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Effect of Screen Time on Sleep Quality of College Students: A Cross-Sectional Study

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ABSTRACT

Introduction: A growing number of college students are spending more time on electronic devices, with that habit escalating to nighttime use. Late-night smart phone barring is said to interfere with one's circadian sleep-wake rhythm, leading to insomnia and worsened daytime sleepiness. The primary focus of this study is to examine the correlation between screen time and sleep quality.

Aim & Objectives:

- To assess the average screen time amongst college students
- To evaluate the sleep quality using standardized sleep quality indices
- To determine the correlation between screen time and sleep quality.

Methods: A cross-sectional observational study was carried out amongst undergraduate and postgraduate students with age group of 18-25 years in Lucknow, U.P, India. A total of 512 participants were included in the study and the data were collected using a self-administered questionnaire designed to assess screen time on average, number of hours per day spend on electronic devices (mobile, laptop, TV, etc.) and sleep quality by administered "Pittsburgh Sleep Quality Index (PSQI") used to measure sleep quality.

Result: The average daily screen time was 7.7± 2.4 hours. About 63%of students had poor sleep quality (PSQI>5). A significant positive correlation ($r=0.45$. $p<0.001$) was found between screen time and poor sleep quality. Recreational screen use after 10PM was strongly associated with delayed onset and reduced total sleep duration.

Conclusion: Screen time was shorter before the COVID-19 pandemic in comparison to what is experienced now. Engaging with gadgets/practicing physical disconnection on a digital device may replace time for rest or any activity that can induce relaxation in order to rest. Along with relaxation, social interactions on digital devices are possible but hinder the ability of an individual to sleep due to overstimulation. There are studies showing that light from digital devices negatively affects

a person's sleep and regulates their biological clock. It is essential to dedicate the last hour of an individual's day to calming activities in addition to avoiding the use of these devices. Formed to support the increased use of technological resources, interventions have been developed targeting hexing their usage to restrict their usage..

KEYWORDS: *Screen time, Sleep quality, Academic performance, Electronic devices, social media*

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1. INTRODUCTION

The development of healthy relationships and connections is of fundamental importance to adolescent well-being. The use of social media plays a vital role in the lives of young generation. Yet the association between different types of social media use and the quality of relationships and connections remains unknown, and most existing analyses on this topic are based on modest and non-representative samples. Sleep is a biological need for human survival. Adequate sleep is crucial for a healthy and productive life. Sleep quality during the night influences our energy in the day. Sleep plays a vital role in physical and mental health, especially among young adults. Evidence shows that adequate sleep can maintain physical and mental health. Good quality sleep at the right time can also improve learning and memory [1][2].

Students are advised to take quality sleep, inadequate sleep may influence their academic performances, problem-solving skills, emotional status, and safety in life [1]. Many people are familiar with the benefits one could enjoy when he/she has an adequate sleep, especially when it comes in maintaining good health [1], but university students, unlike other groups, do not address the issue of establishing good habits associated with preventing such an issue as sleep deprivation. According to the latest guidelines from the National Sleep Foundation, an optimal amount of sleep is 7–9 h for young adults; however, only 24% of university students sleep more than 8 h per day [3].

University students tend to neglect their sleep on weekdays and over 40% experienced poor sleep quality, based on the Pittsburgh Sleep Quality Index (PSQI) measures survey [4-5].

Sleep is a periodic resting behaviour which is synchronized in circadian rhythms. Human follows the light cycle for daily activities such as sleep. Artificial illumination affects our rhythm in increasing alertness and cognitive performance and also in suppressing sleep [6-7].

However, as a result of technological developments, the usage of electronic devices (EDs) including smartphones, computers, laptops, and tablets has significantly increased over the past decade globally. With numerous functions and easy access, EDs have become an important part of students' daily lives. Students study and spend leisure time on EDs every day. The increasing time spent on ED use not only in daytime but also before bedtime should be noticed. ED usage near bedtime has become one of the foremost factors associated with sleep disturbance, in addition to various other factors such as caffeine consumption, exercise amount, tobacco smoking, alcohol consumption, prolonged working time, and depression [8,9,10]. This study aims to explore how screen time affects sleep quality among college students.

