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Original Article

Psychiatry/Mental Health Section

Smartphone Addiction and its Impact on Insomnia among the Undergraduate Medical Students of a Teaching Hospital of Maharashtra, India- A Cross-sectional Study

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ABSTRACT

Introduction: Smartphone addiction is a type of behavioural addiction. Because of their alluring and exciting features, they have become favourite among young adults. Medical students are also prone to develop smartphone addiction. Excessive use of these devices has produced detrimental effect on physical and psychological well-being of an individual. Continuous exposure to screen has reduced sleep duration, delayed sleep onset and poor sleep quality.

Aim: To assess the prevalence of smartphone addiction and its impact on insomnia among undergraduate medical students.

Materials and Methods: Present online cross-sectional study was conducted by the Department of Psychiatry of Government Medical College, Akola, Maharashtra, India, over a period of three days from October 3, 2021 to October 5, 2021 on undergraduate MBBS (Bachelor of Medicine and Bachelor of Surgery) students of the selected college. This study was an online survey by using Smartphone Addiction Short Version Scale (SAS-SV) and Insomnia Severity Index (ISI) scale to assess smartphone addiction and insomnia respectively. A total of 275 complete responses were included in the study. Statistical analysis was carried out by using Chi-square test and Pearson's correlation test.

Results: A total of 275 complete responses of the undergraduate medical (MBBS) students, age 18-25 years ,143 males and 132 females,were included. Smartphone addiction was found to be present among 181 (65.8%) medical students. It was significantly associated with factors such as spending more than three hours per day on smartphone, having perceived bad impact of increased smartphone use over academic performance and facing criticism regarding increased smartphone use. Insomnia was present among 143 (52%) medical students, of which 82 (29.8%) had mild, 47 (17.1%) had moderate, and 14 (5.1%) had severe insomnia. Significant correlation (r-value 0.35; p-value <0.001) existed between the smartphone addiction and the severity of insomnia among study participants.

Conclusion: This study reveals alarming rise in smartphone addiction and its impact on insomnia among medical undergraduates. There is a need of continuous supervision and intervention program for early detection of addiction and safeguarding the well-being of medical students.

Keywords: Insomnia, Insomnia severity index, Sleep, Smartphone addiction, Smartphone addiction short version scale

INTRODUCTION

Without a social life, it will be more difficult for the humans to survive with good mental health. Smartphone technology has boosted this social integration because of easy availability and unique features like camera, internet access, messaging, calling, online shopping, etc. Smartphones have soon gained priority in human life [1-3]. A study observed that smartphones have assisted people in their professions, provided them needed information via internet, helped them in tackling the stress at times, and helped them in establishing their social identity via social online applications [4]. Because of the smartphones, approach towards the socialisation and communication has been changed. Now young adults rely more on virtual platforms rather than direct interaction with each other [5]. A study of University students revealed that 46% preferred smartphone facilities for social connectivity [6]. Smartphone use is rampant since the last decade [7]. Smartphones have become very popular among college going students including the medical students. Use of social networking sites over smartphones such as Facebook, WhatsApp, Instagram, Twitter, online as well as offline gaming, and internet browsing have attracted attention of youths towards the smartphones. The smartphones were also demonstrated to be of immense use to medical students as a gadget to "learn anywhere" [8]. Despite the advantages, there are many detrimental effects of irrational and excess smartphone use. Excess smartphone use can cause dependency issues among users [9-11]. This dependency arises out of tolerance which compels users to spend more and more time on their smartphones to experience gratification and this has led to rise in compulsive checking [12], which can adversely affect daily life [13].

Although smartphone addiction is not included in Diagnostic and Statistical Manual of Mental disorders 5th edition (DSM-5) [14], and International Classification of Diseases 10th edition Diagnostic Criteria for Research (ICD-10-DCR) [15], literature has shown that it is having lots of similarities with substance use disorders which is a term used by DSM-5 and with substance dependence syndrome which is a term used by ICD-10 [16,17]. These similarities particularly involve behavioural impairment in the form of compulsions like continuous checking, functional impairment like inattention, forgetfulness, inability to complete the task, tolerance, and withdrawal in the form of feeling agitated and restless without the smartphone [17].

