

Prevalence of Smart Phone Addiction and Its Association with Sleep Quality Among Medical Students in a Tertiary Care Institute in Gautam Budh Nagar, Uttar Pradesh: A Cross-Sectional Study

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Abstract

Background: Smartphone addiction has emerged as an important public health concern among medical students because of its potential impact on sleep quality and overall wellbeing. Excessive smartphone use may adversely affect sleep patterns through prolonged screen exposure and disturbed sleep habits. **Material & Methods:** A cross-sectional study was conducted among MBBS students at a tertiary care institute in Uttar Pradesh, North India. Stratified random sampling with equal allocation was used to select participants from each batch. Data were collected using online self-administered, structured questionnaire comprising demographic details, Smartphone Addiction Scale-Short Version (SAS-SV) and Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using SPSS version 28.0. Chi-square test and multiple logistic regression analysis were applied. A p-value <0.05 was considered statistically significant. **Result:** The prevalence of smartphone addiction was found to be 31.6%, while 31.3% of participants had poor sleep quality. Smartphone addiction showed significant association with gender, daily duration of smartphone use, bedtime smartphone use, frequency of checking smart phones and use of smart phones during meals. Poor sleep quality was significantly higher among participants with smartphone addiction (55.6%) compared to low-risk users (20.0%) ($p < 0.001$). Multiple logistic regression analysis demonstrated that smartphone addiction was an independent predictor of poor sleep quality (AOR=5.192, $p < 0.001$). **Conclusion:** Smartphone addiction was prevalent among nearly one-third of medical students and was significantly associated with poor sleep quality. The findings highlight the need for awareness programs and interventions promoting healthy smartphone usage and sleep hygiene among medical students.

Key words: Smartphone addiction, Sleep quality, SAS-SV, PSQI

Introduction

Smartphones have become an integral part of daily life, especially among young adults and students. In India, approximately 85.5 percent of households possessed at least one smartphone. Around 86.3 percent households in India have access to internet within the household premises. In rural area around 79.2 percent males and 75.6 percent females in the age group '15 years and above' own a smartphone. Whereas, in urban area the percentage estimated at around 89.4 and 86.2 percent for male and female, respectively, for the same age group.^[1]

There are four components of smart phone addiction: obsessive phone use, behaviors such as repetitive checking for messages or updates; tolerance or longer and more intense of use; withdrawal or feelings of agitation or suffering without the phone; and functional impairment or interference with other life activities and face to face social relationships.^[2] It is important to note that smartphone addiction has several terms of

reference including "nomophobia," "problematic smartphone use" and "smartphone dependence".^[3]

Quality sleep, as well as sleep schedule, is related to the students' learning abilities and academic performance. Sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience. It encompasses several dimensions, including sleep latency (how quickly one falls asleep), duration (total time spent asleep), continuity (ability to stay asleep throughout the night) and depth (perceived restfulness and rejuvenation upon waking).^[4] Smartphone addiction can result in poor sleep quality, reduced sleep duration and daytime dysfunction.^[5-7]

Several studies on smartphone addiction have been conducted both in India and globally. According to a systematic review that included studies published between 2016 and 2022, the overall prevalence of smartphone addiction was found to be 39%.^[5] In India, a Delhi-based study conducted among university students reported a smartphone

addiction prevalence of 25%.^[8] Increasing smartphone use among young adults and students has emerged as an important public health concern because of its potential impact on mental health, academic performance, social interactions and sleep quality. Therefore, the present study was conducted with the objectives of assessing the prevalence of smart phone addiction among medical students, identifying factors associated with smart phone addiction and evaluating the association between smart phone addiction on sleep quality among medical students.

Material & Methods

Study type and design

The study design was a cross sectional study

Study setting

The study was conducted in a medical college in Gautam Budh Nagar district , Uttar Pradesh

Study population

MBBS students from batch 2021 to 2025

Inclusion criteria

- Those who gave consent

Exclusion criteria

- Students with diagnosed sleep disorders
- Those who did not give consent

Sample Size Calculation: Using Cochran's formula with an estimated prevalence of smart phone addiction of 39% from a systematic review,^[5] confidence interval of 95% and margin of error of 5%, the calculated sample size is approximately 365. Since the total population for the study is 750, by using the Finite Population Correction formula the final sample size was 246 . Participants were selected from each MBBS batch from first year to final year and each batch was considered a separate stratum.

During the study period, a total of 263 MBBS students were approached and assessed for eligibility using stratified random sampling. Among them, seven students who reported diagnosed sleep disorders were excluded as per the predefined exclusion criteria. Thus, data from 256 eligible participants were included in the final analysis . Informed consent was obtained from all the study participants .