2. MATERIAL AND METHODS

Study Design and Participants

A cross sectional observational study was carried out amongst undergraduate and postgraduate students with age group of 18-25 years in Lucknow, U.P, India. A total of 512 participants were included in the study. All the participants were selected through convenience sampling from multiple colleges during the period of January to March 2025.

Data Collection Tool

A cross sectional study was conducted using a structured, web-based survey which was administered by Google Forms. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study. Informed consent was obtained electronically from all the participants. The study population comprised college students including 403 (79%) females and 109 (21%) males. Individuals above 25 years of age and those with pre-existing sleep disorders or ongoing psychiatric conditions were excluded from the eligibility criteria. All the data were collected using a self-administered questionnaire designed to assess relevant demographic, behavioural and sleep related parameters. Demographic data included age, gender, academic level of participants. Screen time and sleep quality was also assessed on the basis of following criteria:

- Screen time assessment: "On average, number of hours per day spend on electronic devices (mobile, laptop, TV, etc.)
- Sleep quality assessment: The Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality. A global PSQI score >5 was considered indicative of poor sleep quality [Buysse et al., 1989][11].

Statistical Analysis

Data were analysed using SPSSv25.0. Mean ± standard deviation (SD) was calculated for continuous variables. Chi-square test was used for categorical comparisons. Pearson's correlation coefficient (r) was used to analyse the relationship between screen time and PSQI scores. A p-value <0.05 was considered statistically significant.

3. RESULT

A total of 512 students (403 females and 109 males) between the age group of 15-25 years were included in this study. The average age of the students in the study was 22.1 years with most students being between 20.3 and 23.9 years old.
More than half (55%) of the students used screen for over 8 hours a day, 63% of them had poor sleep quality, based on their PSQI score. Almost half (48%) of the participants slept for less than 6 hours each night. A large majority (72%) used electronic devices after 10 PM at night [Table 1] [Figure 1].

Table1. Frequency distribution of the study subjects depending on age

Variable		Frequency	Percent	Mean ± SD
Age Group	18-25	472	92.2	22.1 ± 1.8
	26-30	33	6.4	
	31-35	3	.6	
	36-40	4	.8	
	Total	512	100.0	

The majority of respondents (92.2%) belonged to the 18–25 age group, with a **mean age of 22.1 ± 1.8 years**.

Figure 1. Gender wise distribution of study subjects

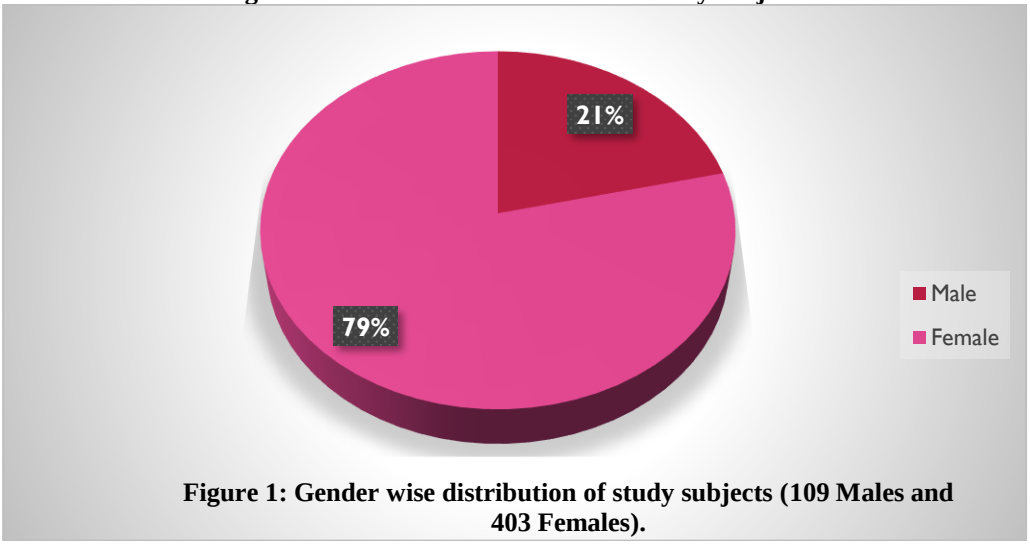

Figure 1: Gender wise distribution of study subjects (109 Males and 403 Females).