Students are investing more time than required on smartphones. Studies have also conveyed that this is adding to the psychological

disturbances among student [18]. Poor sleep quality is one among them [19], which in turn can cause low concentration and below average performance [20].

Researchers investigated that more use of smartphones affect the sleep initiation [21], led to inattention at school or work [22], led to sleep disturbance [23], and difficulties in the relationship [24]. Longer hooking onto the screen has been linked with lesser sleep duration and lower sleep efficiency [25]. Smartphone addiction is an emerging behavioural addiction which is becoming one of the most common causes of insomnia [26].

Undergraduate students nowadays are using smartphones over prolonged periods of time not only for the recreational purpose but for the educational purpose also. Such an increased use of smartphones by medical students may lead to insomnia in them. On reviewing the literature, there were ample studies regarding assessment of relationship between smartphone addiction and sleep quality among Indian medical students [27-31], but there was paucity of data regarding assessment of impact of smartphone addiction on severity of insomnia among undergraduate medical students.

Present study was carried out for creating awareness among undergraduate medical students regarding the relationship between smartphone addiction and insomnia, so that they can limit the use of their smartphones for the appropriate period of time and for the appropriate reasons. So, this study was aimed to assess impact of smartphone addiction on insomnia among the undergraduate medical (MBBS) students of a teaching hospital.

MATERIALS AND METHODS

This was a cross-sectional observational study carried out by online survey (www.surveymonkey.com). The study was organised by the Department of Psychiatry of Government Medical College, Akola, Maharashtra, India. Data collection was carried over a period of three days from October 3, 2021 to October 5, 2021, by applying standard questionnaires like SAS-SV and ISI which are explained below and data analysis was done on 6th and 7th October 2021 immediately after the authors got the required data. Prior to onset of the present study, Institutional Ethics Committee approval was taken (Out. No./GMCA/EC/190/2018, dated 13th June 2018). Prior to commencement of survey, all participants were provided with details of time taken to complete the survey, nature of the survey and information that filling in survey implies provision of informed consent by the participants.

Inclusion criteria: The undergraduate students and both genders, between age group of 18-25 years and studying in first, second, third and fourth year of Bachelor of Medicine and Bachelor of Surgery (MBBS) course who were willing to participate in the study.

Exclusion criteria: Those students who were reluctant to participate in the study and undergraduate students of other colleges were excluded from the study. Participants' identities were kept anonymous throughout the study.

Questionnaire

All the authors of this study prepared the format of prevalidated questionnaire (gender, academic year, family type, having extra smartphone, hours and money spent on smartphone, academic performance and criticism) and study questionnaire by using "survey-monkey website" and the corresponding link was distributed among undergraduate students through WhatsApp application. Based on the previous studies, [16,32] the authors questioned the study participants about usage of smartphone upto 3 hours/day and more than 3 hours/day or whether they perceived any bad impact of increased smartphone use on their academics, and also regarding the criticism they faced from others due to their increased use of smartphones [16,32]. In this study, purposive sampling method was applied to collect the data. The survey was in English language. In this survey, parameters like smartphone addiction and insomnia were assessed by using SAS-SV and ISI scale, respectively [33,34].

Smartphone Addiction Short Version Scale (SAS-SV): This scale is a self-reported questionnaire with 10 items. Each item is rated on a 6-point Likert scale sequencing from "strongly disagree" to "strongly agree". The lowest score is 10 and highest is 60. Greater the score, greater is the degree of smartphone addiction. The scale has high validity and reliability for evaluation of smart phone addiction [33].

Insomnia Severity Index (ISI): A self-reported questionnaire used to describe insomnia symptoms. It comprises of seven items rated as 0-4. It evaluates insomnia by assessing various facets like delay in sleep induction, sustaining sleep, early awakening, satisfaction with sleep quality, disturbances in functioning and worries linked with sleep problems. The Arabic validated version of the ISI has best psychometric properties [34]. ISI scores of 0-7 indicate clinically insignificant insomnia, whereas scores of 8-14, 15-21, and 22-28 indicate sub-threshold, clinically moderate, and clinically severe insomnia, respectively [34]. The sensitivity and specificity of ISI is 86% and 88%, respectively [35].

