Research Article

Exploring Digital Behavior among Medical Students: A Cross-Sectional Study

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ABSTRACT

Introduction: Pervasive use of electronic devices has significantly transformed daily routines and behavioral patterns across all age groups. Among medical students, digital devices are integral for academic activities and social interactions. However, excessive and unregulated screen time is increasingly prevalent and may impact psychological and physical health.

Aim: To examine digital behavior, daytime sleepiness, and abdominal obesity among preclinical medical undergraduates.

Methods and materials: This cross-sectional study involved 122 preclinical medical undergraduate students (63% female) from a private medical college in Chennai, with minimal exercise routine. Digital behavior was evaluated using the 18-item Digital Screen Exposure Questionnaire (DSEQ). Daytime sleepiness was evaluated using the Epworth sleep scale (ESS). Data on Waist-Hip Ratio (WHR) were collected to assess abdominal obesity.

Results: Most participants (92%) used screens for over 2 hours daily, with higher usage of portable devices on weekends and weeknights. Higher prevalence of daytime sleepiness (69.7% with ESS ≥10) was observed. While higher screen time was associated with increased WHR and ESS, these associations were not statistically significant.

Conclusions: Device-specific and timing-related screen behaviors are prevalent among medical students and that increased screen time may be linked to adverse health outcomes. Promoting healthy digital habits and strategies to optimize screen use could enhance sleep hygiene, academic performance, and overall well-being.

Keywords: Digital behaviour, Screen time, Daytime sleepiness, Medical students, abdominal obesity.

1. INTRODUCTION

In the contemporary digital era, pervasive use of electronic devices has transformed daily routines and behavioral patterns across all age groups, particularly among young adults and students. Screen-based activities have become an integral part of daily life, extending beyond work and entertainment into social interactions and even bedtime routines [1]. Increasing reliance on electronic devices such as smartphones, tablets, laptops, and computers led to significant changes in daily routines, often resulting in extensive screen exposure. Among medical students, digital devices are integral to academic activities, research, clinical learning, and social interactions. However, many individuals engage in excessive and unregulated screen time late into the night and throughout weekends, raising concerns regarding its potential adverse effects on health and well-being [2]. Several epidemiological studies have indicated that excessive screen time can lead to eye strain, sleep disturbances, physical inactivity, mental health issues like anxiety and depression, impaired attention, social withdrawal, and reduced academic performance [3, 4].

One of the key health issues associated with prolonged digital exposure is disturbed sleep

patterns, which can adversely affect physiological, psychological, and metabolic processes. Epidemiological studies have documented high prevalence rates of screen time among university students, with some reporting that over 80% of participants engage in more than two hours of daily screen use [5]. Furthermore, the relationship between screen time and physical health outcomes, such as abdominal obesity, remains inconclusive in young, healthy populations. While sedentary screen behaviours are hypothesized to contribute to weight gain, confounding factors like lifestyle and activity levels complicate the association [6]. Despite growing awareness, there remains a paucity of systematic assessments focusing on digital behavior and its implications for sleep and metabolic health among medical students. Understanding the extent and impact of digital screen exposure on sleep among medical students is essential for developing targeted interventions to promote healthier habits. Hence, this descriptive cross-sectional study aims to explore digital behaviour, daytime sleepiness, and abdominal obesity among medical undergraduates.

2. MATERIALS & METHODS

2.1 Materials

The present cross-sectional study involved 122 preclinical medical undergraduates, including both genders, with minimal exercise routines aged 17 to 25 years, from a private medical college in Chennai between April 2025 and July 2025. Institutional Ethics Committee approval (Ref. No: PMCHRI-IHEC-313) was obtained prior to the commencement of the study. The sample size was determined using Fisher's Z-transformation for correlation analysis, as referenced in prior literature [7]. With a 95% confidence interval, 80% power, and r = -0.35 between smartphone addiction and sleep quality, the estimated sample size was 122. Based on the sample size calculation, we randomly selected students using their roll numbers with a random number generator. Subsequently, written informed consent was obtained from all the selected participants. All selected subjects participated in the study, and all gave consent.

Demographic details of the study participants included their age and gender. Height, weight, waist, and hip circumference, were recorded, and their BMI and Waist-Hip Ratio (WHR) were computed. Evaluation of digital behaviour and daytime sleepiness among the study participants was conducted online, employing an 18-item Digital Screen Exposure Questionnaire (DSEQ) [8]. This questionnaire evaluated the type of device used (stationary, portable, background screen) and the duration of screen usage during weekdays, weeknights, and weekends. Daytime sleepiness was assessed utilizing the Epworth sleep scale [9].

