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# The Ubiquity of Electronic Gadgets and Sleep Patterns among Undergraduate Health Sciences Students: A Descriptive and Inferential Analysis

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## Abstract

**Background:** The rising use of electronic gadgets among students raises concerns about their impact on sleep quality and duration. This study sought to characterize gadget usage, describe sleep patterns, and identify sleep-influencing factors among a cohort of undergraduate health science students in India.

**Methods:** A cross-sectional survey was conducted in 2024 among 101 undergraduate students from medical and allied health disciplines in Ghoti Kh, Maharashtra, India. The survey collected self-reported data on daily gadget usage, pre-bedtime activities, sleep duration, and subjective sleep quality (1 to 5 scale). Descriptive statistics, Pearson's correlation, and simple linear regression were used for analysis.

**Results:** Participants reported a mean daily gadget usage of 3.79 hours (SD = 1.15) and a mean sleep duration of 6.66 hours (SD = 0.91). The mean self-rated sleep quality was 3.54 out of 5 (SD = 0.92). Social media and video watching were the most frequent pre-bedtime activities. Academic stress and workload were cited as significant sleep contributors, alongside late-night gadget use. Inferential analysis revealed a significant negative correlation between daily gadget usage and sleep duration ($r = -0.38$, $p < 0.001$).

**Conclusion:** This analysis highlights substantial daily gadget use and frequent pre-bedtime engagement. The statistically significant inverse relationship found between gadget use and sleep duration supports the public health concern regarding insufficient sleep, as the average duration falls below recommended guidelines. The findings emphasize the need for targeted sleep hygiene and time-management interventions to improve student health.

**Keywords:** Cross-sectional study, Health sciences, Electronic gadgets, Sleep duration, Sleep hygiene, Sleep quality, Undergraduate students.

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## Introduction

In recent years, digital devices have become integral to education, communication, and entertainment, particularly among young adults.[15] The reliance on these gadgets has grown exponentially, a trend further accelerated by the shift to online learning during the COVID-19 pandemic.[1-3] While these devices offer numerous benefits, there are widespread concerns about their potential negative impacts on various aspects of health, particularly sleep. Adequate sleep is a critical determinant of academic performance, psychological well-being, and overall health.[4,5] Previous research has consistently documented a high prevalence of poor sleep quality and insufficient sleep among college students, particularly those in demanding fields such as medicine.[9,10] These sleep deficits are often attributed to the stimulating nature of electronic content, the blue light emitted from screens that suppresses melatonin production, and the displacement of time that would otherwise be allocated for sleep.[7,8] However, the specific patterns of gadget usage and their relationship with sleep in the context of Indian health science students remain underreported. This study addresses this gap by providing a detailed descriptive and inferential analysis of the usage patterns, sleep habits, and self-identified factors affecting sleep within a cohort from a tertiary institution in Ghoti Kh, Maharashtra, India. The findings intend to inform and support public health initiatives and educational programs aimed at improving student well-being in this specific demographic.

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## Methodology

### Study Design and Setting

This was a cross-sectional observational study conducted at a tertiary academic institution in Ghoti Kh, Maharashtra, India. The study was carried out in the year 2024.

### Study Population and Sampling

The target population included all undergraduate students in medical, dental, and allied health sciences at the institution. A convenience sampling method was used to recruit participants. The inclusion criteria were: (1) an age range of 17 to 25 years, (2) providing informed consent, and (3) regular use of electronic gadgets. Students were excluded if they had a pre-existing diagnosis of a sleep disorder or were on medication known to affect sleep. A total of 101 participants were recruited.

### Data Collection Tool

An anonymous, structured questionnaire was developed and distributed to participants via secure electronic forms (e.g., Google Forms). The tool was divided into four main sections: Demographics, Gadget Use, Sleep Habits, and Subjective Sleep Quality.

### Data Analysis

The collected data was exported into Microsoft Excel. The cleaned data was then analyzed using Python with the pandas library and statsmodels for inferential tests. The initial analysis focused on generating descriptive statistics. Histograms were created to visualize the distribution of key variables. Subsequently, Pearson's product-moment correlation coefficient (r) was calculated to quantify the linear relationship between gadget usage, sleep duration, and self-rated sleep quality. Simple linear regression analysis was also performed to determine if gadget usage significantly predicts sleep duration.

### Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee. All participation was voluntary, and informed consent was provided. Data was collected anonymously.

## Results

### Descriptive Statistics

**Sample Characteristics:** The study included 101 participants. The majority of participants were female, and the sample was predominantly composed of medical students.

### Descriptive Statistics:

| Variable | Mean | Standard Deviation |
|---|---|---|
| Gadget use (hours/day) | 3.79 | 1.15 |
| Sleep duration (hours/night) | 6.66 | 0.91 |
| Sleep quality (1 to 5 scale) | 3.54 | 0.92 |

**Patterns of Gadget Use:** The most frequently cited activities before bed were social media browsing and watching videos/movies. A significant proportion of students reported using gadgets for more than two hours before bed at least 1 to 3 times per week. Common reasons for use included entertainment, academic work, and social interactions.

