



A CROSS SECTIONAL STUDY ON SMARTPHONE ADDICTION AND ITS EFFECT ON SLEEP QUALITY AMONG MEDICAL STUDENTS

Physiology

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ABSTRACT

Background: Excessive smartphone use, commonly referred to as smartphone addiction, has become increasingly common among young adults. In medical students, such behaviour has been associated with negative outcomes, particularly poor sleep quality. Considering the academic pressure and clinical responsibilities of MBBS students, understanding this relationship is essential. **Objectives:** This study aimed to measure the prevalence of smartphone addiction among MBBS students, evaluate their sleep quality, and analyse the link between smartphone use and sleep disturbances. **Methods:** A cross-sectional survey was carried out in April 2024 among 127 MBBS students aged 18 to 23 years. Participants were chosen using simple random sampling. Smartphone addiction was assessed using the Smartphone Addiction Scale–Short Version (SAS-SV), and sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI). Data were analysed using descriptive statistics, t-tests, and Pearson's correlation. **Results:** Of the 127 students (50 males and 77 females), 27.5% were found to be addicted to smartphones, while 55.9% were at high risk. The primary use reported was for entertainment (59.05%), with academic use and calling accounting for about 10%. Poor sleep quality (PSQI ≥ 5) was noted in 51.9% of students, with major concerns related to sleep latency (54.5%) and perceived sleep quality (34.6%). A significant correlation was observed between smartphone addiction and poor sleep quality ($r = 0.06$, $p < 0.05$). **Conclusion:** The findings indicate a high rate of smartphone addiction and sleep issues among MBBS students. These results highlight the importance of raising awareness about healthy smartphone use and the need for better sleep habits to protect students' overall well-being, academic success and better patient care.

KEYWORDS

Smartphone addiction, Sleep quality, MBBS students, SAS-SV, PSQI

INTRODUCTION

Smartphone addiction often referred to as problematic smartphone use describes the compulsive and excessive use of smartphones, which can negatively impact various areas of an individual's life. This condition typically presents as a lack of control over the frequency and duration of use, leading to issues such as neglect of responsibilities, reduced productivity, poor sleep quality, social isolation, and strained relationships. A recent systematic review found that approximately 23.3% of children and adolescents exhibit problematic smartphone use, indicating the scope of this issue among younger populations.¹ Though not yet officially recognized in the DSM-5 or ICD-11, problematic smartphone use has been likened to behavioral addictions or substance-use disorders due to its similar symptom patterns, such as withdrawal, tolerance, and impaired control.² Sleep quality, a fundamental component of overall and mental health, is significantly influenced by digital behaviour. Good quality sleep involves sufficient duration, minimal interruptions, and feeling rested upon waking. Conversely, poor sleep is marked by delayed sleep onset, frequent awakenings, and non-restorative rest. It includes increased sleep latency, bad sleep quality and decreased sleep efficiency.³ Studies report that problematic smartphone use can impact sleep quality and overall well-being, with prevalence rates ranging widely from 2.9% to 64.5%, depending on the population studied. Individuals with such usage patterns often continue using smartphones despite recognizing their harmful impact, particularly on social functioning and academic performance.³

Among adolescents, frequent use of smartphones just before bedtime is common. This behaviour is associated with increased cognitive and emotional arousal, making it more difficult to fall asleep a phenomenon supported by the pre-sleep arousal theory, which suggests that stimulating content keeps the brain overly alert during rest periods.⁴ Night time use of smartphones has been associated with reports of poor sleep quality, increased daytime tiredness, concentration difficulties, and lower academic achievement.⁵

To measure the extent of smartphone addiction, researchers commonly employ validated self-report tools. Terms such as "nomophobia" (fear

of being without a mobile phone), "mobile phone overuse," and "problematic mobile phone use" are frequently used in academic discussions to describe this growing phenomenon. A study done by Krishnan et al⁶, had shown a pattern of smart phone addiction amongst MBBS students with dependency to social media usage. Similarly a cross-sectional study conducted by Sinha et al.⁷ at AIIMS New Delhi found a significant association between mobile phone use and various health concerns. Aside from behavioral concerns, biological mechanisms also play a role in sleep disruption. Smartphone screens emit blue light that activates melanopsin-containing retinal ganglion cells, leading to suppression of melatonin, a hormone critical for sleep regulation. This disruption affects the body's circadian rhythm, resulting in decreased sleep quality and delayed sleep onset.^{7,8}

In the current scenario, it is crucial to study the association between mobile phone addiction and sleep quality among medical students. These students must remain fully functional and focused, particularly when designing study plans or implementing treatment plans in clinical settings. Such studies are highly recommended and are indeed the need of the hour.

