## **Original Research Article**

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# Assessment of mobile phone problematic usage and associated health related symptoms among medical students at Goa Medical College

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## **ABSTRACT**

**Background:** Mobile Phones can be considered as one of the essential socio-personal utility with diverse features but its overuse may have negative consequences on health. The objective of the present study was to assess the prevalence of mobile phone problematic usage among the medical students and to study the association of health related symptoms and problematic mobile phone usage.

**Methods:** A total of 250 medical students were included in this study. Data regarding the sociodemographic factors and perceived health symptoms related to mobile phone use was collected on a predesigned, structured and self-administered questionnaire. Mobile phone problem use scale (MPPUS) was employed to assess the problematic usage of mobile phone and students were classified into following four categories - casual users ( $\leq$ 74), regular users (75-143), at risk users ( $\geq$ 143- $\leq$ 179) and problematic users ( $\geq$ 179).

**Results:** The total prevalence of problematic users was 22% (17.2% at risk, 4.8% problematic users). Eye strain, concentration difficulties, memory disturbances, morning tiredness, headache, sleep disturbances, painful fingers and restlessness were significantly associated with at risk and problematic users.

**Conclusions:** Multiple health symptoms were associated with problematic use of mobile phones among the medical students. MPPUS is a useful tool which can be used to identify problematic usage of mobile phones.

Keywords: Mobile phone, Problematic usage, Medical students, Symptoms

#### **INTRODUCTION**

Mobile phones are an integral part of our lives as they provide an easy mode of communication between the individuals. The Indian telecom sector is the second largest in the world in terms of the number of subscribers. According to telecom regulatory authority of India (TRAI) there were a total of 1206.22 million subscribers in India out of which 1183.41 million were wireless subscribers at the end of 2018. With the technological revolution in the field of telecommunications and increased availability of smart phones at much affordable prices, mobile phone has become more than a communication device. They are mostly used nowadays for surfing the internet, playing games, checking email,

taking photos or selfies and updating on the social media accounts.

A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use although some studies have reported changes in brain activity, reaction times, and sleep patterns.<sup>2</sup> Several self-reported symptoms such as headache, ear ache, warmth sensations around the ear, concentration difficulties are found to be associated with excessive use of mobile phones.<sup>3,4</sup> Mobile phones communicate by transmitting radio waves (frequencies between 450 and 2700 MHz). The WHO and international agency for research on

(IARC) has classified radiofrequency cancer electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma which is associated with wireless phone use.<sup>5</sup> Studies have reported musculoskeletal symptoms such as pain in the neck/upper back, shoulder/upper extremities, and numbness/tingling in the hand/fingers due to intensive texting on a mobile phone.<sup>6</sup> Also there is an increased risk of traffic accidents if mobile phones are used while driving due to distraction. Nomophobia or fear of being out of mobile phone contact is an emerging behavioural addiction seen among students professional colleges.<sup>7,8</sup>

Almost all medical undergraduate students use a mobile phone as it helps them to stay connected with family and friends. The numerous apps and features available with smart phone may enhance their knowledge to keep them updated. Mobile phones can be considered as one of the socio-personal utilities with diverse features but its overuse may exert negative consequences on health. Hence, there is a need to study the potential adverse health risks of mobile phones. This study was planned with the objective to assess the prevalence of mobile phone problematic usage its association with various self-reported health related symptoms among the medical students in Goa.

#### **METHODS**

This cross sectional study was conducted among the undergraduate medical students of the Goa Medical College. The study period was 3 months i.e., January 2019 to March 2019. Ethical clearance was obtained from the Institutional Ethics Committee of the Goa Medical College. A written informed consent was obtained from each of the students willing to participate in the study, after explaining them the objectives of the study as provided in the participant information sheet.

The instrument used in our study was the mobile phone problematic use scale (MPPUS) which was originally designed and validated by Bianchi and Phillips for an age group of 18 to 85 years. It has 27 Likert-type items and response options ranging from 1 (not true at all) to 10

(totally true). The total score for the original scale considers a range of 27 to 270 points<sup>9</sup>. The students were classified based on the criteria given by Chow et al into four categories - casual users (≤74), regular users (75-143), at risk users (>143-<179) and problematic users (≥179) taking 15, 80, and 95 percentiles of the MPPUS scores as the cut-off point. Overall prevalence of problematic mobile phone usage was calculated by combining at risk and problematic users.

