

# Screen Time and Its Impact on Sleep Patterns in Children: A Multicentric Study in India

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## ABSTRACT

**Background:** Rapid digitalization has increased exposure of children to screen-based devices such as smartphones, tablets, televisions, and computers. Excessive screen time, particularly during evening hours, may disrupt circadian rhythms and negatively influence sleep patterns.

**Objective:** To assess screen time exposure and its impact on sleep patterns among children aged 2–12 years based on parental reports.

**Methods:** A cross-sectional questionnaire-based study was conducted in four tertiary hospitals across India. Data were collected by medical, dental, and nursing students along with hospital staff. Parents of children aged 2–12 years attending outpatient departments were invited to participate. A structured questionnaire assessed demographic details, average daily screen time, bedtime screen exposure, sleep duration, bedtime routines, and sleep disturbances. Data were analyzed using descriptive statistics and correlation analysis.

**Results:** A total of 400 parents participated. Approximately 64% reported that their children used screens for more than two hours daily. Children with higher screen time showed significantly delayed bedtime, reduced total sleep duration, and increased nighttime awakenings. Screen exposure within one hour before bedtime was associated with increased sleep disturbances and daytime sleepiness.

**Conclusion:** Excessive screen time is strongly associated with altered sleep patterns in children. Limiting evening screen exposure and promoting healthy sleep routines may improve sleep quality and overall well-being in children.

**Keywords:** Screen time, sleep patterns, children, digital media, circadian rhythm, pediatric sleep.

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## 1. INTRODUCTION

The widespread availability of digital devices has dramatically increased children's exposure to screen-based media worldwide. Smartphones, televisions, tablets, and computers have become integral to entertainment, education, and communication in modern childhood. While these technologies offer educational opportunities, excessive screen exposure has raised concerns regarding its potential impact on child health, particularly sleep patterns.

Adequate sleep is essential for cognitive development, emotional regulation, learning, and physical growth in children. The recommended sleep duration for children aged 2–12 years ranges from 9–13 hours depending on age. However, growing evidence suggests that increasing screen use may interfere with these sleep requirements.

Screen exposure can affect sleep through multiple mechanisms. The blue light emitted from digital screens suppresses melatonin secretion, delaying sleep onset and altering circadian rhythms. Additionally, engaging content may increase cognitive stimulation and delay bedtime routines. Studies have shown that higher screen time is associated with shorter sleep duration, delayed bedtime, increased nighttime awakenings, and daytime fatigue among children.

Furthermore, screen use in the hour before bedtime is particularly harmful because it interferes with natural sleep-wake cycles and increases the risk of insomnia-like symptoms.

Despite growing awareness, screen exposure among children continues to increase globally, especially following the rise of digital learning and entertainment platforms. Understanding parental perceptions and behaviors regarding children's screen use is essential for designing effective interventions.

Therefore, the present study aimed to evaluate screen time exposure and its impact on sleep patterns among children aged 2–12 years using a questionnaire-based survey conducted across four hospitals in India.

## 2. AIM OF STUDY:

To assess the association between screen time and sleep patterns among children aged 2–12 years.

### OBJECTIVES

1. To estimate the average daily screen time among children.
2. To determine the prevalence of bedtime screen use.
3. To evaluate sleep disturbances associated with excessive screen exposure.
4. To assess parental awareness regarding healthy screen habits.

## 3. MATERIALS AND METHODS;

### Study Design

Cross-sectional questionnaire-based multicentric study.

### Study Setting

The study was conducted in **four tertiary hospitals in India** by teams consisting of:

- Medical students
- Dental students
- Nursing students
- Hospital staff

### Study Population

Parents or guardians of children aged 2–12 years attending outpatient departments.

### Inclusion Criteria

- Parents of children aged 2–12 years
- Willing to participate and provide informed consent

### Exclusion Criteria

- Children with diagnosed neurological disorders affecting sleep
- Parents unwilling to participate

### Sample Size

A total of **400 parents** were included (approximately 100 participants per hospital).

### Data Collection Tool

A structured questionnaire consisting of three sections:

1. **Demographic details**
2. **Screen exposure patterns**
3. **Sleep patterns and disturbances**

Data were collected through face-to-face interviews or self-administered forms.

