

# Mobile Phone Usage Pattern and Incidence of Self-Reported Health Problems among a Selected Population of University Students in Sri Lanka: A Cross Sectional Study

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## Abstract

**Background:** Excessive use of mobile phones has become an emerging challenge to the public health worldwide. The purpose of this study was to assess mobile phone usage pattern and incidence of self-reported health problems among a selected population of university students in Sri Lanka.

**Methods:** A descriptive cross-sectional study was conducted among a random sample of 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduates (n=372) of University of Sri Jayewardenepura, Sri Lanka. Self-designed, pre tested self-administered questionnaire was used to collect data. Association between categorical variables were tested using Pearson chi square test and effect size was tested by means of Cramer's V.

**Results:** Majority of the students were using their mobile phones for 1 to 5-year duration (61.3%) and 1-5-hour duration per day (56.5%). Majority of the participants (83.1%) were moderately addicted to their mobile phones while 5.1% were severely addicted. Significantly higher mobile phone addiction level was associated with incidence of self-reported headache, body ache, ear ache, eye strain, irritability/restlessness, sleep disturbances, hearing defects while or after using mobile phone ( $p < 0.01$ ) and phantom vibration among the participants ( $p < 0.05$ ).

**Conclusion:** It is a timely need to educate especially vulnerable groups such as young adults and adolescents to depend less on the device or to take measures to prevent from the associated health hazards of problematic usage of mobile phones.

**Key words:** Health problems, mobile phone usage, undergraduates, Addiction

## Introduction

Problematic use of mobile phones has been reported substantially among people during the COVID-19 pandemic over last two years with sudden shifting of day to day activities from natural style

to more technology-based style. "A recent global survey reported that approximately 70% of internet users especially the young generation were using their smart phones or mobile phones as a direct result of lockdown, due to corona virus outbreak<sup>1</sup>. In fact, the mobile phones have enabled people to maintain their social connectedness despite physical distancing during the COVID-19 pandemic.

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Even though the mobile phones are useful for people to make interactions with each other through communication, excessive and compulsive use of mobile phones is similarly associated with negative health consequences both physical and mental<sup>2</sup>. Even though there is widespread use of mobile phones, many users are unaware of the potential health risks associated with over and unsafe use of mobile phones<sup>3</sup>.

Number of recent research studies have found that there are associations between certain health problems including headache, earache, hearing problems, warmth sensations around the ear, eye strain, concentration difficulties, mood swings, memory loss, symptoms of depression, sleep disturbances, stress, ringxiety (phantom ringing/ ringing delusion) and musculoskeletal symptoms such as pain in hands or arms (due to intensive texting) along with over usage of mobile phones<sup>2</sup>.

A study conducted in Saudi Arabia among female university medical students revealed that there were substantial number of students who reported side effects with use of mobile phones including recent memory impairment (45.8%), prolonged sleep (31.7%), insomnia (30%), Chronic headache (22.5%) and concentration problems (22.5%)<sup>4</sup>.

It was observed eye symptoms (63%), headache (40%), and feeling irritable (25%) as the most common perceived ill health effects due to mobile phone usage in a study conducted among people in the community in India. In addition to that, neck pain (21%), lack of sleep (24%), ear pain (15%), digital thumb (8%), elbow pain (9%) and feeling depressed (11%) were prevalent substantially among the same study participants<sup>5</sup>.

In a study done in Italy, reported that the percentage of adolescents who were addicted to their smart phones was increased from 26.1% to 46.7% over the course of COVID-19 pandemic<sup>6</sup>. A similar study

done in Egypt among university students, revealed that approximately 59% of university students were addicted to their smart phones irrespective of their gender difference. Smart phone addiction was significantly associated with incidence of depression, anxiety, sleep disturbances, smoking and suicide among university students<sup>7</sup>.