STATISTICAL ANALYSIS

The PSPP (open source application free alternative for Statistical Package for Social Sciences) software version 1348.0.0.0 was used for the statistics. Level of significance on both scales was measured by using Chi-square test. To find out correlation between smartphone addiction and insomnia severity, Pearson test of correlation was used. Level of significance was set at 0.05.

RESULTS

A total of 325 undergraduate MBBS students participated in the online survey during the time period of the study, out of which 275 students submitted the complete responses in questionnaire.

Distribution of socio-demographic characteristics among study participants: [Table/Fig-1] shows that majority of the study participants belonged to 18-21 years of age group 213 (77.5%), male gender 143 (52.0%), first academic year 141 (51.3%), urban area of residence 182 (66.2%), and nuclear families 213 (77.5%).

Socio-demographic characteristics	N (%)
Age group (years)*	
18-21	213 (77.5)
22-25	62 (22.5)
*Mean age=20.52±1.34 (18-25).	
Gender	
Male	143 (52.0)
Female	132 (48.0)
Academic year	
First	141(51.3)
Second	68 (24.7)
Third	57 (20.7)
Final	9 (3.3)
Residence	
Rural	93 (33.8)
Urban	182 (66.2)
Family type	
Nuclear	213 (77.5)
Joint	62 (22.5)

[Table/Fig-1]: Socio-demographic data of study participants (N=275).

Distribution of smartphone use related data among study participants: [Table/Fig-2] shows that majority of the study participants didn't have an extra smartphone 180 (65.5%), spent more than 3 hours/day on smartphone use 199 (72.4%), spent

upto rupees 250/month on their smartphone use 190 (69.1%), had perceived bad impact of excessive smartphone use on their academic performance 215 (78.2%), and faced criticism because of their increased smartphone use 139 (50.5%).

Smartphone use related characteristics	N (%)
Having an extra smartphone	
Yes	95 (34.5)
No	180 (65.5)
Time spent on smartphone use (in hours/day)	
Upto 3	76 (27.6)
More than 3	199 (72.4)
Amount of money spent on smartphone use (in Rupees/month)	
Upto 250	190 (69.1)
From 251 to 500	66 (24.0)
Above 500	19 (6.9)
Perceived bad impact of an increased smartphone use on academics	
Yes	215 (78.2)
No	60 (21.8)
Facing parental/familial/peer criticism over excessive smartphone use	
Yes	139 (50.5)
No	136 (49.5)

[Table/Fig-2]: Smartphone related characteristics of the study participants (N=275).

Distribution of smartphone addiction among study participants: [Table/Fig-3] shows that prevalence of smartphone addiction was 65.8% among the study participants as per the scores of SAS-SV. Mean score of SAS-SV was 35.68±9.70 (10-60).

Smartphone addiction	N (%)
Present	181 (65.8)
Absent	94 (34.2)

[Table/Fig-3]: Prevalence of the smartphone addiction among study participants using Smartphone Addiction Scale – Short Version (SAS-SV) (N=275).

Distribution of the severity of insomnia among the study participants: [Table/Fig-4] show that the prevalence of insomnia was 52% of which 82 (29.8%) had mild, 47 (17.1%) had moderate and 14 (5.1%) had severe insomnia. The mean score of ISI was 9.35±6.50 (0-28).

Severity of insomnia	N (%)
No insomnia	132 (48.0%)
Mild insomnia	82 (29.8)
Moderate insomnia	47 (17.1)
Severe insomnia	14 (5.1)

[Table/Fig-4]: Severity of insomnia among study participants (N=275).
Insomnia Severity Index (ISI)

Association between smartphone use related data and smartphone addiction: [Table/Fig-5] shows that amongst smartphone use related data, factors such as spending more than 3 hours/day on smartphone, having a bad impact of increased smartphone use over academic performance, and facing criticism regarding increased smartphone use were significantly associated with the presence of smartphone addiction among the study participants.

Association between smartphone use related data and insomnia: [Table/Fig-6] shows that amongst smartphone use related data, factors such as having an extra smartphone, having a bad impact on academic performance due to an increased use of smartphone, and facing criticism over an excessive smartphone use were significantly associated with the presence of insomnia.

Correlation between smartphone addiction and insomnia: [Table/Fig-7] shows that significant correlation existed between the smartphone addiction and the severity of insomnia among the study participants.