2.2 Statistical Methods

Statistical analysis was done using the R software tool (version 4.1.2). Descriptive parameters were presented using frequency and percentage for categorical variables, while continuous variables were summarized with mean and standard deviation. Continuous variables exhibiting a non-parametric distribution were expressed as median and interquartile range (IQR). The strength of association was evaluated through an independent t-test and Mann-Whitney U test, with a p-value of less than 0.05 being statistically significant.

3. RESULTS

This cross-sectional study included 122 preclinical medical undergraduates from a private medical college in Chennai. 77 (63%) of the study participants were female and the remaining 45 (37%) were male. Table 1 shows the descriptive characteristics of the study participants.

Table 1. Descriptive characteristics of the study participants (N=122)

Study Variables	Total (n = 122) (Mean ± SD)	Male (n=45) (Mean ± SD)	Female (n=77) (Mean ± SD)
Age (years)	19.3 ± 1.24	19.3± 1.25	19.2± 1.24
Height (cms)	166 ± 10.8	175 ± 9.42*	161 ± 7.9
Weight (Kg)	66.3 ± 15.7	75 ± 16.2*	61.5 ± 13.2
BMI	24.1± 4.8	24.6 ± 4.7	23.8 ±4.9
Waist circumference (cms)	79.2 ± 12.3	83.3 ± 11.8*	76.8 ± 12
Hip circumference (cms)	89.6 ± 13	91.3 ± 13.6	88.6 ± 12.6
Waist Hip ratio	0.9 ± 0.1	0.92 ± 0.05	0.87 ± 0.1

Note: «*»association is significant at the 0,05 level (two-sided).

The average age of the study participants was 19.3 ± 1.24 with a mean BMI of 24.1 ± 4.8 (Male: 24.6 ± 4.7; Female: 23.8 ± 4.9). The mean WHR of the male and the female participants was 0.92 ± 0.05 and 0.87 ± 0.1, respectively. Nearly 37 % (Female: 21.4%; Male: 15.6%) of the study participants reported to have excess body weight (BMI ≥ 25 Kg/m^2). 47% (n=57) of the study participants were day scholars and the rest (53%, n=65) were hostellers.

Majority (92%) of the study participants reported screen time exposure more than 2 hours/day of which about 39% exhibited very high screen time exposure (≥ 4 hours/day) (Figure 1).

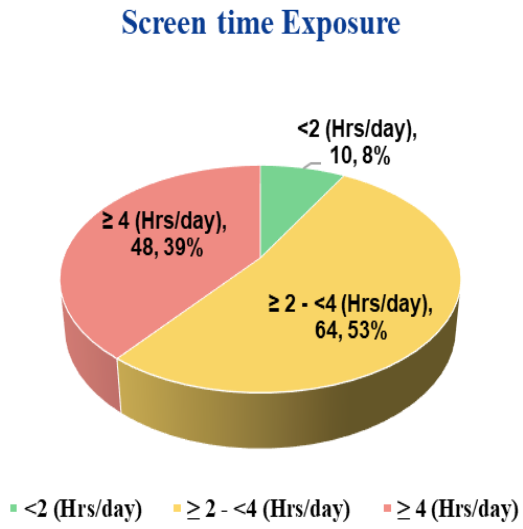

Fig. 1 Screen time exposure among the medical undergraduates

On comparing the duration of screen use across weekdays, weeknights, and weekends (Table 2), it was found that the usage of portable devices displayed a significant increase during weeknights [4 hours/day (IQR: 3–5), ($p<0.05$)] and weekends [8 hours/day (IQR: 6–11), ($p<0.001$)] compared to weekdays. Additionally, usage of stationary devices was significantly higher ($p<0.01$) during weekends compared to weekdays and weeknights. However, background screen exposure remained relatively stable during weekdays and weeknights but increased significantly to 2 hours/day (IQR: 1–4) during weekends. Overall, it was observed that the usage of all screen types (portable, stationary, and background) was significantly higher during weekends compared with weekdays ($p < 0.05$). Assessment of screen type usage across time categories revealed that the usage of portable screen devices was significantly higher in all time categories (Figure 2).

