Prevalence of Smartphone Addiction with Sedentary and Non Sedentary Lifestyle and Its Impact on Wrist Rom and Upper Limb Function

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ABSTRACT

Background/ Aims: The mobile phones have considerably the new epidemic of this century. It has both the positive and negative consequences. The objective of the study was to determine the prevalence of Smartphone addiction with sedentary and non sedentary among students.
The purpose of this study was to check an impact of Smartphone addiction on dominant upper limb function and Wrist ROM in Smartphone addiction with sedentary lifestyle and Smartphone addiction with non-sedentary lifestyle.
Methods: In this study SAS was used to assess the Smartphone addiction. A random sampling method was conducted on a sample of 500 students with response rate of 90%. 450 students were given positive response. The questionnaire was a self rating questionnaire which used for the collection of data. 64% students reported Smartphone addiction.
For Smartphone addiction's impact on upper limb function and wrist ROM in sedentary and non sedentary lifestyle
Both male and female subjects, 26 male and 34 female subjects were taken in this study. Aged between 18 to 28 years healthy individuals who have a habit of overuse of Smartphone were included in this study. Two groups were formed on the basis of sedentary and non sedentary life style with Smartphone addiction. To check any difference in upper limb functional ability in sedentary group with Smartphone addiction and non sedentary group with Smartphone addiction, we use QuickDASH questionnaire. And to check any difference in ROM of dominant hand of both group, we used universal goniometer as a measuring tool.
Results: Data analysis reveals there is high prevalence rate of Smartphone addiction and group A which was sedentary more addicted and upper limb function was lightly affected. And there is no significance correlation of Smartphone addiction with upper limb function in group B. There is significance correlation of Smartphone addiction with extension in group A (0.044) and in group B there is significance correlation of Smartphone addiction with ulnar deviation (0.01).
Conclusion: our study concluded that prevalence of Smartphone addiction was high among students and sedentary group of individuals was more addicted. This type of study helpful for primary preventing for different types if impairment and disability.

Keywords: Smartphone addiction, sedentary and non sedentary, quickDASH, range of motion, universal goniometer.

INTRODUCTION

A Smartphone is a device which can performs many of the features of a computer and can additionally perform complex task, which usually have web access, social network and many different purposes and also supports Wi-Fi networking.[1]

Smartphone are the most essential part of everyday life for most college students they use as a device for social interaction, entertainment, video games and study related information. In 21st century technology plays a very important role in our life. Among all gadgets Smartphone play a important role in daily life because it has many functions. People are not only using for communication, texting and browsing internet but it is highly become source to play video games, listing music, watching videos of own choice and also for shopping.[2] It makes our life so easy and everything is reachable through touch. Furthermore, it is a portable and easily accessible device that make possible to use anywhere at any time.

A research shows that the Smartphone usage is estimated to be 2.87 billion users worldwide in 2020.[3]

Addiction is a disorder with multiple effects on physical as well psychological health.[4]

Overuse Smartphone and or addiction of Smartphone defined as a form of behavior described by the compulsive use of Smartphone results in various types of psychological, physical or social harm.[5] Excessive use of Smartphone may cause risk factors such as lower sleep quality, decrease self esteem, lower perceived social support, excessive social distress or decrease communications skills between others.[6] Many studies confirmed that Smartphone addiction has hazardous results on intellectual health.

One study shows their result that frequency of Smartphone addiction among university students to be high(66%) and additionally there is a correlation between heavy Smartphone usage and hand pain which indicate that heavy usage of Smartphone can cause sub acute effects on the human hand.[7]

Sedentary behavior has been defined as any walking behavior characterized by energy expenditure greater or equal to 1.5 METs while in a sitting or reclining posture.[8]Sedentary behavior refers to certain activities such as in a reclining, seated or lying position in which require very low energy expenditure.[9]

The term physical inactivity refers performing inadequate amounts of moderate to vigorous intensity activities that means not meeting specific physical activity guidelines. The World Health Organization recommends that adults aged 18 or older take part in at least 150 min of moderate to vigorous activity per week or equivalent of 30 min of daily activity.[10]

Sedentary behavior has detrimental outcome on health such as cardiovascular disease, diabetes and obesity. Now a day the increased sedentariness is a global challenge. In most of the western countries below than 40 % of children and young adult meet sedentary behavior.[11] Sedentarism and physical inactivity is extremely prevalent globally, and correlated with chronic disease. Sedentary behavior may also associate with poor sleep quality

METHODOLOGY

Sample size: 500 students were participated in this study for prevalence of Smartphone addiction and sample of 60 students was selected to take part in the study based on the fulfillment of inclusion and exclusion criteria. The students were selected from department of physiotherapy in integral university.