#### Sample size

Considering the prevalence (P) of problematic mobile phone use as 20.5% as reported in a previous study by Jose De Sola et al using MPPUS the sample size was calculated to 250 according to the formula.<sup>11</sup>

$$n = \frac{Z_{1-\alpha/2}^{2} P (1-P)}{d^{2}}$$

Where n- sample size; d- absolute precision of 5% of p;  $Z_{1-\alpha/2}$  - value taken from standard normal distribution at a specified confidence level (For  $\alpha$  =0.05,  $Z_{1-\alpha/2}$  = 1.96) at 5% level of significance.

#### Data analysis

The data was entered and analyzed in SPSS version 22. The categorical variables were expressed in percentage and proportions and Chi-square test was used to determine if there is any association between the study variables.

#### **RESULTS**

A total of 250 students participated in this study of which 146 (58.4%) were males and 104 (41.6%) were females. The mean age of the students was  $21.06\pm1.489$  years (18-28 years). Majority of them 206 (82.4%) were Hindus and stayed in nuclear family 219 (87.6%). Most of the students i.e., 75 (30%) belonged to class II socioeconomic status according to modified BG Prasad classification. The detailed sociodemographic characteristics are presented in Table 1.

Table 1: Socio-demographic characteristics of the medical students.

Demographic variable	Male	Female	Total
Demographic variable	N (%)	N (%)	N (%)
Age (in years )			
<20	57 (22.8)	38 (15.2)	95 (38%)
>20	89 (35.6)	66 (26.4)	155 (62%)
Religion			
Hindu	116 (46.4)	90 (36)	206 (82.4)
Muslim	03 (1.2)	04 (1.6)	07 (2.8)
Christian	27 (10.8)	10 (4)	37 (14.8)
Type of family			
Nuclear	129 (51.6)	90 (36)	219 (87.6)
Joint	17 (6.8)	14 (5.6)	31 (12.4)

Continued.

Domographia variable	Male	Female	Total				
Demographic variable	N (%)	N (%)	N (%)				
Phase							
II	45 (18)	30 (12)	75 (30)				
III-1	33 (13.2)	36 (14.4)	69 (27.6)				
III-2	37 (14.8)	17 (6.8)	54 (21.6)				
Intern	31 (12.4)	21 (8.4)	52 (20.8)				
Hostelite							
Yes	61 (24.4)	38 (15.2)	99 (39.6)				
No	85 (34)	66 (26.4)	151 (60.4)				
Socioeconomic status (according to Mo	Socioeconomic status (according to Modified BG Prasad classification)						
I	65 (26)	55 (22)	120 (48)				
II	67 (26.8)	38 (15.2)	105 (42)				
III	13 (5.2)	10 (4)	23 (9.2)				
IV	01 (0.4)	01 (0.4)	02 (0.8)				
V	00	00	00				
Using more than one handset							
Yes	18 (7.2)	23 (9.2)	41 (16.4)				
No	128 (51.2)	81 (32.4)	209 (83.6)				
Total N (%)	146 (58.4)	104 (41.6)	250 (100)				

Table 2: Distribution of students according to self-reported health symptoms.

Symptoms experienced due to mobile use		Male	Female	Total
		N (%)	N (%)	N (%)
1.	Headache	57 (22.8)	42 (16.8)	99 (39.6)
2.	Eye strain	87 (34.8)	57 (22.8)	144 (57.6)
3.	Concentration difficulty	67 (26.8)	47 (18.8)	114 (45.6)
4.	Memory disturbances	28 (11.2)	14 (5.6)	42 (16.8)
5.	Sleep disturbances	49 (19.6)	30 (12)	79 (31.6)
6.	Hearing problem	13 (5.2)	06 (2.4)	19 (7.6)
7.	Warmth sensation around the ear	32 (12.8)	20 (8)	52 (20.8)
8.	Neck pain	37 (14,8)	23 (9.2)	60 (24)
9.	Morning tiredness	43 (17.2)	29 (11.6)	72 (28.8)
10.	Painful fingers	17 (6.8)	10 (4)	27 (10.8)
11.	Tingling fingers	11 (4.4)	11 (4.4)	22 (8.8)
12.	Restlessness	32 (12.8)	17 (6.8)	49 (19.6)
13.	Tinnitus	02 (0.8)	00	02 (0.8)

Table 3: Distribution of students according to MPPUS scores.