Rapid development of mobile phone technology has been contributed to the learning process of students and might be improved their academic performance especially during the COVID 19 pandemic all over the world in which the time that restricted physical classroom learning. However, apart from the benefits for academic activities, mobile phones can be influenced in developing negative health consequences with its continuous usage among the most frequent mobile phone users such as university students. Thus, it is an intended need to assess the magnitude of the problem related to excessive use of mobile phones and increase the awareness of negative health effects of excessive mobile phone use among frequent mobile phone users. Therefore, the current study aimed to assess the mobile phone usage pattern and incidence of self-reported health problems among a selected population of university students in Sri Lanka.

## **Materials and Methods**

The study was a descriptive cross-sectional study which was conducted among a selected population of 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduates in University of Sri Jayewardenepura, Sri Lanka. The study group included 372 university students. The sample was selected by simple random sampling method from each faculty of the university among 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduates who were willing to participate in the study. Pre tested self-administered questionnaires were administered to the study participants which included socio demographic data, items assessing problematic mobile phone use based on problematic use of mobile phone

scale (PUMP Scale) and questions on adverse health effects of excessive mobile phone usage. Evaluation of mobile phone addiction level was carried out with considering the scores obtained from the items of PUMP Scale<sup>8</sup>. The original PUMP scale was first developed and validated by Merlo et al. considering the substance disorder criteria in the Diagnostic Statistical Manual of Mental Disorders (DSM-V) in United States of America. The PUMP scale is a highly reliable instrument to determine the level of mobile phone addiction in which has demonstrated excellent internal consistency across all the items with Cronbach's alpha =0.94<sup>8</sup>. The judgmental validity (Face and content validity) of the items of PUMP scale of the current study was assessed by the experts of the research field and group of university students. Out of the items of PUMP scale, 12 items were used to assess the level of mobile phone addiction among university students in the current study considering the cultural and content relevance of the items of the original scale. The items of the PUMP scale included degree of impact of mobile phone usage with regard to the day to day activities. Responses for each item in the PUMP scale were ranged from 1 = strongly disagree to 5= strongly agree. Total scores yielded from 12 item scale was ranged from 12 to 60 marks. The students who responded to every question as agree or strongly agree were categorized as individuals with high level of mobile phone addiction (more than 48 marks), and who disagreed with every question were categorized as individuals with low level of mobile phone addiction (less than 24 marks). Students who gained marks in between (25-47 marks) were categorized as moderate mobile phone addiction. As there was no universally accepted cutoff values in determining level of mobile phone addiction in previous literature, present study presumed as the high score yielded from PUMP scale denoted to high level of mobile phone addiction while lower scores to less addiction.

Before starting to collect data, Pretesting of the questionnaire was done by group of university students (n=5). Required approvals were obtained from the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka. Informed written consent was obtained from all the participants before starting the data collection of the study. Privacy and the confidentiality of the participants were ensured during all steps of the study. The statistical analysis was carried out using International Business Machines Corporation (IBM) statistical package for social sciences (SPSS) version 21.0 software. Descriptive statistics including numerical tools (frequencies, percentages, mean, median and standard deviation) were used to present the results of the current study. Chi square test was used to determine association between two categorical variables and Cramer's V was used to test the strength of association between categorical/nominal variables. Significant level of the associations was predetermined at p value <0.01 and p value <0.05.

## **Results**

### **Socio demographic characteristics**

In total, the sample included 372 participants comprising 121 males (32.5%) and 251 Females (67.5%). The age range of the population was 20-26 years with a mean age of 23±1 SD year. The majority of the participants (57.8%) were residing in hostels (Table 1).

### **Mobile phone usage pattern among university students**

Majority of the students were using their mobile phones for 1 to 5-year duration (61.3%) and 1-5-hour duration per day (56.5%). Majority of the students mentioned that they receive 1-10 calls per day (79.6%) and most of them were receiving 1-10 text messages per day (43.1%). Most of them were occasionally awakened at night using mobile phones

(47.6%) and majority were used vibration method during both day and night (60.5%) as the mostly used ringing mode. Majority of the participants (87%) used

to keep mobile phone next to the ear while calling and most of them used to keep mobile phone near the head on the bed while sleeping (48.1%).