Inclusion criteria: Both male and female students.
Duration of Smartphone use (3-4 hours)
Age group of 18-28 years, Individuals having Smartphone, Sedentary group of individuals with Smartphone addiction, Non sedentary group of individuals with Smartphone addiction.

Exclusion criteria: Age less than 18 years, Individuals does not having Smartphone,

Students with any other medical cause or known condition which could lead to pain in the upper limb or wrist.

PROCEDURE

Subjects were selected on the basis of inclusion and exclusion criteria. A consent form was signed prior to start the procedure to ensure safety The purpose of study and procedure were explained to each of them.

PROCEDURE FOR PREVALENCE OF SMARTPHONE

A survey was conducted to determine the prevalence of Smartphone addiction among students. This study was conducted as a cross sectional study. A random sampling method was conducted on a sample of 500 students with response rate of 90%. 450 students were given positive response. Smartphone addiction was assessed using a short version of Smartphone addiction scale. Number of students who fulfilled the inclusion criteria was provided with a questionnaire form. Out of 450 students, 261 were females and 189 were males' students [58% females and 42% males]. The mean age of male and female students was 20.9 and standard deviation was 2.311.

The SAS-SV contains 10 items, each score on a Likert scale of 1 (strongly disagree) to 6 (strongly agree). The sum of these items gives an overall SAS-SV score (range: 10-60) with higher score indicating PSU (Problematic Smartphone use).

The SAS-SV cut off scores for males was ≥31 and ≥33 for females.

The SAS-SV questionnaire was filled, clarifying and explaining each question of the questionnaire to the subjects. No questionnaire was mailed or forwarded. After the collection of primary data through questionnaire method of 500 students, all the data were arranged, the entire questionnaire were scored and submission of all score was done.

ASSESSMENT OF SEDENTARY AND NON-SEDENTARY LIFESTYLE

International physical activity questionnaire (IPAQ)-Short was used to assess the sedentary and non sedentary behaviour of the participants. It was used to know the past 7 day's activities of the participants. The international physical activity questionnaire (IPAQ)-short form assesses the types of intensity of physical activity and sitting time that people do as part of their daily lives are considered to estimate total physical activity in MET- min/week and time spent sitting.

ASSESSMENT OF THE WRIST ROM

Wrist Range of motion of dominant hand was measured with the help of Universal Goniometer.

WRIST FLEXION

Testing position: Position the subject so that he or she is sitting next to a supporting surface with the shoulder abducted to 90 degrees and the elbow flexed to 90 degrees. Place the forearm midway between supination and pronation so that the palm of the hand faces the ground.

Stabilization: Stabilize the radius and ulna to prevent supination or pronation of the forearm and motion of the elbow.

Goniometer Alignment: center the fulcrum of the goniometer on the lateral aspect of the wrist over the triquetrum. Align the proximal arm with the lateral midline of the ulna, using the olecranon and ulnar styloid process for reference. Align the distal arm with the lateral midline of the fifth metacarpal. Do not use the soft tissue of the hypothenar eminence for reference.

Expected findings: expected range of motion was 0-75 degrees

WRIST EXTENSION

Testing position: Position the subject sitting next to a supporting surface with the shoulder abducted to 90 degrees and the elbow flexed to 90 degrees. Place the forearm midway between supination and

pronation so that the palm of the hand faces the ground. Rest the forearm on the supporting surface, but leave the hand free to move.

Stabilization: Stabilize the radius and ulna (to prevent supination or pronation of the forearm and motion of the elbow.