Categories of students	Male	Female	Total	Chi-square
	N (%)	N (%)	N (%)	
Casual users (≤74)	24 (9.6)	17 (6.8)	41 (16.4)	2.006
Regular users (75-142)	95 (38)	59 (23.6)	154 (61.6)	2.996 p>0.05
At Risk users (143-178)	22 (8.8)	43 (17.2)	43 (17.2)	p>0.03
Problematic users (≥179)	05 (2)	07 (2.8)	12 (4.8)	

Only 99 (39.6%) students were staying in hostel and 41 (16.4%) used a single handset. The perceived symptoms reported by the students due to mobile phone use are given in table 2. A total of 211 (84.4%) students reported atleast one symptom and 67 (26.8%) students reported

more than 5 symptoms related with mobile phone use. The most common symptom reported was eye strain 144 (57.6%), followed by concentration difficulties 114 (45.6%), headache 99 (39.6%), sleep disturbances 79 (31.6%) and morning tiredness 72 (28.8%).

Table 4: Association between sociodemographic variables and categories of students according to MPPUS.

Demographic variable	Casual users (≤74)	Regular users (75-142)	At risk users (143-178)	Problematic users (≥179)	Total	Chi square	
	N (%)	N (%)	N (%)	N (%)	N (%)		
Age (in years )							
<20	12 (4.8)	62 (24.8)	14 (5.6)	07 (2.8)	95 (38)	4.307	
>20	29 (11.6)	92 (36.8)	29 (11.6)	05 (2)	155 (62)	p>0.05	
Religion							
Hindu	37 (14.8)	125 (50)	36 (14.4)	08 (3.2)	206 (82.4)	25.222	
Muslim	0	04 (1.6)	0	03 (1.2)	07 (2.8)	p<0.05	
Christian	04 (1.6)	25 (10)	07 (2.8)	01 (0.4)	37 (14.8)		
Type of family							
Nuclear	35 (14)	138 (55.2)	36 (14.4)	10 (4)	219 (87.6)	1.558	
Joint	06 (2.4)	16 (6.4)	07 (2.8)	02 (0.8)	31 (12.4)	p>0.05	
Phase							
II	08 (3.2)	51 (20.4)	10 (4)	06 (2.4)	75 (30)	15.150	
III-1	11 (4.4)	37 (14.8)	18 (7.2)	3 (1.2)	69 (27.6)	p>0.05	
III-2	11 (4.4)	38 (15.2)	4 (1.6)	1 (0.4)	54 (21.6)		
Intern	11 (4.4)	28 (11.2)	11 (4.4)	2 (0.8)	52 (20.8)		
<b>Hostel Resident</b>							
Yes	13 (5.2)	62 (24.8)	20 (8)	4 (1.6)	99 (39.6)	2.152	
No	28 (11.2)	92 (36.8)	23 (9.2)	8 (3.2)	151 (60.4)	p>0.05	
Socioeconomic s	tatus (accordin	g to Modified l	BG Prasad classif	ication)		•	
I	26 (10.4)	75 (30)	16 (6.4)	3 (1.2)	120 (48)	23.452	
II	14 (5.6)	59 (23.6)	24 (9.6)	8 (3.2)	105 (42)	p<0.05	
III	1 (0.4)	19 (7.6)	3 (1.2)	0	23 (9.2)	•	
IV	0	1 (0.4)	0	1 (0.4)	2 (0.8)		
V	0	0	0	0	0		
Using more than one handset							
Yes	8 (3.2)	25 (10)	7 (2.8)	1 (0.4)	41 (16.4)	0.863	
No	33 (13.2)	129 (51.6)	36 (14.4)	11 (4.4)	209 (83.6)	p>0.05	
Total number	41 (16.4)	154 (61.6)	43 (17.2)	12 (4.8)	250		

Table 5: Association between symptoms reported and categories of students according to MPPUS.