Objectives

- To assess the smartphone addiction among MBBS students.
- To assess the sleep quality of MBBS students.
- To explore the association between smartphone addiction and sleep quality among MBBS students.

MATERIALS AND METHODS

This cross-sectional study was conducted at the clinical physiology laboratory of Azeezia Institute of Medical Sciences and Research, Kollam, Kerala, India. The study was conducted in April 2024 among 127 MBBS students in the age group 18-23 years.

There were 50 males and 77 females. Simple random sampling technique was applied for selecting participants.

Inclusion Criteria:

MBBS students who were willing to participate.

Exclusion Criteria:

Students with sleep disorders, mental disorders, who were taking medicines like anti-epileptic and other drugs which may interfere with the normal sleep cycle and students with history of substance abuse.

Sample Size Calculation⁶

$n = (Z\alpha/2)^2 pq / l^2$, where n = sample size, $Z\alpha/2$ = level of confidence; taken as 1.96, p = proportion, $q = 100 - p$, l = relative error which is taken as 10% of proportion. The sample size was calculated as:

$$\alpha = 5\% \quad Z\alpha/2 = 1.96$$

$$p = 43\%, \quad q = 57\% \quad l = 8.6$$

$$n = 1.96^2 \times 43 \times 57 / 8.6^2 = 127$$

Data Collection Tool

A Semi-structured questionnaire containing variables given below was used to collect the data:

- 1) Age: 2) Gender: 3) Age at which started using smart phone:
- 4) Duration/day: (a) >5hrs (b) 5-2hrs (c) 2hrs (d) <1hr
- 5) Reason for maximum usage: (a) Entertainment (b) Calling (c) Academics (d) Social-media.

The smartphone addiction was assessed using Smart Phone addiction scale-Short version (SAS-SV scale)⁶. SAS-SV scale is a validated questionnaire for smartphone addiction. The questionnaire includes 10 questions. For each item, participants expressed their opinion on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). Males are added to scores higher than 31, with high risk of addiction with scores between 22 and 31 and females are added to scores higher than 33, with high risk of addiction on scores between 22 and 33.

PSQI (Pittsburg Sleep Quality Index)⁷ is a self-rated questionnaire that assesses sleep quality over the preceding one month. It has seven component scores in the following domains-subjective sleep quality, sleep latency (SL), sleep duration, habitual sleep efficiency, sleep disturbances, need to use medications for sleep and daytime dysfunction. Each component score of the PSQI ranges from 0 to 3, with 3 indicating the greatest dysfunction or disturbance. The seven component scores are then summed to obtain a global PSQI score, which ranges from 0 to 21. Higher scores indicate poorer sleep quality, with a score greater than 5 suggesting significant sleep difficulties. A PSQI global score of ≥ 5 yielded a diagnostic sensitivity of 89.6 per cent and specificity of 86.5 per cent in distinguishing good and poor sleepers.

Data Collection And Analysis

Informed consent from participants were taken. Investigators had interviewed each participant for 10-15 minute and filled the questionnaire. Data was entered in Microsoft Excel software. Analysis was done using descriptive statistics like mean, standard deviation, proportion etc., Inferential statistics like chi-square test for association, t-test to know the difference between mean and other relevant statistical tests was also used. Correlation was done using Pearson correlation test.

RESULTS:

The study was conducted among 127 MBBS students out of which 50 were males and 77 females and the average age at which they started using smart phone was 17 ± 2 years.