Goniometer Alignment: Center the fulcrum of the goniometer on the lateral aspect of the wrist over the triquetrum. Align the proximal arm with the lateral midline of the fifth metacarpal. Do not use the soft tissue of the hypothenar eminence for reference.
Expected findings: expected range of motion was 0-70 degrees.

RADIAL DEVIATION
Testing position: Position the subject sitting next to a supporting surface with the shoulder abducted to 90 degree and the elbow flexed to 90 degree. Place the forearm midway between supination and pronation so that the palm of the hand faces the ground.

Stabilization: Stabilize the radius and ulna to prevent pronation or supination of the forearm and elbow flexion beyond 90 degree.

Goniometer alignment: Center the fulcrum of the goniometer on the dorsal aspects of the wrist over the capitates. Align the proximal arm with the dorsal midline of the forearm. If the shoulder is in 90 degree of abduction and the elbow is in 90 degree of flexion, the lateral epicondyle of the humerus can be used for reference. Align the distal arm with the dorsal midline of the third metacarpal. Do not use the third phalanx for reference.

Expected findings: expected range of motion was 0-20 degrees.

ULNAR DEVIATION
Testing position: Position to the next to a supporting surface a with the shoulder abducted to 90 degrees and the elbow flexed to 90 degrees. Place the forearm midway between supination and pronation so that the palm of the hand faces the ground. Rest the forearm and hand on the supporting surface.

Goniometer Alignment: Center the fulcrum of the goniometer on the aspect of the wrist over the capitate. Align the proximal arm with the dorsal midline the forearm. If the shoulder is in 90 degrees abduction and the elbow is in 90 degrees of the lateral epicondyle of the humerus can be for reference. Align the distal arm with the dorsal midline of third metacarpal. Do not use the third phalanx for the reference.

Expected findings: expected range of motion was 0-30 degree.

Assessment for upper limb function: *Quick DASH* questionnaire was utilized to evaluate the upper limb function. The *Quick DASH* uses 11 items to measure physical function and symptoms in persons with any or multiple musculoskeletal disorders of the upper limb

STATISTICAL ANALYSIS
Statistical analysis was done using SPSS 21.0 version software. Descriptive statistics of mean, standard deviation, and frequency distribution were used to summarize data. ANOVA correlation was used to find the effect of Smartphone addiction on upper limb function and Wrist ROM in students. A statistically significant difference was defined as p value less than 0.05.

RESULT
The demographic details of participants were recorded as Age, gender, height, weight and BMI of both groups sedentary and non sedentary. Total of 60 participants [Female = 34 and Male = 26] participated in the study. The mean age was almost equal

for both groups i.e. 20.96 And 20.93. Table given below gives the details of mean and standard deviation of all variables.

Table 4.1: **Demographic data analysis of group A and group B**

Variables	Mean SD(Group A)	Mean SD(Group B)
Age	20.96 ± 2.3	20.93 ± 2.34
Gender(M,F)	30 ± 4	30 ± 4
Height	162±11.17	162.23 ± 9.8
Weight	59.26±10.0	59.16 ± 8.55
BMI	22.39±5.5	22.04 ± 1.67

Table 4.3: Smartphone addiction among participants

Total no of participants	Addicted	Not addicted
450	288	162

Table 4.4: **Correlation between Smartphone addiction, Quick dash score and wrist ROM in group A**

Parameters	Smartphone addiction r value	P value
Quick DASH score	0.265	0.156
Wrist ROM Flexion	0.34	0.063
Extension	0.36	0.044
Radial deviation	-0.15	>0.05
Ulnar deviation	0.10	>0.05

Table 4.5*: **Correlation between Smartphone addiction, QuickDASH score and wrist ROM in group B.**

Parameters	Smartphone addiction r value	P value
Quick DASH Score	-0.22	0.15
Wrist ROM Flexion	0.07	>0.05
Extension	-0.07	
Radial deviation	0.34	0.06
Ulnar deviation	0.44	0.014