Data Collection Tool:

Data were collected using a pre-tested, self-administered structured questionnaire consisting of three sections. Section A included demographic details such as age, gender and batch/year of study. Section B assessed smart phone usage patterns and smartphone addiction using the Smartphone Addiction Scale-Short Version (SAS-SV).^[9] This scale consisted

of six factors (daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse and tolerance from the original version of the smartphone addiction scale) with ten items each, rated using the six-point Likert scale (1: strongly disagree to 6: strongly agree). The cut off value for addiction are 31 for males and 33 for females , with a higher score indicating smartphone addiction and a lower score indicating a lower risk of addiction^[9]

Section C assessed sleep patterns and sleep quality using the Pittsburgh Sleep Quality Index (PSQI).^[10] The PSQI consisted of seven components (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and day time dysfunction) with scores from 19 items. Each of the seven components was equally weighted on a scale ranging from 0 to 3. The total score was compiled and those respondents who scored 5 or less on PSQI global score were classified as good sleepers while higher scores represented poor sleepers.

After obtaining informed consent through Google Forms, the self-administered questionnaire was distributed electronically to the selected participants. The Google Form was configured to accept only one response per participant using the "Limit to one response" option, thereby minimizing the possibility of duplicate submissions. Participants were requested to complete the questionnaire independently and confidentiality of the collected information was maintained throughout the study. Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement of the study.

Data Analysis: The collected data were entered into Microsoft Excel and analyzed using SPSS software version 28.0. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize demographic characteristics and study variables. The Chi-square test was applied to assess the association between smartphone addiction and sleep quality, along with demographic variables and smart phone usage patterns. Multiple logistic regression was used to identify independent predictors of poor sleep quality. A p-value of less than 0.05 was considered statistically significant

Result

The age distribution of the study participants consisted of 54.7% belonging to the younger age group (17 - 21 yrs) and 45.3% representing older age group (21 - 26 yrs) while gender distribution consisted of 55% females and approximately 45% males . (Table 1) According to SAS SV scale , 31.6% (81 out of 256) of the study participants were found to have smartphone addiction. The mean value of smartphone addiction was 29.18 with a standard deviation of 9.26 .

Table 1. Socio-demographic Characteristics of the Study Participants (Number = 256)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	17–21	140	54.7
	22–26	116	45.3
Gender	Male	113	44.1
	Female	141	55.1
	Others	2	0.8
Batch	2021	51	19.9
	2022	51	19.9
	2023	51	19.9
	2024	51	19.9
	2025	52	20.3

Approximately 34% of participants belonging to the younger age group had smart phone addiction which was comparative higher than the older age group but no statistical significant association was found between age and smartphone addiction ($p=0.317$). (Table 2) However, a statistically significant association was observed between gender and smartphone addiction ($p=0.016$), with male students demonstrating a comparatively higher proportion of high-risk smartphone addiction than female students. Batch/year of study showed a significant association with smartphone addiction ($p=0.004$) with higher proportions of smartphone addiction observed among students from 2022 and 2025 batches. (Table 2)

Daily duration of smart phone use was significantly associated with smartphone addiction ($p<0.001$). Students using smart phones for more than 6 hours daily showed markedly higher levels of high-risk smartphone addiction. A highly significant association was observed between duration of smart phone use during bedtime and smartphone addiction ($p<0.001$) with students using phones for more than 60 minutes during bedtime had higher proportions of smartphone addiction. (Table 2)

Frequency of checking smart phone per hour was significantly associated with smartphone addiction ($p<0.001$). Participants checking their phones more than five times per hour demonstrated comparatively higher rates of smartphone addiction. A significant association was also observed between smart phone use during meals and smartphone addiction ($p=0.012$). Smartphone addiction was more prevalent among students who reported using phone during meals. (Table 2)

Table 2: Association of Various Factors with Smartphone Addiction Among Medical Students

