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Study of smartphone addiction: prevalence, pattern of use, and personality dimensions among medical students from rural region of central India

Abstract

Introduction: Smartphone use among adolescents has increased dramatically in the last decade which results in a new condition called as smartphone addiction. **Objectives:** To estimate the prevalence of smartphone addiction, to understand its pattern of use, and to determine association of smartphone addiction with pattern of use and personality dimensions among medical students. **Methodology:** A total 146 out of 150 medical students participated from Sawangi, district Wardha, Maharashtra, India. Data collection was done using sociodemographic proforma, smartphone addiction scale, and dimensional personality inventory. **Results:** Mean age of the students was 18.50 (±0.80) years. The prevalence of smartphone addiction was found to be 24.65% with high risk of addiction being 7.53% and 17.12% among males and females respectively. The smartphone addiction was associated with smartphone use duration on a typical day, frequency of use, and most personally relevant smartphone function ($p<0.05$). The personality dimensions, such as assertive-submissive, depressive-nondepressive, and emotional instability-emotional stability also had significant association with smartphone addiction ($p<0.05$); and these dimensions were also found to be predictors along with duration of use on multivariate analysis. **Conclusion:** This study identified the association between smartphone use pattern, personality dimensions, and smartphone addiction among medical undergraduates. It is advised further studies should be conducted to understand the different variables and appropriate measures should be taken to prevent harmful use and to create awareness among students.

Keywords: Assertive. Depressive. Emotional.

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INTRODUCTION

The new generations of cellular phones are smartphones with integrated computer-related functions and a variety of tasks based on number of applications.[1] Smartphones have a wide range of functions based on the Internet. It can also be used to play games, use messenger systems, chat with friends, access web services, and search for information in addition to making phone calls.[2] Thus, they are no longer just a medium of communication but a part of daily life. The rate of smartphone usage is highest (62%) in the age group of 25-34 years. Among smartphone users, 53% are male and 47% are female. There has been a drastic increase in use of smartphone in the last decade. Among adolescents (16 to 18 years), there has been rapid rise in smartphone use from five per cent in 2012 to 25% in 2014.[3] In 2012, it was estimated that smartphone use crossed one billion worldwide.[4] Recently in urban India, the rate of rise from year 2012 was 90% and in 2013, there were around 51 million smartphone users.[3]

The increased popularity of smartphone use leads to many problems due to overuse. The terms 'smartphone addiction', 'problematic mobile phone use', 'mobile phone addiction', 'mobile phone dependence', 'compulsive mobile phone use', and 'mobile phone overuse' have been used to describe more or less the same phenomenon. The excessive smartphone use can cause physical difficulties, such as neck stiffness, wrist or back pain, blurred vision, and sleep disturbances. It can also reduce academic achievement, social interactions, and lead to relationship problems.[5-11] Griffiths defined technological addiction that is human-machine interaction as a type of behaviour addiction and is non-chemical type of addiction.[12] Problematic smartphone use is characterised by 1) individual is preoccupied with a specific behaviour (smartphone use), 2) the behaviour is used in order to escape reality or create euphoria, 3) tolerance develops as the behaviour continues, 4) withdrawal symptoms occur when the behaviour interfered, 5) interpersonal problems occur as consequence of continuous behaviour, and 6) experience of relapse against will.[13]

Smartphone addiction generally has four main components: compulsive behaviours, tolerance, withdrawal, and functional impairment.[14] While smartphone use has been increasing across all sectors, university students have

been seen as the largest consumer group of smartphone services. Students use them for several purposes, such as to explore applications which provide new functions, communicate with others face to face instantly, enjoy different kinds of entertainment like games, and to escape from uncomfortable situation while surfing on the Internet; hence, its use has become vital to them.[5,15] A smartphone survey reported that 25.5% of adolescents were in a smartphone addiction risk group, which was about two to nine times higher than adults.[16]

Studies on smartphone addiction revealed a significant association between neurotic personality traits and severity of smartphone addiction.[2] A survey on Korean college students revealed, both aggression and impulsion to be positive predictors of smartphone addiction.[17] Previous studies also reported that depression, loneliness, and anxiety emerged as independent predictors of smartphone addiction.[17-20] A US study on adults revealed that lower age, depression, and extraversion predicted higher scores on measures of problematic mobile phone use.[21] Another US study on college undergraduates reported that although addictive activities varied by gender, time spent on social networking sites, number of texts sent, and number of phone calls made were predictors of mobile phone addiction.[22]