Table4. 6: **Between the group analysis**

Parameters	Group A Mean ± SD	Group B Mean ± SD	t-value	p-value
SAS	45.23 ± 5.56	39.53 ± 4.500	2.0017	0.00
TQDS	18.8 ± 2.90	16.6 ± 4.72	2.0017	0.03
Flexion	67.96 ± 6.18	67.9 ± 7.32	2.00	0.96
Extension	65.16 ± 9.79	64.03 ± 5.68	2.00	0.58
Radial deviation	26.26 ± 6.30	23.3 ± 4.73	2.00	0.04
Ulnar deviation	31.0 ± 5.91	29.6 ± 4.07	2.00	0.30

DISCUSSION

Our present study is a cross-sectional study aimed to know the prevalence of Smartphone addiction with sedentary and non sedentary lifestyle and what is the impact of Smartphone addiction on upper limb function and wrist ROM.

Out of total 450 students, 261 were female and 189 were male students. The mobile phone addiction level in students is shown in graph 4.2. The overall prevalence of addiction was 64%. Our results are same with the study done by Sameeha Naser et al stating that the prevalence of mobile phone addiction has been 60% in studied students. A survey was conducted to determine the prevalence of Smartphone addiction among students and also found that female were more addicted than male.

Alaa Aziz Alhazmi et al stated that the overall prevalence of Smartphone addiction was high among their study and this Smartphone addiction was associated with daily hours of Smartphone usage. They conduct a cross- sectional study on 203 medical students and their response rate was 89%, 87 male and 94 female were respondents. Their study showed there was significant association between the total score on the Smartphone addiction scale and daily Use.

Now a days, it is common in our young generation to spend several hours each day on mobile phones for playing games,

chatting, studying and browsing internet. One of the reasons for this high prevalence could be a lot of study material present on the internet and it is easy for the students using Smartphone rather than computer or laptop.

Another reason could be that during covid 19 classes were held online and many apps and software used for study. Therefore, the use of Smartphone for educational purpose could be one of the important contributing factors.

And our study aim is also to explore the relationship between Smartphone addiction and sedentary and non sedentary behaviors. And our finding showed that both groups was Smartphone addicted, but group A which is sedentary are more addicted [Mean= 4.523; SD= 5.56] group B [39.53, SD = 4.5].

Our results show same results with the study done by Ke- leiguo et al. stating that the higher the level of physical exercise, the lower the degree of mobile phone addiction tendency. Their correlation analysis showed that sedentary behavior was positively correlated with duration of Smartphone use (p<0.001) and Smartphone addiction (p<0.001) and negatively correlated with self- control (<0.001).

Sung- Eunkim et al reported that high risk Smartphone users showed less physical activity.

Sedentary group participants were more addicted it may be due their sitting hour more than group B which was non sedentary. According to Barkley et al they said, a consistent body of literature showed that more than 80% of people reported typically sitting when using their device.

The next aim of the study is to know the impact of Smartphone on wrist ROM and upper limb functional ability. Our study's result shows that upper limb of group A is statically more affected than group B. If we compare A has more impact on upper limb it may be due to prolong use of Smartphone or may be due to faulty Posture.

Saeed taj din et al stated in their study increases Smartphone addiction decreases the hand strength and increases upper limb disability. Mild to moderate level of disability was found in students and which was found slightly higher among male.

In group A the correlation of Smartphone addiction with wrist extension are significance (p= 0.044) . And the correlation of Smartphone addiction with wrist ulnar deviation are significance (p=0.04) in group B. It may be due to different holding habit of Smartphone or may be due to faulty posture And may be measurement error determined by using standard error of measurement (SEM) and minimal detectable change (MDC). Our result shows Wrist extension significantly high in group. May be due to repetitive extension same as Inal et al.2015 they concluded that the extensive flexion or extension of the wrist occur when an individual uses a Smartphone. Placing wrist and thumb in static postures will likely lead to an increased load on wrist joints and decreased strength of muscles and tendon.

CONCLUSION
Present study evaluated that there is a high prevalence of Smartphone addiction among students and sedentary group of participants is more addicted than non sedentary group participants evaluated using SAS. In group A there is mild upper limb disability present. And there is significance effect of extension present. In group B there is significance effect of ulnar deviation present.

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