Data analysis revealed Entertainment (59.05%) was the primary reason for the usage of smart phone apart from social media (30.70%), academic reasons (7.08%) and calling (3.14%) (figure 1)

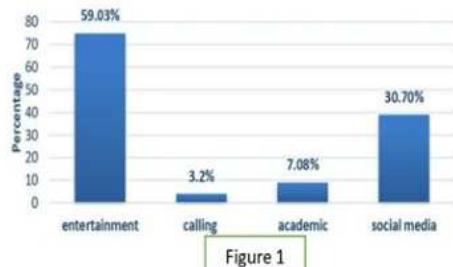


Figure 1

Smart phone addiction according to the SAS – SV scale showed that 35(27.5%) members were addicted to smart phone while 71(55.9%) of them had high risk of addiction and 21(16.5%) had no addiction to smart phone usage (figure 2). 39.40% of the people strongly agreed on

being impatient while not holding phone in their hands. 26.87% of the people strongly agreed on difficulty in concentrating at work. 34% of the participants had agreed on missing important work, having phone in their mind even when not working and also experience neck and wrist joint pain. From our study mean value of smart phone addiction by SAS-SV scale in males was 28.60 ± 1.153 and female was 29.10 ± 0.8261 .

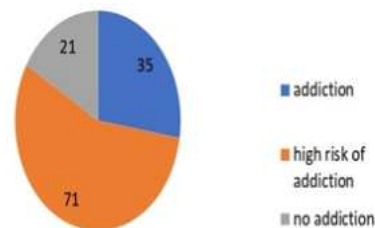


Figure 2

Data analysis of PSQI revealed that out of the 127 participants 51.9% (66) had poor sleep quality and 48.03% (61) had good sleep quality (figure 3).

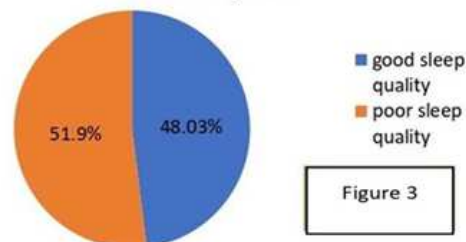
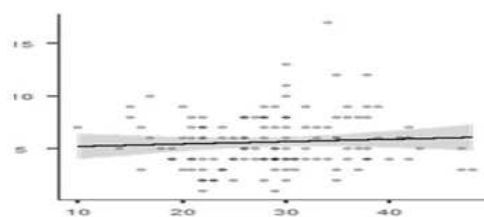
Good sleepers Vs Bad sleepers

Figure 3

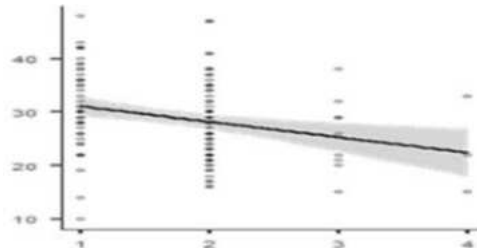
Mean value of sleep quality by PSQI scale in male is 5.98 ± 0.391 and female is 5.44 ± 0.2813 . Of the seven components assessed with PQSI sleep latency was worse amongst 54.54% of the students, they took longer time to fall asleep. Subjective sleep quality was very bad for 34.6% of the students. 23.14% had sleep disturbances of different kinds based on the questionnaire.

The correlation between smart phone usage and sleep quality was assessed with Pearson correlation with a coefficient value of 0.06 which proves to be statistically significant ($p = < 0.05$). (Graph 1)



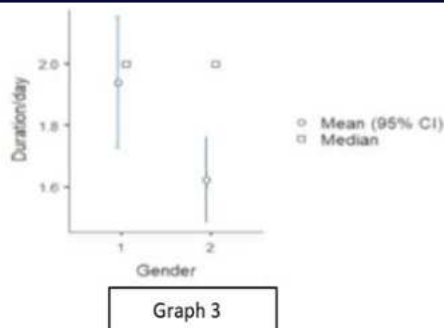
Graph 1

The correlation between duration of usage of smart phone and addiction to it was also proven to be statistically significant with an r value of -0.262 and p value < 0.001 . (Graph 2)



Graph 2

T test showing association between duration/day for the usage of mobile phone amongst gender showed statistically significant results in (graph 3).



P value is < 0.001 , hence the association between duration /day and gender is statistically significant i.e., in a population duration/day is higher for males than females.

The correlation between the SAS-SV score and age at which they started using smart phone also was statistically significant and the r value was -0.172 and p value is < 0.001

It was further noted in the study that association between gender and SAS-SV score and PSQI score was statistically not significant using T test and P value was $\neq < 0.001$.