**Table 1: Socio demographic characteristics of the study group**

Characteristics	Category	Frequency	Percentage
<b>Age</b>	20-23 years	287	77.2%
	24-26 years	85	22.8%
<b>Gender</b>	Male	121	32.5%
	Female	251	67.5%
<b>Marital status</b>	Married	10	2.7%
	Single	362	97.3%
<b>Academic year</b>	Second year	226	60.8%
	Third year	146	39.2%
<b>Residence</b>	Home	67	18.0%
	Hostel	215	57.8%
	Boarding place	83	22.3%
	Annex	7	1.9%

**Problematic mobile phone usage among university students**

Problematic mobile phone usage among participants were assessed based on the PUMP scale item analysis (Table 2). Majority of the students (60.2%) indicated that it is difficulty to give up using the mobile phone. A considerable percentage of students (39%) agreed that the mobile phone disturbed to their other important work such as studying,

working, sleeping or eating while 7.8% students strongly agreed with the same. More than 50% of the students agreed that they have given up, delayed or reduced their day to day activities such as academic activities and sleeping due to mobile phone use.

**Mobile phone addiction level**

Mobile phone addiction level was determined among university students based on scores yielded

from the items of PUMP scale developed by Merlo et al. including all the items given in table 2. Mean problematic mobile phone use (addiction) score among university students was 33.24+8.71SD. Based

on the scores yielded from PUMP scale, majority of the university students (83.1%) were moderately addicted to their mobile phone device while 5.1% were reported high level of addiction (Table 3).

**Table 2: Problematic mobile phone use scale item frequency analysis**

	Item	Strongly Disagree	Disagree	No idea	Agree	Strongly Agree
1.	Less satisfied when decreasing the time spending on the phone	10.8%	35.2%	12.9%	36.6%	4.6%
2.	Very difficult to give up using the mobile phone	7.5%	26.6%	5.6%	47.3%	12.9%
3.	Disturb the other important work	10.2%	37.9%	5.1%	39.0%	7.8%
4.	Spend too much time on mobile phone	11.0%	44.1%	5.9%	32.0%	7.0%
5.	Have gotten into trouble at work or university because of cell phone use	16.7%	55.9%	5.4%	19.1%	3.0%
6.	When not using the phone, thinking about it and plan to do it next	15.6%	37.9%	6.5%	34.9%	5.1%
7.	Feeling anxious if haven't received a call or message for some time	14.0%	39.8%	6.2%	33.3%	6.7%
8.	Have ignored the people or disturbed relationships due to use of mobile phone	10.5%	43.8%	7.3%	33.1%	5.4%
9.	Have use mobile phone when knowing it was dangerous to do so	10.8%	41.4%	5.6%	34.1%	8.1%
10.	Day to day activities are given up, delayed or reduced due to mobile phone use (Academics, sleeping)	8.1%	30.6%	4.3%	47.0%	9.9%
11.	Have almost cause an accident due to mobile phone use (road traffic accidents, day to day injuries)	26.3%	56.2%	4.3%	9.9%	3.2%
12.	Have used cell phone even when someone asked to stop it	19.9%	47.6%	6.2%	22.8%	3.5%