Table 2. Screen use pattern across weekdays, weeknights and weekends

Screen Type	Weekday Median (IQR)	Weeknight Median (IQR)	Weekend Median (IQR)
Portable devices (Hrs/day)	2.7 (1.3 - 4)	4 (3 -5)*	8 (6 -11)*
Stationary devices (Hrs/day)	0.9 (0-3)	1.6 (0.04 - 3)	3 (0-6)*
Background Screen use (Hrs/day)	1 (0.25 - 2)	1 (0.5 - 2)	2 (1 - 4)*

Note: «*»association is significant at the 0,05 level (two-sided).

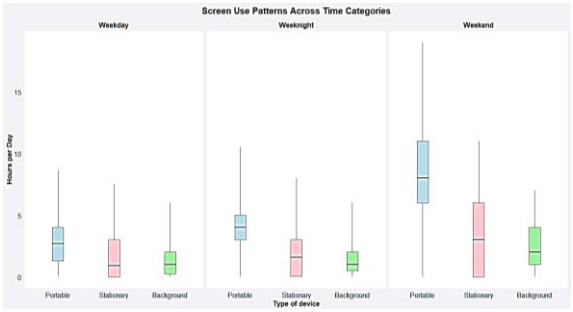

Fig. 2 Screen time behavior among the medical undergraduates

Table 3. Association between screen time exposure with gender, Waist Hip ratio and sleep score

Variable		Overall Screen Time usage Median (IQR)	P value
Gender	Female	3.15 (2.35 - 3.1)	0.001
	Male	4.12 (3.1 - 4.1)	
WHR	Normal	3.45 (2.4 - 4.4)	0.8
	High	3.72 (2.65 - 4.8)	
ESS Score	Normal	3.12 (1.9 - 4.4)	0.1
	High	3.75 (2.75 - 5)	

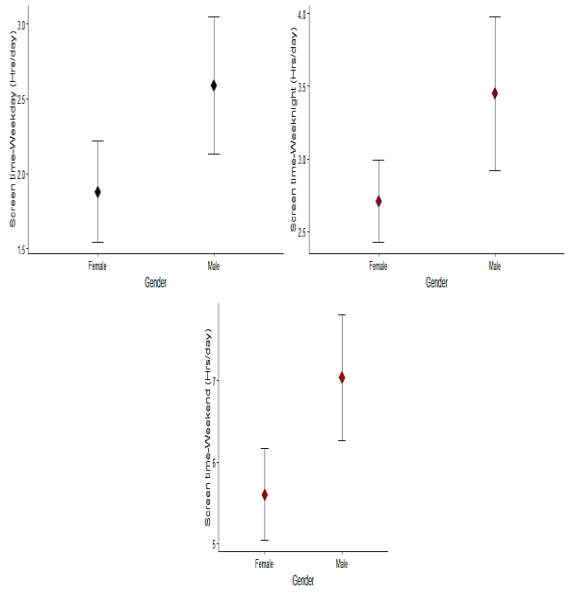

Fig. 3 Gender based variation in screen time usage

On assessing daytime sleepiness, it was found that 85 (69.7%) of the study participants reported excessive daytime sleepiness (ESS ≥10), of which 24 (19.7%) reported severe daytime sleepiness (ESS ≥15). The average ESS score was 11.8 ± 4.3, with male students having a higher score than female students (Male: 12.1 ± 5.16; Female: 11.6 ± 3.8).

Table 3 shows the association between screen time exposure and gender, WHR, and sleep score. There was a significant (p = 0.001) association between gender and overall screen time exposure, and this association was significant across all time categories (Figure 3). However, increased screen time exposure was nonsignificantly associated with WHR and Epworth sleep score (Table 3).

4. DISCUSSION

This cross-sectional study assessed the digital behaviour, daytime sleepiness and abdominal obesity among apparently healthy preclinical undergraduates. The study outcomes explicitly show that screen time is high, with 92% of the participants reporting more than 2 hours of screen usage. On assessing their digital behaviour, it was found that there was significantly higher screen usage of all types during weekends and lower screen usage on weekdays. Our findings were consistent with Martin et al., who reported higher screen usage during weekends compared to weekdays [10]. Further, Kontostoli *et al.,* assessing the diurnal pattern of screen behaviour, reported maximum screen usage during weekend evenings [11]. This study also found that the usage of portable screen devices was higher across all time categories compared to the usage of stationary screens and background screen usage.