Smartphone use related data	Smartphone addiction		p-value (Calculated by using Chi-square test)
	Present (n_1=181)	Absent (n_2=94)	
Having an extra smartphone			
Yes	67 (37.0)	28 (29.8)	0.285
No	114 (63.0)	66 (70.2)	
Time spent on smartphone use (in hours/day)			
Upto 3	38 (21.0)	38 (40.4)	**0.001**
More than 3	143 (79.0)	56 (59.6)	
Amount of money spent on smartphone use (in Rupees/month)			
Upto 250	128 (70.7)	62 (66.0)	0.589
From 251 to 500	40 (22.0)	26 (27.6)	
Above 500	13 (7.3)	6 (6.4)	
Perceived bad impact of an increased smartphone use on academics			
Yes	153 (84.5)	62 (66.0)	**0.001**
No	28 (15.5)	32 (34.0)	
Facing parental/familial/peer criticism over excessive smartphone use			
Yes	107 (59.1)	32 (34.0)	**<0.001**
No	74 (40.9)	62 (66.0)	

[Table/Fig-5]: Association between the smartphone use related data and smartphone addiction among study participants (n=275).

Smartphone use related data	Insomnia		p-value (Calculated by using chi-square test)
	Present (n_1=143)	Absent (n_2=132)	
Having an extra smartphone			
Yes	57 (39.9)	38 (28.8)	**0.05**
No	86 (60.1)	94 (71.2)	
Time spent on smartphone use (in hours/day)			
Upto 3	33 (23.1)	43 (32.6)	0.082
More than 3	110 (76.9)	89 (67.4)	
Amount of money spent on smartphone use (in Rupees/month)			
Upto 250	95 (66.4)	95 (72.0)	0.491
From 251 to 500	36 (25.2)	30 (22.7)	
Above 500	12 (8.4)	7 (5.3)	
Bad impact of an increased smartphone use on academics			
Yes	123 (86.0)	92 (69.7)	**0.001**
No	20 (14.0)	40 (30.3)	
Facing parental/familial/peer criticism over excessive smartphone use			
Yes	84 (58.7)	55 (41.7)	**0.006**
No	59 (41.3)	77 (58.3)	

[Table/Fig-6]: Association between the smartphone use related data and insomnia among study participants (n=275).

Smartphone addiction	Insomnia		p-value (calculated by using Chi-square test)	Correlation 'r'
	Present (n_1=143)	Absent (n_2=132)		
Present	117 (81.8)	64 (48.5)	<0.0001	0.35
Absent	26 (18.2)	68 (51.5)		

[Table/Fig-7]: Shows that significant correlation existed between the smartphone addiction and the severity of insomnia among the study participants.

DISCUSSION

In the present study, most of the participants were male undergraduates 143 (52%) and belonged to first year of curriculum 141 (51.3%). The authors may say that male undergraduates were more enthusiastic towards participation than their female colleagues. In this study, maximum participant belonged to urban residence 182 (66.2%). These observations were similar to another study where 482 (62.3%) study participants belonged to urban residential area [32]. An Indian

study observed that majority of the study participants 290 (58.5%) were from urban residential area and smartphone addiction was significantly higher among urban college students [36]. From these findings, the authors may interpret that Indian urban population uses smartphones more than the rural ones which may predispose urban population for the development of smartphone addiction. In this study majority participants 213 (77.5%) belonged to nuclear family. The family type serves an important function of providing support system thereby making nuclear families more prone to functional disorders and addictive disorders. Kim HJ et al., noticed that smartphones addiction and family dysfunction were closely associated with each other [24].

In present study, majority participants 180 (65.5%) did not have extra smartphone. Most of the participants 199 (72.4%) were spending more than 3 hours on smartphone. These findings were consistent with a study in which maximum 379 (52.1%) of students were spending 3-6 hours per day on phone [32]. In this study majority participants 190 (69.1%) were spending upto Rupees 250 per month on smartphone use. Pavithra MB et al., also described similar findings that 148 (74%) students spend Rupees 300-500 per month over smartphone use [37].

In present study, majority of participants (78.2%) agreed that there was bad impact of smartphone use on academic performance. Because of more hooking onto screen, students find less time for academics. Moreover, lack of concentration due to overuse of phone has been described. In present study, 50.5% of participants were facing criticism from parents and peers. These findings were similar to those in the study where majority (52.5%) of undergraduate health sciences students had described facing parental criticism due to overuse of smartphone [16].