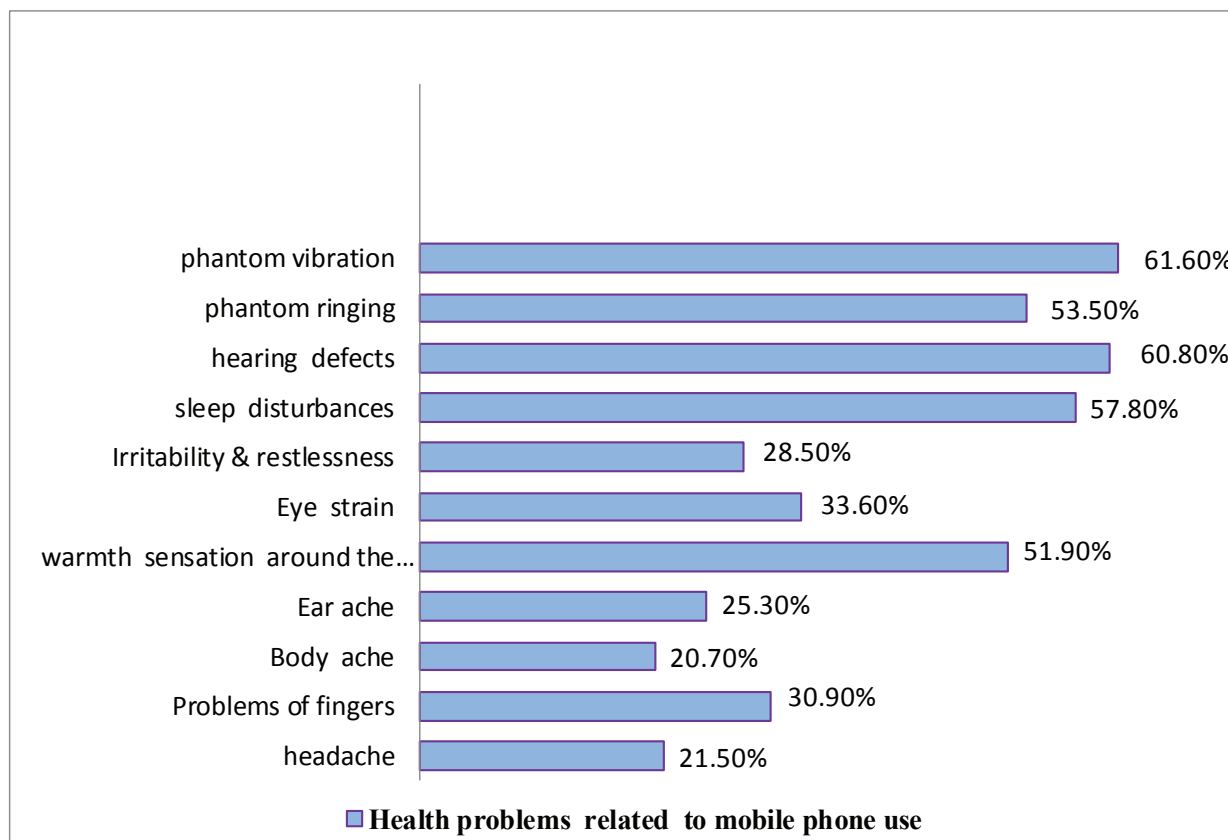
**Table 3: Mobile phone addiction level among university students**

Category	Score	Frequency	Percentage
Severe addiction	>48	19	5.1%
Moderate addiction	25-47	309	83.1%
Less addiction	<24	44	11.8%
Total		372	100.0%

**Prevalence of self-reported health problems related to mobile phone use**

Proportion of university students who had self-reported health problems related to usage of mobile phones is presented in figure 1. Self-reported health

problems such as phantom vibration (61.6%), phantom ringing (53.5%), hearing defects (60.8%), sleep disturbances (57.8%) and warmth sensation around the auricle (51.9%) were highly prevalent among university students due to usage of mobile phones in the present study.



**Figure 1: Self –reported health problems related to mobile phone use**

Association between Mobile phone usage pattern and incidence of self-reported health problems

Students who used vibration mode as mostly used method in both day and night (60.5%) showed significant relationship with experiencing phantom vibration syndrome [Pearson  $\chi^2 = 25.928$ ;  $P=0.000 < 0.05$ ; Cramer's  $V=0.264$ ]. The incidence of headache ( $\chi^2=22.05$ ;  $p=0.001<0.01$ ; Cramer's  $V=0.172$ ), body ache ( $\chi^2=0.98$ ;  $p=0.02<0.05$ ; Cramer's  $V=0.163$ ), warmth sensation around the auricle ( $\chi^2=10.2$ ;  $p=0.017<0.05$ ; Cramer's  $V=0.166$ ), eye strain ( $\chi^2=11.17$ ;  $p=0.01<0.05$ ; Cramer's  $V=0.173$ ), feeling irritable or restlessness ( $\chi^2=22.54$ ;  $p=0.000<0.01$ ; Cramer's  $V=0.246$ ), Sleep disturbances ( $\chi^2=29.35$ ;  $p=0.000<0.01$ ; Cramer's  $V=0.281$ ), hearing defects while or after using mobile phone ( $\chi^2=22.49$ ;  $p=0.000<0.01$ ; Cramer's  $V=0.246$ ), phantom ringing( $\chi^2=14.27$ ;  $p=0.003<0.01$ ; Cramer's  $V=0.196$ ) and phantom vibration ( $\chi^2=14.03$ ;  $p=0.003<0.01$ ; Cramer's  $V=0.194$ ) were significantly associated with increased number of hours using mobile phone per