Considering the enormous use of smartphone by adolescents which is the most vulnerable group on account of the time they spend on smartphones and its effects on health, it is important to study smartphone use in this subset of population. There is a paucity of research on smartphone addiction and to the best of our knowledge, this is a first study of its kind in our region. The objectives of the present study were to estimate the prevalence of smartphone addiction, understand pattern of smartphone use, and to determine the association of smartphone addiction with pattern of use and personality dimensions among medical students.

MATERIALS AND METHODS

A cross-sectional survey was conducted on medical students from the Jawaharlal Nehru Medical College in Sawangi, district Wardha, Maharashtra, India during the period of November-December 2017. A total of 150 MBBS students aged 17-20 years using smartphone were assessed through self-reported questionnaire during lecture hours. Of the total participants, four could not be included due to incomplete forms submitted by them and thus, 146 students participated in the study. Before collecting the data, the students were explained about the purpose and nature of the study. The written consent was obtained and data was collected. The study was conducted after obtaining permission from college authorities and approval from institutional ethics committee.

The following questionnaires were used to assess the study participants.

Sociodemographic proforma

The questionnaire includes age, gender, duration of smartphone use, duration of smartphone use on a typical day, frequency of smartphone use on a typical day, time until first smartphone use in the morning, and most personally relevant smartphone function.

Smartphone addiction scale short version (SAS-SV)

A ten-item self-report instrument which measures smartphone addiction. The participants responded on a six-point Likert scale ranging from "strongly disagree" to "strongly agree". The total score ranges from ten to 60 with the highest score indicating higher risk of smartphone addiction. The measure's items were selected from the original smartphone addiction scale (SAS) on basis of their validity. The SAS short version (SAS-SV) addresses five component areas, such as daily life disturbance, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. A Cronbach's alpha correlation coefficient of 0.91 was obtained for SAS-SV. The cut-off values of ≥31 and ≥33 for male and female participants were used respectively. It can be efficiently used for the evaluation of smartphone addiction in community and research areas.[23]

Dimensional personality inventory

The inventory consists of 60 statements and is available in Hindi as well as in English version. The areas of dimensional personality inventory include activity-passivity, enthusiastic-nonenthusiastic, assertive-submissive, suspicious-trusting, depressive-nondepressive, and emotional instability-emotional stability. Three response alternatives - yes, undecided, and no - are used to measure each personality trait by ten items. The 'yes' is to be scored as two, 'undecided' is to be scored as one, whereas 'no' is equal to zero. This test can be administered on all individuals above the age of 16 years. The test was found reliable.[24]

Statistical analysis

The analysis was done by descriptive and inferential statistics using student t-test, Chi-square test, and multiple logistic regression analysis with p-value <0.05 considered as significant. Data were analysed using SPSS version 22.0 and Graph Pad Prism 6.0 version. In the present study, Chi-square value was calculated by using Graph Pad Prism 6.0 version; for any frequency which is less than five, it was added to the frequency which is more than five by the method known as 'method of pooling'.

RESULTS

A total 146 out of 150 students were selected in the present study. There were 43 (29.5%) males and 103 (70.5%) females with mean age of 18.50 (±0.80) years. Majority of the students were using the smartphone for one to three years (55.47%). Majority of them was using the smartphone for three to four hours (36.3%) on a typical day and frequency of use was 11-20 times/day (35.6%). Most of the students were using smartphone first time in the morning within five minutes (34.9%) and the most personally relevant functional use was social networking (21.60%) and listening to music (20.27%). (Table 1).

In the present study, students were assessed using the dimensional personality inventory. Majority of them scored average on activity-passivity (82.9%),

enthusiastic-nonenthusiastic (76.7%), assertive-submissive (72.6%), suspicious-trusting (72.6%), depressive-nondepressive (63.01%), and emotional instability-emotional stability (63.01%) personality dimensions (Table 2).

The prevalence of smartphone addiction was 24.65% with high risk of smartphone addiction among males, 7.53% and among females, 17.12% (Table 3).