Categories of students	Casual users (≤74) N (%)	Regular users (75-142) N (%)	At risk users (143-178) N (%)	Problematic users (>179) N (%)	Total N (%)	Chi- square
Headache	09 (3.6)	60 (24)	22 (8.8)	08 (3.2)	99 (39.6)	11.445*
Eye strain	14 (5.6)	92 (36.8)	29 (11.6)	09 (3.6)	144 (57.6)	12.716*
Concentration difficulty	06 (2.4)	72 (28.8)	27 (10.8)	09 (3.6)	114 (45.6)	25.235*
Memory disturbances	03 (1.2)	22 (8.8)	12 (4.8)	05 (2)	42 (16.8)	12.438*
Sleep disturbances	07 (2.8)	44 (17.6)	21 (8.4)	07 (2.8)	79 (31.6)	14.535*
Hearing problem	0	13 (5.2)	05 (2)	01 (0.4)	19 (7.6)	4.530
Warmth sensation around the ear	07 (2.8)	31 (12.4)	10 (4)	04 (1.6)	52 (20.8)	1.689
Neck pain	04 (1.6)	39 (15.6)	14 (5.6)	03 (1.2)	60 (24)	6.442
Morning tiredness	04 (1.6)	38 (15.2)	21 (8.4)	09 (3.6)	72 (28.8)	29.439*
Painfull fingers	02 (0.8)	17 (6.8)	04 (1.6)	04 (1.6)	27 (10.8)	7.927*
Tingling fingers	02 (0.8)	14 (5.6)	04 (1.6)	02 (0.8)	22 (8.8)	1.741
Restlessness	01 (0.4)	28 (11.2)	15 (6)	05 (2)	49 (19.6)	17.941*
Tinnitus	00	01 (0.4)	01 (0.4)	0	02 (0.8)	1.733

<sup>\*:</sup> Significant values at p<0.05.

The maximum MPPUS score reported was 231 and minimum was 34. The categorization of students according to MPPUS scores is depicted in table 3. According to criteria by Chow et al, 43 (17.2) were found to be at risk and 12 (4.8%) students were problematic users of mobile phone. 10 Thus the overall prevalence of problematic mobile phone use was 22% (n=55). It was similar in both the sexes. Hindu religion and higher socioeconomic status were found to be significantly associated (p<0.05) with problematic use of Mobile phone according to MPPUS scores (Table 4). Selfreported symptoms such as headache, eye strain, concentration difficulties, Memory disturbances, morning tiredness, sleep disturbances, painful fingers and restlessness were also significantly associated with at risk and problematic users (Table 5).

#### **DISCUSSION**

The objective of this study was to find out the prevalence of problematic use of mobile phone and to study its association with multiple health symptoms. We found an overall prevalence of 22% (17.2% at risk and 4.8% problematic users) which is slightly higher than the previous study reported by Sola et al (20.5%) using the MPPUS. <sup>11</sup> Kalhori et al have validated the MPPUS in university students in Tehran and have found it to be a reliable questionnaire to assess the extent of problems caused by misuse of mobile phones. <sup>12</sup>

We did not find any significant difference in MPPUS score among the two age groups and sex. However a study among Swiss adolescents using a shortened 10-item version (MPPUS-10) reported a significant increase of MPPUS score in females and increasing age. 13 Also study done among medical interns using (problematic use of mobile phones) PUMP scale revealed that male gender was associated with higher scores than females.14 Another study done among college students in Goa found a strong association between gender and amount of money spent on mobile phones per month, with the boys spending significantly more than girls. They also found significant association in terms of religion and gaming facilities on mobile phones, wherein Muslim respondents play significantly less as compared to the Christians and Hindus. 15 Similarly we found a higher prevalence of problematic users amongst Hindus (17.5 at risk and 3.9% problematic) which was statistically significant (p<0.05).

We found significant association of multiple self-reported health symptoms amongst the problematic users. Similarly Stalin et al in community based study among adult population in South India reported a significant association of symptoms like tinnitus, painful fingers, restlessness, earache with mobile phone usage. Mortazavi et al in a study among school students found significant association between the number of headaches, vertigo and sleeping problems per month and total time spent on mobile phones. Frequent mobile phone use was associated with current stress, sleep disturbances,

and symptoms of depression in study by Thomee et al in a young population (20-24 years). <sup>18</sup>

#### Limitations

Our study included only the medical students of a single college so the results cannot be generalized to all youth or the general population. We did not assess the pattern of mobile phone usage among the students. Since this was a cross sectional study, long term effects of use of mobile phone could not be assessed

#### **CONCLUSION**

There was high prevalence of multiple health related symptoms positively associated with use of mobile phones. MPPUS is a useful tool which can be used to identify problematic usage of mobile phones. Long term studies such as cohort studies should be undertaken in different sets of population to explore the possible adverse health effects of overuse of mobile phones. Students should be counselled regarding the problematic usage of mobile phones and should be suggested to limit their screen time.

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