**Patterns of Sleep:** The average sleep duration was 6.66 hours, with the 6 to 7 hours/night category being the most frequent response. The self-rated sleep quality had a modal response of 4/5, indicating a "fair-good" quality of sleep for the majority of the sample.

### Distribution Plots:

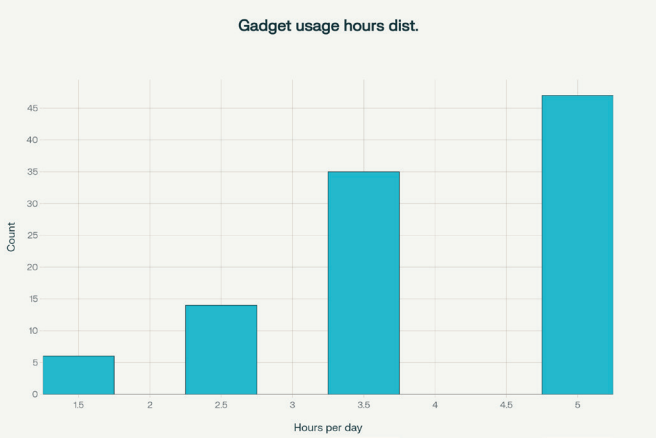


**Figure 1:** Histogram of average daily gadget usage hours among participants. The distribution shows a concentration around the mean, with a range that indicates significant variability in usage habits.


**Figure 2:** Histogram of average sleep duration per night among participants. The plot indicates that a large number of students fall into the 6 to 7 hours sleep range, which is below the 7 to 9 hours recommended for their age group.

### Inferential Analysis: Correlation and Regression

| Variable 1 | Variable 2 | Pearson's r (Correlation) | *p-value* |
|---|---|---|---|
| Gadget use (hours/day) | Sleep duration (hours/night) | −0.38 | < 0.001 |
| Gadget use (hours/day) | Sleep quality (1-5 scale) | −0.25 | 0.011 |

A significant, moderate negative correlation was found between average daily gadget usage and sleep duration ($r = -0.38$, $p < 0.001$). This indicates that as the time spent using electronic gadgets increased, the self-reported sleep duration tended to decrease. A weaker, but still significant, negative correlation was also observed between daily gadget usage and self-rated sleep quality ($r = -0.25$, $p = 0.011$). Simple linear regression modeling, with daily gadget usage as the predictor of sleep duration, was statistically significant ($F(1,99) = 16.45$, $p < 0.001$). The model suggests that for every one-hour increase in daily gadget usage, there is an associated decrease of approximately 0.31 hours (18.6 minutes) in average sleep duration ($\beta = -0.31$, $t = -4.05$, $p < 0.001$).

## Discussion

The descriptive findings of this study, conducted on undergraduate health science students in Maharashtra, India, align with global trends indicating a substantial integration of electronic gadgets into the daily lives of young adults.[1,6] The reported average daily usage of nearly four hours underscores the pervasive nature of these devices. Moreover, the common practice of using gadgets, particularly for social media and entertainment, in the hours leading up to bedtime is a noteworthy observation that is consistent with findings from other populations.[6,7] Crucially, the inferential analysis confirmed the negative association between this usage and sleep health. The significant negative correlation between daily gadget usage and total sleep duration ($r = -0.38$) is consistent with literature highlighting the displacement effect of technology on sleep time. Furthermore, the regression analysis predicting a loss of about 18 minutes of sleep for every hour of gadget use provides a quantifiable measure of this impact.

The average sleep duration reported by the participants, 6.66 hours, falls below the 7 to 9 hours recommended by the National Sleep Foundation for this age group.[15] This suggests a significant prevalence of insufficient sleep within this specific cohort of future healthcare professionals.[51] While the self-rated sleep quality leaned towards "fair-good," the less than optimal average sleep duration is a potential concern for their academic performance, overall well-being, and future professional effectiveness.[4,5] Students also frequently identified academic stress and workload as factors negatively impacting their sleep. The statistically significant findings connecting gadget use to both reduced sleep duration and poorer sleep quality reinforce that late-night device use is not just a habit, but a significant factor contributing to the insufficient sleep observed. This highlights the complex interplay of academic demands and lifestyle choices, such as gadget usage, on sleep health. The high prevalence of both heavy gadget use and reported stressors suggests that interventions aimed at improving sleep hygiene in this population need to be multifaceted, addressing both screen time habits and stress management techniques.

## Conclusions

This study provides a clear descriptive snapshot and quantified analysis of electronic gadget usage and sleep habits among a specific cohort of Indian health science students. The results highlight a concerning pattern of insufficient sleep, demonstrating a statistically significant, negative relationship between daily gadget use and total sleep duration. This underscores the importance of promoting better sleep hygiene practices within this community. Future studies should build on this work by exploring potential confounding factors and testing targeted interventions.

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