Variable	Categories	Low Risk n (%)	High Risk n (%)	χ^2 value	p-value
Age group (years)	17–21	92 (65.7)	48 (34.3)	0.999	0.317
	22–26	83 (71.6)	33 (28.4)		
Gender	Female	106 (75.2)	35 (24.8)	8.251	0.016
	Male	67 (59.3)	46 (40.7)		
	Others	2 (100.0)	0 (0.0)		
Batch/Year	2021	41 (80.4)	10 (19.6)	15.584	0.004
	2022	30 (58.8)	21 (41.2)		
	2023	36 (70.6)	15 (29.4)		
	2024	41 (80.4)	10 (19.6)		
	2025	27 (51.9)	25 (48.1)		
Daily smartphone usage	<2 hours	17 (89.5)	2 (10.5)	20.973	<0.001
	2–4 hours	68 (79.1)	18 (20.9)		
	4–6 hours	64 (67.4)	31 (32.6)		
	>6 hours	26 (46.4)	30 (53.6)		
Smartphone use after going to bed	<30 minutes	69 (78.4)	19 (21.6)	23.369	<0.001
	30–60 minutes	56 (66.7)	28 (33.3)		
	>60 minutes	22 (43.1)	29 (56.9)		
	Do not use after bed	28 (84.8)	5 (15.2)		
Primary purpose of smartphone usage	Communication	23 (74.2)	8 (25.8)	5.525	0.137
	Educational purpose	52 (76.5)	16 (23.5)		
	Entertainment	52 (59.8)	35 (40.2)		
	Social media	48 (68.6)	22 (31.4)		
Frequency of checking smartphone/hour	Rarely	30 (90.9)	3 (9.1)	21.901	<0.001
	1–2 times	100 (74.1)	35 (25.9)		
	3–5 times	27 (51.9)	25 (48.1)		
	>5 times	18 (50.0)	18 (50.0)		
Smartphone use during meals	No	92 (76.0)	29 (24.0)	6.247	0.012
	Yes	83 (61.5)	52 (38.5)		

80 out of 256 participants (31.3%) had poor sleep quality according to PSQI. (Table 3) A highly statistically significant association was observed between smartphone addiction and sleep quality ($\chi^2=35.58$, $p<0.001$). (Table 3) Among students with high-risk smartphone addiction, 55.6% had higher sleep problems, whereas only 20% of low-risk users reported higher sleep problems. This finding suggests that smartphone addiction is strongly associated with poor sleep quality among medical students.

Table 3. Association between Smartphone Addiction and sleep Quality

Smartphone Addiction	Low Sleep Problems	Higher Sleep Problems
Low Risk	140	35
High Risk	36	45
Total	176	80

Chi-square = 35.58, $p<0.001$

Multiple logistic regression analysis demonstrated that

smartphone addiction was a significant independent predictor of poor sleep quality among medical students (AOR=5.192, $p<0.001$). Participants with smartphone addiction had approximately 5.2 times higher odds of poor sleep quality compared to low-risk users after adjusting for age and gender. Age also showed a significant association with sleep quality ($p=0.003$), whereas gender was not significantly associated with poor sleep quality ($p=0.595$) (Table 4).

Table 4: Multiple Logistic Regression Analysis for Predictors of Poor Sleep Quality Among Medical Students

Variable	Adjusted OR	p-value
Age	0.400	0.003*
Gender	0.851	0.595
Smartphone Addiction	5.192	<0.001*

*Dependent variable: Poor sleep quality based on Pittsburgh Sleep Quality Index (PSQI).

Discussion

The present study demonstrated that approximately 31% of the medical students had high-risk smartphone addiction as assessed by the Smartphone Addiction Scale-Short Version (SAS-SV), indicating a substantial burden of problematic smartphone use among this population. The SAS-SV is a widely used and validated instrument, and several previous studies among medical students have employed the same scale to assess smartphone addiction.

The prevalence observed in the present study was lower than that reported by Kumar VA et al.^[11] who found smartphone addiction among 44.7% of medical students in South India. Similarly, a systematic review and meta-analysis by Leow M et al.^[5] reported an overall prevalence of 39% among medical students, while Sohn SY et al.^[3] documented a prevalence of 38.9% among university students in the United Kingdom. Ghosh T et al.^[12], using the Smartphone Addiction Scale (SAS), reported an even higher prevalence of 49% among nursing students in West Bengal. Lane HY et al.^[6], who utilized the Smartphone Addiction Inventory Scale, also reported a prevalence of 38% among university students.

In contrast, Nikolic A et al.^[7] reported a lower prevalence of smartphone addiction (21.7%) among medical students compared to the findings of the present study. Differences in the prevalence of smartphone addiction across studies may be attributed to variations in study populations, sociocultural environments, academic demands, lifestyle patterns, and the assessment tools and diagnostic criteria used to identify smartphone addiction.

The prevalence of smartphone addiction observed in the study highlights the growing dependence on smartphones among medical students likely due to academic demands, social networking, entertainment and easy internet accessibility.

In the present study, 34% of participants belonging to the younger age group (17 to 21 years) had smartphone addiction,

which was higher than that observed among the older age group (21 to 26 years). However, the association was not statistically significant on bivariate analysis. A similar trend of higher prevalence of smartphone addiction among younger age groups was reported by Sohn SY et al., but the association was found to be statistically significant.^[3] Nikolic A et al.^[7] found higher prevalence among women but there was no significant association between age and smartphone addiction.