Sleep Quality Pattern Based on PSQI Scores

A total of 512 college students were assessed for sleep quality using the Pittsburgh Sleep Quality Index (PSQI). The mean PSQI score was 6.40 ± 2.60, indicating an overall trend toward poor sleep quality in the study population.

Based on PSQI interpretation nearly two-third of the participants (65%) experienced some level of sleep disturbance, with a significant proportion falling into the poor or very poor categories [Table 2]. The Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality of participants. The interpretation of PSQI scores was as follows [11].

<5 = Good sleep quality
6–10 = Poor sleep quality
>10 = Very poor sleep quality

Table 2: Frequency distribution of the study subjects depending on the scores of the PSQI Index

PSQI Score	Interpretation	Frequency	Percent
Less than 5	Good sleep quality	179	35%
6-10	Poor sleep quality	314	61%
More than 10	Very poor sleep quality	19	4%
		512	100.0

Out of 512 study participants, 35% had good sleep quality (PSQI scores < 5), 61% had moderate sleep disturbances (scores 6–10), and 4% had poor sleep quality (scores > 10).

Screen Time Pattern Based on number of hours per day

A total of 512 study subjects were included in the analysis. The majority of participants (57%) reported screen time of 4-8 hours per day. About 18.9% of the subjects had screen time of less than 4 hours, while 23.2% reported using screen time for more than 8 hours daily. The mean screen time among the study subjects was 16.17 hours per day with a standard deviation of 2.59 hours. The results indicating a moderate variability in screen time across individuals. [Table 3].

Table 3: Frequency distribution of the study subjects on the basis of screen time per hour

Screen Time per Day	Frequency	Percent
Less than 4 hours	97	18.9%
4-8 hours	296	57%
More than 8 hours	119	23.2%
	512	100.0

The majority of participants (57%) reported a daily screen time between 4–8 hours, while 23.2% exceeded 8 hours. Only 18.9% reported screen time below 4 hours.

Correlation between PSQI and Screen time

The mean screen time was found to be 6.9± 2.4 hours per day while the mean PSQI (Pittsburgh Sleep Quality Index) was recorded as 6.82±2.1, which indicates poor sleep quality pattern among participants. A Spearman's correlation analysis was conducted to assess the relationship between screen time and sleep quality (PSQI score). The results revealed a statistically significant positive correlation between screen time and PSQI score ($p<0.05$ is statistically significant, $^{**}p<0.01$ is statistically highly significant). There was a positive correlation between screen time and PSQI score ($r = 0.41$, $p < 0.001$), indicating that increased screen time was associated with poorer sleep quality [Table 4].

Table 4. Showing Spearman's correlation between PSQI and Screen Time

Spearman's Correlation		Hours Per Day on Screen
PSQI	Correlation Coefficient	0.219
	p value	0.000**
	Number (N)	512
Mean PSQI Score: 6.82 ± 2.1		Mean screen time: 6.9 ± 2.4 hours/day

Correlation is $^{*}p<0.05$ is statistically significant, $^{**}p<0.01$ is statistically highly significant

4. DISCUSSION

Digital technology has become a major part of our lives, and children are using screens like smartphones, tablets, computers, and TVs more than ever. Although these technologies have many benefits but too long screen time might affect student's health especially their sleep patterns and academic performance.[12]