DISCUSSION

This study aimed to assess the smartphone addiction among MBBS students, evaluate their sleep quality, and explore the association between these variables. Our findings revealed that 27.5% of the participants were classified as addicted to smartphones according to the SAS-SV scale, with an additional 55.9% at high risk of addiction. These figures are consistent with previous studies reporting high rates of problematic smartphone use among medical students and young adults, highlighting the pervasive nature of this issue in this demography in the study done by Krishnan et al and Jain et al.^{6,10} Entertainment emerged as the predominant reason for smartphone use, aligning with trends observed in adolescent and young adult populations where social media, gaming, and video streaming constitutes major components of smartphone engagement. These results are similar to the study done by Chu and Siebers in the respective studies.^{1,4} Notably, nearly 40% of participants reported feeling impatient without their phones, and over a quarter experienced difficulty concentrating at work, indicating potential cognitive and behavioral impacts of excessive smartphone use, as reported by Correa-Iriarte et al.²

Regarding sleep quality, more than half of the students (51.9%) exhibited poor sleep quality as assessed by the PSQI, with significant delays in sleep latency and subjective reports of poor sleep. These findings are consistent with several studies demonstrating that smartphone overuse adversely affects sleep patterns among university students had been highlighted by Sinha et al in his study done in AIIMS New Delhi⁷ and also same results were got from the study done by Moattari & Moattari from Kharazmi University, Iran.⁸ The blue light emitted by screens and the psychological stimulation from engaging content are known to disrupt circadian rhythms and delay melatonin production, thereby impairing sleep initiation and quality. It was also noted from their studies that brain when active prior to sleep would disrupt the sleep cycle thereby increasing the time of REM sleep and decreasing the time NREM sleep which would result in daytime tiredness which was highlighted in the study done by Kheirinejad et al.⁵ from Finland where they analysed the sleep patterns with a wearable ring on the participants and similar results were seen in the study done by Alzhrani et al on health care students and workers.¹²

Our analysis demonstrated a statistically significant positive correlation between smartphone addiction scores and poorer sleep quality ($r = 0.06$, $p < 0.05$), supporting the growing evidence of a link between excessive smartphone use and sleep disturbances which aligns with study by Sohn et al. from UK³, and the study by Izquierdo-Condoy et al., from Latin America.⁹ The negative correlation between the age at which smartphone use started and addiction scores ($r = -0.172$, $p < 0.001$) suggests that earlier initiation of smartphone use may predispose students to higher risk of addiction, which concurs with findings from Kumar et al., who emphasized early exposure as a risk factor¹¹. Additionally, the significant association between longer daily smartphone use and higher addiction scores ($r = -0.262$, $p < 0.001$)

reinforces the dose-response relationship between usage duration and problematic use as reported in the study of Chu et al.¹ Gender differences in smartphone usage duration were significant in our study, with males using smartphones for longer periods daily compared to females, echoing findings from Alzhrani et al.¹² However, in our study, no significant gender differences were observed in addiction prevalence or sleep quality, indicating that while usage patterns may vary, the impact on addiction and sleep may be comparable across genders, a conclusion supported by Jain et al.¹⁰

Limitations Of The Study

The study's cross-sectional design limits causal inference, and self-reported measures may be subject to response biases. Future studies employing objective measures such as smartphone usage tracking and sleep monitoring devices could provide more robust insights. The small sample size may have impacted the reliability of the correlation estimates; future studies should consider larger samples for generalizability.

CONCLUSION

This study highlights a significant prevalence of smartphone addiction and poor sleep quality among MBBS students, with a considerable proportion at high risk of problematic use. Early initiation of smartphone usage and longer daily usage durations were also associated with higher addiction scores, suggesting a dose-response relationship. While gender differences in usage patterns were noted, their impact on addiction and sleep quality appeared comparable across both sexes. These results align with existing literature and emphasize the need for targeted interventions to promote healthier digital habits, improve sleep hygiene, and support the mental well-being of medical students. Future research using objective tracking tools and longitudinal designs is warranted to better understand the causality and long-term effects of smartphone overuse in this vulnerable population.

Conflict Of Interest: Nil

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