{11,12}

There is dearth of evidence that proposes the effects of smartphone usage on wrist function among computer engineering students. Hence the need arises to evaluate the association between smartphone addiction and wrist pain among computer engineering students to determine the severity of pain.

METHODS

A Cross-sectional survey was conducted in October 2021. Participants were selected from undergraduate computer engineering students at Krishna School of Emerging Technology & Applied Research, KPGU, Vadodara. Ethical approval was obtained and informed consent form were taken. The sample size was 150. Sample were selected using non probability convenience sampling technique. Students between the

age group of 18 to 25 years who owned a Smartphone and use it for > 2 hours daily were included in this study. Individuals with a history of hand surgery or inflammatory arthritis were excluded.

Smartphone addiction scale short version (SAS-SV) was used to evaluate the addiction related to smart phone usage among computer engineering students. SAS-SV was originally developed from a previous version termed the Smartphone addiction scale (SAS). It consists of 10 questions that are based on a self-reporting system with a Likert scale of 6 points.

Pain was assessed using the Patient Rated Wrist Evaluation, it was designed to assess pain and functional difficulties of wrist and hand, it consists of 3 main components: Pain, Function specific activity, Function usual activities. In this pain sub-scale consists mainly 5 questions. Function specific activities consists 6 questions and Functional usual activities consists of 4 questions. Each item is analysed with a numerical scale (0-10), where 0 means no pain and 10 means severe pain ever felt. The scoring system is calculated by adding the functional score and dividing them by 2, then adding the pain scores to give a total 100 points. Lower score indicates better function and less pain.

Data entry and data analysis was done using SPSS version 23. Categorical variables are expressed as frequency or proportion. Continuous variables are expressed as mean and SD.

RESULT

The total number of participants in this study was 160, in that total 150 participants met inclusion criteria, that including 52% of men and 48% of women. Age range was 18 to 23. Most of the participants were right-handed (88%). Table 1 showed demographic details of all participants. Table 2 showed details of SAS-SV. Table 3 showed PRWE.

Table 1: Demographic details of participants

Gender	
Male	52%
Female	48%
Dominant side	
Right-handed	88%
Left-handed	12%

Table 2 : Short version of smartphone addiction scale

Questions	Strongly Disagree	Disagree	Weakly Disagree	Weakly Agree	Agree	Strongly Agree
Missing planned work due to smartphone use?	8.67%	14%	12%	16%	42.67 %	6.67 %

Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use?	8.67%	21.33%	14%	14.67%	30%	11.33%
Feeling pain in the wrists or at the back of the neck while using a smartphone?	16.67%	22.67%	9.33%	10.67%	33.33%	7.33%
Won't be able to stand not having a smartphone?	26%	32.67%	8.67%	11.33%	16.67%	4.67%
Feeling impatient and fretful when I am not holding my smartphone?	33.33%	28.67%	9.33%	14.67%	10%	4%
Having my smartphone in my mind even when I am not using it?	27.33%	32%	9.33%	16%	10%	5.33%
I will never give up using my smartphone even when my daily life is already greatly affected by it?	20.67%	34%	11.33%	16%	16%	2%
Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook?	26.67%	27.33%	8.67%	14.67%	16%	6.67%
Using my smartphone longer than I had intended?	9.33%	12%	8.67%	17.33%	36.67%	16%
The people around me tell me that I use my smartphone too much?	20.67%	20.67%	10%	20.67%	21.33%	6.67%

Table 3: Pain Rated Wrist Evaluation

PRWE	18.48 ±19.52
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DISCUSSION

The aim of this study was to evaluate the effects of smartphone usage on wrist function among computer engineering students. The present study found that wrist pain was common complain among computer engineering students due to mobile phone usage. The young age population suffers from more wrist pain as it includes the students who are addicted towards the usage of their smart phone for academic as well as leisure activities.¹³

In current study 36.67% participants reported pain in wrist. Previous studies have also shown that wrist pain is associated with the usage of different electronic devices.¹⁴

The results of this study suggested that male and female both have wrist pain due to use of smartphone. Previous studies have also concluded that the male as well as female are prone to have musculoskeletal disorders due to smart phone use. One study found that male and female both are engaged in the usage of smart phone. The most troublesome applications are voice calls, text messages and social networks. For females the cell phone is a means of social contact in which messaging and social networks play a prominent role, while for males a more diversified type of usage was observed, involving text messages, voice conversations and gaming applications.¹⁵

In this study the dominant hand, wrist was more affected than non-dominant side in computer engineering students. One study suggested that flexor pollicis longus tendons were significantly larger on dominant side compare to non-dominant side of smartphone users and non-users, but the greatest differences were found in the high smartphone users. Additionally, median nerve cross-sectional space was greater on the dominant side of high-smartphone user group compared with non-dominant side. These data led us to consider the possibility of enlargement of the flexor pollicis longus when median nerve in high-smartphone users who have a habit of single hand-held smartphone use.¹²

In current study the students who were using smart phone for more than 2 hours, were having more wrist pain. Other studies also suggest that the wrist and hand were more affected than other joints. The repetitive movements and different positions of the wrist joint while using mobile phone can cause effect on the structures of the wrist joint. So the conclusion of the study was computer engineering students who were heavy users of smartphone for personal work or any academic work they lead to pain on wrist/thumb. Because they have to do more work on smartphone due to that posture of wrist impaired that ultimately causes pain on wrist area.

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