Despite the high prevalence of excessive daytime sleepiness (69.7% with ESS ≥ 10), there was no significant association between screen time exposure and Epworth Sleepiness Scale scores, nor with WHR. The absence of a detectable relationship with WHR might be attributable to the relatively young and metabolically homogeneous sample, where screen behaviour may not yet have manifested as measurable central adiposity. Literature examining screen time and adiposity in young adults yields mixed results, with some studies implicating sedentary screen behaviours in increased obesity risk [12, 13], while others emphasise the mediating role of concomitant lifestyle behaviours. A few plausible mechanisms include that prolonged screen time promotes sedentary behaviours, which significantly decrease physical activity levels, thereby reducing energy expenditure and leading to a positive energy balance that favours fat storage, particularly in the abdominal region [14]. Additionally, increased screen exposure, especially at night, disrupts melatonin secretion due to blue light exposure, impairing circadian regulation. This exposure, in turn, influences the hypothalamic-pituitary-adrenal (HPA) axis, leading to elevated serum cortisol levels that promote the centripetal distribution of fat and abdominal obesity [15]. Meaningful associations between screen exposure and sleep outcomes may also be dependent on the timing of use, particularly pre-sleep and night-time screen engagement, as nocturnal device use has been robustly linked to impaired sleep quality and excessive daytime sleepiness [16]. Brosnan *et al.*, have reported that not all kinds of screen usage are associated with impaired sleep. Further, screens used for interactive activities such as social networking and gaming have been significantly associated with less sleep [17].

The gender differences observed, where male participants exhibited higher overall screen time across all time categories (p = 0.001), are in line with some studies reporting behavioural and motivational differences in digital media engagement by gender [18]. Prior research has shown variable gender effects on screen exposure and associated sleep disturbances, with some reports indicating greater vulnerability among female university students in the context of night-time technology use and irregular sleep patterns [19]. These discrepancies may reflect sociocultural influences, differing academic and recreational screen uses, or underlying psychosocial factors that warrant targeted investigation.

The present study is one of its kind to systematically evaluate temporal patterns of screen exposure across day types and device

categories, demonstrating disproportionately higher weekend and night-time portable device use among preclinical medical undergraduates. These findings highlight an emerging behavioural trend with potential implications for sleep and circadian health among young adults. Nevertheless, certain limitations merit consideration. Screen exposure and sleep parameters were assessed using self-reported measures, which are inherently prone to recall and reporting bias. In addition, the cross-sectional design precludes inference of a causal relationship between screen time exposure and sleep or anthropometric outcomes.

Despite these limitations, the study provides valuable insights and underscores the need for future longitudinal investigations incorporating objective sleep assessment evaluation to better elucidate causal pathways. Importantly, the results help raise awareness regarding screen use behaviours, particularly excessive night-time exposure, and emphasise the need to adopt healthier digital habits. Exposure to blue light from electronic screens during evening hours can stimulate the suprachiasmatic nucleus, suppressing melatonin secretion from the pineal gland and thereby disrupting sleep onset and circadian regulation [20]. Behavioural interventions such as reducing screen exposure at least one hour before bedtime and establishing a digital curfew in the evening and promoting alternative low-arousal activities like listening to music or audio-based content such as podcasts may facilitate improved sleep quality and help mitigate excessive daytime sleepiness among medical students.

5. CONCLUSION

This study highlights a high prevalence of screen exposure among preclinical medical undergraduates, with significant temporal variations by day-type and device. Portable screen use was significantly higher during weeknights and weekends, indicating a potential risk for circadian disruption. Gender differences in screen exposure were evident; however, no significant associations were found between screen time and WHR or excessive daytime sleepiness. These findings may reflect the relatively young age of the study population, in whom the long-term health consequences of prolonged screen exposure may not yet be apparent. Future longitudinal studies should involve larger and more diverse populations to clarify the potential effects of screen use on abdominal obesity and sleep health. Overall, these findings emphasize the importance of considering timing and device-specific screen use and underscore the need to promote healthy digital behaviors to support sleep hygiene, academic functioning, and overall well-being.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING INFORMATION

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ETHICAL INFORMATION

The study was reviewed and approved by the Ethics Committee of Panimalar Medical College and Research Institute (Ref. No: PMCHRI-IHEC-313).

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