day by the university students. Awakening at night using mobile phones by the university students was significantly associated with incidence of stiffness, tremors or pain in fingers ( $\chi^2=15.2$ ;  $p=0.002<0.01$ ; Cramer's  $V=0.202$ ), body ache ( $\chi^2=20.02$ ;  $p=0.000<0.01$ ; Cramer's  $V=0.232$ ), warmth sensation around the auricle ( $\chi^2=15.87$ ;  $p=0.001<0.01$ ; Cramer's  $V=0.207$ ), eye strain ( $\chi^2=15.49$ ;  $p=0.001<0.01$ ; Cramer's  $V=0.204$ ), feeling irritability or restlessness ( $\chi^2=12.04$ ;  $p=0.007<0.01$ ; Cramer's  $V=0.18$ ), phantom ringing ( $\chi^2=15.71$ ;  $p=0.001<0.01$ ; Cramer's  $V=0.206$ ) and phantom vibration ( $\chi^2=13.95$ ;  $p=0.003<0.01$ ; Cramer's  $V=0.194$ ).

According to the results of present study, significant relationships were observed between student's high level of mobile phone addiction and incidence of self-reported health problems such as headache, body ache, ear ache while/ after using mobile phone, eye strain, irritability or restlessness, sleep disturbances, hearing defects while or after using mobile phone ( $P < 0.01$ ) and phantom vibration ( $P < 0.05$ ) (Table 4).

**Table 4: Association between mobile phone addiction level and self-reported health problems due to mobile phone usage**

Self-reported health problems		Addiction category			Chi square value	P value	Cramer's V	Strength of Association
		High level of addiction	Moderate level of addiction.	Less addiction.				
Headache	80/372	12	64	4	24.04	0.000	0.180	Weak association
Body ache	77/372	12	61	4	24.65	0.000	0.257	Weak association
Ear ache	94/372	11	74	9	11.53	0.003	0.176	Weak association
Eye strain	125/372	10	110	5	13.39	0.001	0.190	Weak association
Feeling irritable or restlessness	106/372	13	88	5	21.03	0.000	0.239	Weak association
Sleep disturbances	215/372	17	188	17	31.17	0.000	0.289	Weak association
Hearing defects	226/372	17	192	17	15.85	0.000	0.206	Weak association
Phantom vibration	229/372	15	194	20	7.44	0.024	0.141	Weak association

## Discussion

The results of the present study were compared with certain studies which have been done in other countries such as in India, Iran, Korea, United States, Pakistan, Saudi Arabia, Sweden and Finland. In many studies, same age range young adults (20-26 years) were assessed for problematic use of mobile phones as this is a vulnerable population and due to their tendency to indulge in more usage of mobile phones compared to that of the other age groups.

The adverse health problems related to mobile phone usage were found to be high among young population according to the previous studies. It was reported that headache was the commonest symptom seen in 51.47% college students in India due to use of mobile phones<sup>2</sup> and considerably higher percentage of study subjects (63.3%) were observed with headache in a study in Saudi Arabia among university students<sup>9</sup>. A research study that was conducted in Korea observed that 18.9% of study subjects suffered from headache with the use of mobile phones<sup>10</sup>. Similar to the previous studies, headache was prevalent among university students in the present study with considerable percentage (21.5%). The students who diagnosed to have migraine and other frequent types of headaches were excluded when assessing headache caused by mobile phone use in the present study to minimize the extraneous variables that can cause headache. The participants who mentioned that they get headache due to mobile phone use in the present study were further analyzed for the quality of the headache. Eighty students presented with headache while or after using mobile phone, out of them only forty-four students indicated the quality of headache they experienced. Out of the study subjects who reported the quality of headache, 38.6% were experienced unilateral headache at the side of mobile phone use. 18.18% students were presented with unilateral, burning type headache. Another, 13.3%

of study subjects mentioned that it was only burning type of headache and can't mention the definite place of it. However, the exact cause of headache while or after using of mobile phones is not established till the date but it may be due to diversifying circumstances during mobile phone use like radiofrequency fields, psychological factors, changes in local temperature, vibrations, cacophony and amalgamation of these various factors<sup>10</sup>.