Table 1: Sociodemographic profile of study participants

Variables	Number (n)	Percentage
Age (years)	18.5±0.80	
Gender		
Male	43	29.5
Female	103	70.5
Duration of smartphone use (years)		
1-3	81	55.47
4-6	55	37.67
>6	10	6.84
Duration of smartphone use on a typical day		
<10 minutes	6	4.1
11-60 minutes	4	16.4
1-2 hours	48	32.9
3-4 hours	53	36.3
5-6 hours	12	8.2
>6 hours	3	2.1
Frequency of smartphone use on a typical day (times/day)		
<5	11	7.5
6-10	42	28.8
11-20	52	35.6
21-50	30	20.5
51-100	10	6.8
>100	1	0.7
Time until first smartphone use in the morning		
Within 5 minutes	51	34.9
Within 6-30 minutes	37	25.3
Within 31-60 minutes	25	17.1
After more than 60 minutes	33	22.6
Most personally relevant smartphone function		
Social networking	97	21.60
Phone calls	86	19.15
Gaming	19	4.23
Text messaging	32	7.13
E-mailing	11	2.45
Watching videos	59	13.14
Listening to music	91	20.27
Reading news	37	8.24
Other	17	3.79

The smartphone use duration on a typical day, frequency of use, and relevant smartphone function had significant association with smartphone addiction ($p<0.05$), whereas gender, duration, and time until first smartphone use in the morning were not significantly associated ($p>0.05$) (Table 4).

The personality dimensions, such as assertive-submissive, depressive-nondepressive, and emotional instability-emotional stability had significant association with smartphone addiction ($p<0.05$), whereas activity-passivity, enthusiastic-nonenthusiastic, and suspicious-trusting reported no significant association ($p>0.05$) (Table 5).

The multiple regression analysis showed that duration of smartphone use on a typical day and personality dimensions, such as assertive-submissive, depressive-nondepressive, and

Table 2: Personality traits of study participants on the dimensional personality inventory

Variables	Number (n)	Percentage
Activity-passivity		
High activity	22	15.1
Average activity-passivity	121	82.9
High passivity	3	2.1
Enthusiastic-nonenthusiastic		
Highly enthusiastic	28	19.2
Average enthusiastic-nonenthusiastic	112	76.7
Highly nonenthusiastic	6	4.1
Assertive-submissive		
Highly assertive	14	9.6
Average assertive-submissive	106	72.6
Highly submissive	26	17.8
Suspicious-trusting		
Highly suspicious	11	7.5
Average suspicious-trusting	106	72.6
Highly trusting	29	19.9
Depressive-nondepressive		
Highly depressive	25	17.12
Average depressive-nondepressive	92	63.01
Highly nondepressive	29	19.9
Emotional instability-emotional stability		
Highly emotionally unstable	27	18.5
Average emotional instability-emotional stability	92	63.01
Highly emotionally stable	27	18.5

Table 3: SAS-SV scores among the study participants

Participants (n=146)	Non-addicted students (score <30)	Addicted students (score >30)
Males	32 (21.91%)	11 (7.53%)
Females	78 (53.42%)	25 (17.12%)

SAS-SV=Smartphone addiction scale short version

Table 4: Association of smartphone addiction with pattern of use among study participants