The authors found significant association between smartphone addiction and spending more than three hours per day on phone (p=0.001). Higher the time spent on smartphone, higher the likelihood of smartphone addiction. The authors found significant association between the increase use of smartphone and perceived bad impact of it on students' academics (p=0.001). Wilmer HH et al., and Jilisha G et al., also found similar finding that increased use of smartphones had bad impact on students' academic performance [22,32]. These findings might suggest that smartphone addiction hampers the academic performance of the students. The authors found significant association between smartphone addiction and facing parental criticism for excess use of smartphone. Parents are worried about growing attraction of technology and irrational use of smartphone by their children [32].

In the present study, a significant association existed between users with extra smartphones and presence of insomnia. The authors did not found significant association between having an extra smartphone and smartphone addiction (p=0.285). This finding was similar with another study finding that having an extra smartphone was not associated with presence of smartphone addiction (p=0.13) [16]. These findings explained that it is not necessary to have multiple smartphones with a single individual for the development of smartphone addiction. Even possessing a single smartphone can lead to its addiction. In this study, a significant association existed between insomnia and having perceived bad impact on academic performance (p=0.001). Smartphone use may result in sleep difficulties [19], which in turn can cause inattention and poor academic performance [20]. The authors also found significant associations between insomnia and criticism from others due to increased used of smartphone (p=0.006). Because of the criticism, interpersonal relationship might be disturbed.

In the present study, prevalence of smartphone addiction among participants was 65.8%. A meta-analysis based on systemic review from India had described prevalence of smartphone addiction in a range of 39%-44% [38]. Another study from South India has shown smartphone addiction of 46% among university students [39]. This hike in smartphone addiction in the present study might reflect recent increase in smartphone addiction in last five to six years. A study from East India found that the prevalence of smartphone addiction was 49.5% among the undergraduate nursing students [40]. In the present study, out of 275 undergraduate medical students, 181 had smartphone addiction i.e., the prevalence of smartphone addiction was 65.8% of which 107 (59.1%) were males and 74 (40.9%) were females. A study from North India observed that the prevalence of smartphone addiction was 46.15% and 33.33% among male and female Indian medical students respectively [27]. These findings suggest that the smartphone addiction was more prevalent among male undergraduate medical students than their counterparts.

In this study, prevalence of insomnia among study participants was 52% of which 82 (29.8%) had mild, 47 (17.1%) had moderate and 14 (5.1%) had severe insomnia. Electronic gadgets exposure has unfavourable effect on sleep duration, sleep onset and sleep efficiency. The habit of checking smartphone frequently stimulates reward centre and affects sleep quality [41]. Tamura H et al., has mentioned association between smartphone use of more than 5 hours per day and shorter sleep duration and insomnia [42].

In the present study, significant correlation existed between insomnia severity and smartphone addiction (p=<0.0001, r=0.35). These findings were consistent with another study which stated association between higher smartphone addiction and higher ISI [43]. In a Turkish study, a weak positive correlation was observed between severity of insomnia and smartphone addiction [44]. Overall the authors found high prevalence of smartphone addiction and high prevalence of insomnia among study participants. Factors such as spending more time on smartphone, perceived bad academic performance due to increased smartphone use and facing criticism due to increased smartphone use were significantly associated with smartphone addiction. Factors such as having extra smartphone, perceived bad academic performance due to increased smartphone use and facing criticism due to increased smartphone use were significantly associated with presence of insomnia. Finally smartphone addiction and severity of insomnia were significantly associated.

Limitation(s)

As the study was based on self-reported questionnaire, variations in the individual perception cannot be overlooked. Considering the correlational nature of study design it was difficult to explore causality. Apart from assessing an impact of smartphone addiction on insomnia, other variables like personality factors and coping strategies were not taken in account. Finally, the study was conducted on specific group, so the results could not be generalised to general population.

CONCLUSION(S)

The unfavourable outcome of increased smartphone use and its influence on sleep health needs to be addressed. The authors advice continuous supervision and implementation of intervention program for early detection of smartphone addiction and improving sleep quality. Inculcating other educational resources and activities like sports, entertainment, and cultural programs should be taken into consideration.

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