Gender showed a significant association with smartphone addiction in bivariate analysis in the present study, with male students demonstrating comparatively higher levels of smartphone addiction (40.7%) than female students (24.8%). This finding is consistent with a study conducted by Chatterjee S et al.^[13] which reported smartphone addiction among 46% of males and 33% of females. Similar observations of higher smartphone addiction among male participants were also reported by Kumar VA et al.^[11] and Haddaouay AE et al.^[14] In contrast, some studies did not observe a statistically significant association between gender and smartphone addiction.^[7,15] However, Parlak ME et al.^[16] reported a higher prevalence of smartphone addiction among female participants. These variations across studies may be due to differences in sociocultural factors, lifestyle patterns and study populations used for measuring smartphone addiction.

In the present study, a statistically significant association was found between daily smart phone usage and smart phone addiction. This finding is congruent with Sohn SY et al.^[3] who reported that use of more than 5 or more hours per day increased the odds of smart phone addiction by 2.5 times compared to usage of 3 hours. A significant association between spending 4 hours or more on phone with smart phone addiction was also observed by Nikolic A et al.^[7]

In the present study, among the participants who used phone for more than 1 hour before bedtime, 56.9% of them had smart phone addiction compared to only 15% of them who do not use smart phone during bedtime and this was highly statistically significant. This could possibly be explained by suppression of melatonin due to bright light of computer screen at night. Sohn SY et al reported time between latest phone use and bed time had significant association with smart phone addiction for the students who use phone for more than an hour.^[3] Susmitha TS et al found majority of the addicts reported smartphone usage during night in contrary to non-addicts.^[15]

In the present study, 31.3% of the participants were found to have poor sleep quality based on the Pittsburgh Sleep Quality Index (PSQI). In contrast, a substantially higher prevalence of poor sleep quality has been reported in several other studies. Sohn SY et al.^[3] reported poor sleep quality among 61% of participants, while Kumar VA et al.^[11] observed a prevalence of 51%. An even higher prevalence of 86% was reported by Haddaouay AE et al.^[14] and a meta-analysis documented an overall prevalence of approximately 57%. Parlak ME et al.^[16] also reported poor sleep quality among 61% of participants. The comparatively lower prevalence observed in the present study may be attributed to differences in study population,

lifestyle factors, academic schedules, stress levels, sociocultural influences and variations in assessment methods or cutoff values used across studies.

On multiple logistic regression analysis in present study, smartphone addiction was significantly associated with poor sleep quality ($p < 0.001$). Students with high-risk smartphone addiction had approximately 5.2 times higher odds of poor sleep quality compared to low-risk users after adjusting for age and gender. The strength of association between smart phone addiction and poor sleep quality was higher in our study compared to other studies with an odds ratio of 1.41 reported by Sohn SY et al^[13] and pooled odds ratio of 2.6 reported in a meta analysis.^[17] Chatterjee S et al^[13] and Nikolic A et al^[7] also reported that excessive smartphone use was associated with poor sleep quality. Increased smartphone addiction was also found to have a positive correlation with poor sleep quality reported by Rathakrishnan B et al ($r = 0.49$)^[18], Zhu W et al ($r = 0.287$),^[19] Li S et al ($r = 0.259$)^[20] and Demirci K et al ($r = 0.156$)^[21]

Excessive smartphone use, particularly during night time, may negatively affect sleep through delayed sleep onset, reduced sleep duration and suppression of melatonin secretion caused by prolonged exposure to screen light.

Age showed a statistically significant association with sleep quality, with increasing age associated with lower odds of poor sleep quality (AOR = 0.4, $p = 0.003$). This may reflect better adaptation to academic stress and healthier lifestyle patterns among senior students. Gender was not independently associated with poor sleep quality after adjustment in the regression model (AOR = 0.851, $p = 0.595$).

Conclusion

The findings of the present study highlight the growing impact of smartphone addiction on sleep health among medical students. Medical students are particularly vulnerable because of academic workload, psychological stress, irregular schedules, and extensive dependence on digital devices for educational as well as recreational purposes. Poor sleep quality can adversely affect concentration, learning ability, mental health, academic performance and overall wellbeing. Therefore, there is a need to promote awareness regarding responsible smartphone usage, especially during night time and encourage healthy sleep hygiene practices among medical students.

The data were collected using self-administered questionnaires, which may be subject to recall bias and reporting bias. In addition, the study was conducted in a single medical college, which may limit the generalizability of the findings to other settings.

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