Variables	Normal students (n=110%)	Addicted students (n=36%)	χ^2	df	p-value
Gender					
Male	32 (29.09)	11 (30.56)	0.02	1	0.86
Female	78 (70.91)	25 (69.44)			
Duration of smartphone use (years)					
1-3	65 (59.09)	16 (44.44)	2.35	2	0.30
4-6	38 (34.55)	17 (47.22)			
>6	7 (6.36)	3 (8.33)			
Duration of smartphone use on a typical day					
<10 minutes	6 (5.45)	0 (0)	14.90	5	0.011
11-60 minutes	22 (20)	2 (5.56)			
1-2 hours	40 (36.36)	8 (22.22)			
3-4 hours	34 (30.91)	19 (52.78)			
5-6 hours	6 (5.45)	6 (16.67)			
>6 hours	2 (1.82)	1 (2.78)			
Frequency of smartphone use on a typical day (times/day)					
<5	11 (10)	0 (0)	16.24	5	0.006
6-10	35 (31.82)	7 (19.44)			
11-20	41 (37.27)	11 (30.56)			
21-50	18 (16.36)	12 (33.33)			
51-100	4 (3.64)	6 (16.67)			
>100	1 (0.91)	0 (0)			
Time until first smartphone use in the morning					
Within 5 minutes	35 (31.82)	16 (44.44)	3.85	3	0.27
Within 6-30 minutes	36 (23.64)	11 (30.56)			
Within 31-60 minutes	21 (19.09)	4 (11.11)			
After more than 60 minutes	28 (25.45)	5 (13.89)			
Most personally relevant smartphone function					
Social networking	69 (20.12)	28 (26.42)	14.49	8	0.040
Phone calls	71 (20.70)	15 (14.15)			
Gaming	10 (2.92)	9 (8.49)			
Text messaging	28 (8.16)	4 (3.77)			
E-mailing	10 (2.92)	1 (0.94)			
Watching videos	41 (11.95)	18 (16.98)			
Listening to music	71 (20.70)	21 (19.81)			
Reading news	29 (8.45)	8 (7.55)			
Other	14 (4.08)	2 (1.87)			

df=degree of freedom

emotional instability-emotional stability were predictors of smartphone addiction (Table 6).

DISCUSSION

In the present study, prevalence of smartphone addiction was found to be 24.65% with the risk of addiction being more among females (17.12%) than males (7.53%). The prevalence of addiction in present study was similar to that in junior high school students of South Korea (24.8%), while it was higher than the prevalence rates of smartphone addiction in university students and staff of Spain (12.8%) and Belgium (21.5%) respectively.[23,25] Different studies conducted in China among undergraduates and adolescents reported prevalence rates of 21.3% and 26.2% respectively.[26,27] Another study conducted on Turkish university students revealed that 39.8% had smartphone addiction.[28] A study in Lebanon reported 44.6% of university students had smartphone addiction which was higher than the present study.[29] These differences could be due to different classification methods and instruments used, and differences among participants in other studies.

Table 5: Association of personality traits and smartphone addiction among study participants

Variables	Normal students %	Addicted students %	χ^2	df	p-value
Activity-passivity					
High activity	18 (16.36)	4 (11.11)	0.67	2	0.71
Average activity-passivity	90 (81.82)	31 (86.11)			
High passivity	2 (1.82)	1 (2.78)			
Enthusiastic-nonenthusiastic					
Highly enthusiastic	20 (18.18)	8 (22.22)	2.63	2	0.26
Average enthusiastic-nonenthusiastic	87 (79.09)	25 (69.44)			
Highly nonenthusiastic	3 (2.73)	3 (8.33)			
Assertive-submissive					
Highly assertive	10 (9.09)	4 (11.11)	63.65	2	0.0001
Average assertive-submissive	96 (87.27)	10 (27.78)			
Highly submissive	4 (3.64)	22 (61.11)			
Suspicious-trusting					
Highly suspicious	9 (8.18)	2 (5.56)	0.38	2	0.82
Average suspicious-trusting	80 (72.73)	26 (72.22)			
Highly trusting	21 (19.09)	8 (22.22)			
Depressive-nondepressive					
Highly depressive	5 (4.55)	20 (55.56)	50.88	2	0.0001
Average depressive-nondepressive	82 (74.55)	10 (27.78)			
Highly nondepressive	23 (20.91)	6 (16.67)			
Emotional instability-emotional stability					
Highly emotionally unstable	7 (6.36)	20 (55.56)	44.03	2	0.0001
Average emotional instability-emotional stability	81 (73.64)	11 (30.56)			
Highly emotionally stable	22 (20)	5 (13.89)			

df=degree of freedom

Table 6: Multiple regression analysis when SAS-SV score taken as dependent variable