This study highlights a significant relationship between screen time and sleep quality among college students. A total of 512 students (403 females and 109 males) between the age group of 15-25 years were included in the study. The average age of the students in the study was 22.1 years, with the most students lies between the age group of 20.3 to 23.9 years old. On analysing sleep quality pattern amongst students, it was found that, a majority (61%) of participants were experienced poor sleep quality, with an additional 4% suffering from very poor sleep quality, as indicated by their PSQI scores. Only 35% of the students reported good sleep quality (PSQI<5), suggesting that disturbed sleep patterns are prevalent among the college population. These findings are aligning with previous literature suggesting that increased exposure to screen,

especially before bedtime, delays sleep onset and reduces sleep duration.[12][13]

Similarly, on assessing the daily screen time among 512 college students. The results revealed significant levels of screen exposure. Nearly 80% of students reported spending more than 4 hours per day on electronic devices with an average daily screen time of 6.9 hours, far exceeding the 2-3 hours per day recommended by the American Academy of Paediatrics (AAP).High screen use was found to be associated with poor sleep quality, as students with more than 8 hours of daily screen exposure had significantly higher PSQI scores compared to those with less than 4 hours of screen time.[14] This fin dinging is concomitant with Chang et al 2015 who demonstrate s that blue light from electronic devices suppresses melatonin production and delays circadian rhythms, thereby reducing sleep quality. Similarly, Exelmans and Van den Bulck 2016 reported that bedtime median use in young adults was linked with increased sleep problems.[15][16] Hale and Gun 2015 further showed a dose-dependent relationship, where higher screen exposures was associated with progressively worse sleep outcomes, consistent with the positive correlation between screen time and PSQI scores observed in our study. When considered together, these findings underscore the strong relationship between screen exposure and sleep quality. The coexistence of high screen time (average nearly seven hours daily) and high rates of poor sleep disturbances in this population. This relationship can be understood within the framework of the biopsychosocial model, where both biological factors such a melatonin suppression and circadian disruption and behavioural patterns such as screen use in bed or late night academic and recreational device use interact to impair sleep. [17-20]

Overall, the results of this study are consistent with existing international evidence, reinforcing the conclusion that prolonged screen exposure, particularly in the evening, has a significant negative impact on sleep quality among young adults. This study found a significant positive correlation between daily screen time and PSQI scores, suggesting that students who spent more time on screen had poor sleep quality. These findings are consistent with previous studies reporting that increased academic stress, irregular routines, and especially excessive screen time particularly before bed time can impair sleep. When considered together, these findings underscore the strong relationship between screen exposure and sleep quality. The coexistence of high screen time (average nearly seven hours daily) and high rates of poor sleep quality (65% of students) suggests that excessive device use is a major factor contributing to sleep disturbances in this population. This relationship can be understood within the framework of the biopsychosocial model, where both biological factors, such as melatonin suppression and circadian disruption, and behavioural patterns, such as screen use in bed or late-night academic and recreational device use, interact to impair sleep. [8][11][13]

5. CONCLUSION

The usage of electronic devices, including smartphones, computers, laptops, and tablets, has grown dramatically in tandem with the technological revolution. The use of electronic devices is both required and inevitable. Reduced sleep quality is linked to longer electronic gadgets use before bed. Screen time is higher now than before the onset of the COVID-19 pandemic, and knowledge about the effects of screen time is evolving. Spending time in front of a screen may replace sleep time or sleep promoting activities such as exercise, and the engaging content and social interactions on screens interfere with falling asleep. Evidence exists on the disruption of the circadian rhythm by light emitted by screens. Advice to families should include sleep hygiene activities as well as elimination of screen use at least 1 hour before sleep. This study established a clear association between excessive screen time and reduced sleep quality among college students. Educational interventions, sleep hygiene promotion, and digital well-being campaigns are essential in academic institutions to promote healthy sleep behaviours.

6. RECOMMENDATION

Rigorous use of social media has the potential to strengthen relationships and connections in adolescents. However, when social media use becomes addictive or “problematic,” it is highly correlated with weaker relationships and a sense of social disconnection. Public health initiatives related to social media use should consider how different types of social media use have the potential to impact on different aspects of health.

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