Phantom vibration syndrome (Intermittent perception of vibration of mobile phone when it actually hasn't) was found to be the commonest health problem (61.6%) among participants in the present study. The incidence of phantom vibration syndrome among study participants was significantly associated with using vibration method on their mobile phones as mostly used ringing mode (both day and night) ( $P < 0.05$ ). Phantom ringing (Intermittent perception of ringing of mobile phone when it actually hasn't) was experienced by 53.5% students in the present study and the prevalence is high when compared to a study which was carried out in India (34.5%)<sup>11</sup>. The findings of the present study analogous with another study conducted in India which assessing prevalence and pattern of phantom ringing and phantom vibration among medical interns due to smart phone use<sup>12</sup>. According the Mangot et al., 40% medical interns were reported problematic smart phone use while 60% were experiencing Phantom vibration and 42% were experiencing phantom ringing. Both Phantom vibration and ringing were significantly associated with high frequency of mobile phone use and use of vibration mode similar to the present study<sup>12</sup>.

In addition, 60.8% students mentioned that they need to increase the volume of the mobile phone than previous occasions to hear the other partner's voice clearly. It may be due to the use of high volume on mobile phone when talking for a prolonged period of time. Considerable percentage (57.8%) of study

subjects had sleep disturbances due to being awoken at night with calling, texting and using social media (face book). Sleep disturbances may also cause among the university students due to stress of academic activities, doing part time jobs, long hours travelling as well as medical problems. These factors should be strictly addressed in future studies to minimize extraneous variables causing sleep disturbances. Some students may use to listen loud music using headsets during the night while sleeping. Perhaps they forget to remove their headsets until they wake up in the next day.

In addition, as the major reason causing sleep disturbance at night due to mobile phone usage was identified as blue light emitted by screens of mobile phones which decrease production of melatonin, the hormone which controls the sleep/wake cycle or circadian rhythm of the human body<sup>13</sup>. Negative physical health symptoms such as eye strain due to continuous usage and staring at the screen (33.6%), earache (25.3%), body ache due to use of same posture for a long period of time when calling or texting (20.7%) and problems in fingers such as stiffness, tremors or pain (3.7%) due to intensive texting, continuous usage of fingers especially thumb on small key pad were prevalent among the study participants. In fact, the present study observed wrist pain and stress as new negative health complains among university students when they were using mobile phones for a long period of time.

The present study has a few limitations. The first limitation was there was lack of validated and Sinhala translated PUMP scale in the present study and there were no universally accepted cutoffs to determine the level of mobile phone addiction. The second limitation was the health problems related to over usage of mobile phones were self-reported by the study participants and were not based on clinical diagnosis.

## Conclusions

This study serves as an evidence-based background to make the public aware regarding the potential health risks related to excessive usage of mobile phones and the need to educate the public to depend less on the device especially during COVID-19 pandemic and post pandemic time in which the people more attach with their mobile phone each other. Further studies should be carried out to examine prevalence of health problems related to over usage of mobile phones among young population with a control group who are very less addicted to the device. Precautions such as minimizing call frequency and duration/ day, using hands free devices to hold the mobile phone as much as away from the body and head, using correct body postures while calling or texting for a long period of time, avoiding use of mobile phone during sleeping hours can be implemented to minimize possible adverse health effects due to mobile phone use. Further studies are required to develop diagnostic criteria for accurate diagnosis of the symptoms that occur due to mobile phone usage.

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**Ethical Clearance** – Obtained from Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka

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