Parameters	Unstandardised coefficients		Standardised coefficients	t	p-value	95% confidence interval for B	
	B	Std. Error	Beta			Lower bound	Upper bound
SAS-SV score	0.938	0.664					
Age	0.015	0.033	0.032	0.475	0.636	–0.049	0.080
Gender	–0.115	0.065	–0.122	1.772	0.079	–0.243	0.013
Duration of smart phone use	0.024	0.047	0.035	0.518	0.605	–0.068	0.117
Duration of smart phone use on a typical day	0.073	0.033	0.177	2.243	0.027	0.009	0.138
Frequency of smart phone use	0.016	0.032	0.040	0.498	0.619	–0.048	0.080
Time until first smart phone use in the morning	–0.040	0.025	–0.107	1.581	0.116	–0.090	0.010
Activity-passivity	–0.060	0.085	–0.054	0.705	0.482	–0.227	0.108
Enthusiastic-nonenthusiastic	–0.057	0.068	–0.060	0.837	0.404	–0.191	0.077
Assertive-submissive	0.371	0.070	0.445	5.266	0.0001	0.232	0.510
Suspicious-trusting	–0.010	0.072	–0.012	0.139	0.889	–0.151	0.132
Depressive-nondepressive	–0.116	0.057	–0.164	2.042	0.043	–0.228	–0.004
Emotional instability-emotional stability	–0.159	0.058	–0.225	2.747	0.007	–0.274	–0.045

SAS-SV=Smartphone addiction scale short version

The present study reported no significant gender differences in the prevalence of smartphone addiction ($p>0.05$), which is similar to the results obtained in previous studies.[30] But, the risk of smartphone addiction was

found to be higher in females as compared to males which are in accordance with the findings reported in earlier studies.[28,31,32] Chen *et al*.,[33] in his study showed that males were more likely to play games, listen to music, and watch videos whereas females were more inclined to use smartphone for communication and social networking services.

The results showed significant association of frequency, smartphone use duration on typical day, and most personally relevant function with smartphone addiction ($p<0.05$), whereas the total duration and time use were not significantly associated ($p>0.05$). Haug *et al*.,[34] in his study demonstrated that duration of use, time until first use in the morning, and social networking were significantly associated with smartphone addiction. However, Lee *et al*.[35] and Lin *et al*.,[36] in their studies reported smartphone addiction to be more strongly associated with use frequency than duration. These variations in results may be attributed to differences in study population, recall bias, and time distortion at the time of self-reporting.

The personality dimensions, such as assertive-submissive, depressive-nondepressive, and emotional instability-emotional stability found to be significantly correlated with smartphone addiction in this study ($p<0.05$). The participants with smartphone addiction on the dimensional personality inventory reported highly submissive, highly depressive, and highly emotionally unstable. A survey on smartphone addiction using the Mini-Marker Personality Scale suggested that increased neuroticism and decreased openness were associated with higher likelihood of addiction while conscientiousness, agreeableness, and extraversion were not predictors of smartphone addiction. A significant association was also found between narcissism level and smartphone addiction.[37] A study on university students at Lebanon reported a significant positive association between smartphone addiction and type A personality who are competitive, ambitious, impatient, aggressive, anxious, and workaholic, and also showed significant correlation of depression and anxiety with smartphone addiction.[38]

The present study suggested that personality dimensions, such as assertive-submissive, depressive-nondepressive, and emotional instability-emotional stability and duration of smartphone use were significant risk factors for smartphone addiction. The multivariate analysis by Haug *et al*.,[34] in his study demonstrated that duration of smartphone use, time until first use in the morning, lowest age group, immigrant background with both parents born outside, and high perceived stress were significant predictors of smartphone addiction. Chen *et al*.[33] showed that playing smartphone games, multimedia and social networking applications were predictors of smartphone addiction. Excessive use of smartphone use during a weekday (five or more hours), followed by depression score, non-use of smartphone to call family members, personality type, use for the entertainment purpose, and anxiety score were most powerful predictors of smartphone addiction.[38] These variations in the findings could be due to differences among study participants, different variables and scales used in studies. So, future research will be needed to focus on this issue to elaborate risk and protective factors for smartphone addiction and appropriate measures to prevent harmful use.

Limitations

The sample size is small as compared to previous literature. The results cannot be generalised because study was conducted in only one medical college.

Conclusion

The present study found higher prevalence of smartphone addiction among medical students in comparison to previous literature. Different patterns of use and personality dimensions were found to be significantly associated with smartphone addiction while assertive-submissive, depressive-nondepressive, emotional instability-emotional stability, and duration of smartphone use emerged as predictive factors. These findings suggest that school teachers, counsellors, and mental health professionals should take appropriate measures to prevent harmful use and to create awareness regarding high risk of addiction among students.

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