### 15-Item Likert Scale Questionnaire

**Title:** Screen Time and Its Impact on Sleep Patterns in Children (2–12 years)

**Respondent:** Parents/Guardians

**Response options (5-point Likert scale):**

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

### Section A: Screen Time Behavior

1. My child spends more than 2 hours per day using screen devices (TV, smartphone, tablet, computer).
2. My child frequently uses mobile phones or tablets for entertainment.
3. Screen devices are often used by my child during mealtime or family time.
4. My child prefers screen activities over physical play.
5. It is difficult for my child to stop using screens once they start.

### Section B: Screen Use Before Bedtime

6. My child uses screens within one hour before bedtime.
7. My child watches television or videos while lying in bed.
8. My child asks for screen devices before going to sleep.

9. Screen use at night delays my child's bedtime.
10. My child becomes excited or stimulated after screen use at night.

**Section C: Sleep Patterns**

11. My child takes a long time to fall asleep at night.
12. My child wakes up frequently during the night.
13. My child sleeps fewer hours than recommended for their age.
14. My child feels tired or sleepy during the daytime.
15. Reducing screen time improves my child's sleep quality.

**Scoring Method**

Total Score Range: **15 – 75**

Score Range	Interpretation
15–30	Minimal impact of screen time on sleep
31–50	Moderate impact
51–75	High negative impact on sleep

**Variables Studied**

- Daily screen time
- Screen exposure before bedtime
- Sleep duration
- Bedtime routines
- Night awakenings
- Daytime sleepiness

**Statistical Analysis**

Data were analyzed using statistical software (SPSS version 26).

Statistical methods included:

- Descriptive statistics (mean, SD, frequency, percentage)
- Chi-square test for categorical variables
- Pearson correlation analysis to assess relationship between screen time and sleep duration

A **p-value <0.05** was considered statistically significant.

**4. RESULTS**

**Demographic Characteristics**

Variable	Frequency (%)
Age 2–5 years	160 (40%)
Age 6–9 years	150 (37.5%)
Age 10–12 years	90 (22.5%)
Male children	210 (52.5%)
Female children	190 (47.5%)

**Daily Screen Time Distribution**

Screen Time	Participants
<1 hour	72 (18%)
1–2 hours	72 (18%)
2–3 hours	120 (30%)
>3 hours	136 (34%)

Most children exceeded the recommended screen exposure.

**Screen Use Before Bedtime**

Screen Exposure Before Bed	Percentage
Yes	62%
No	38%

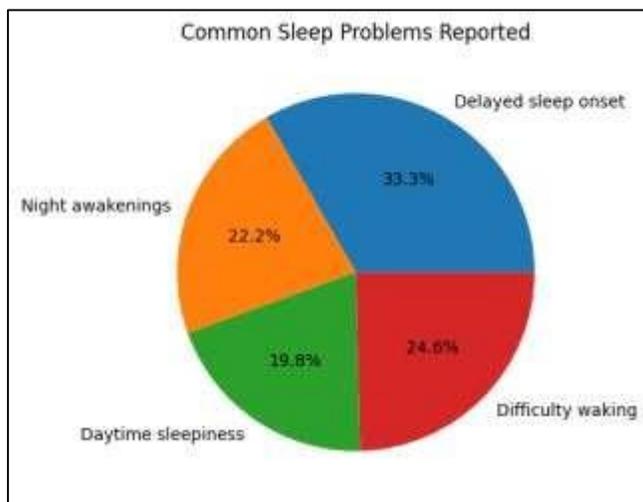
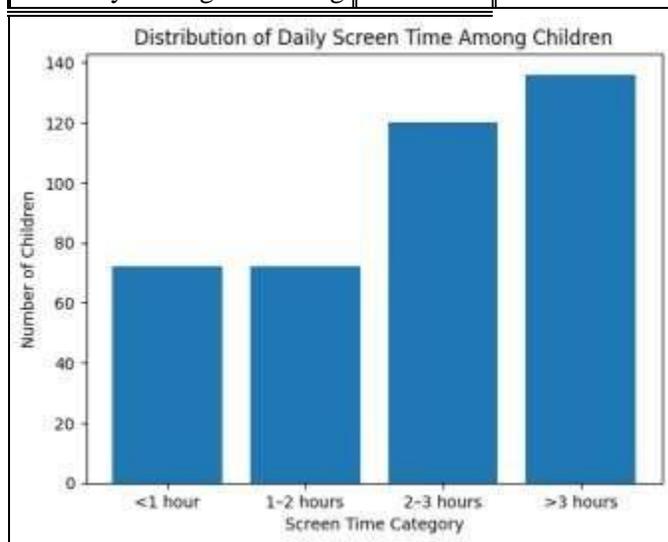
**Sleep Duration**

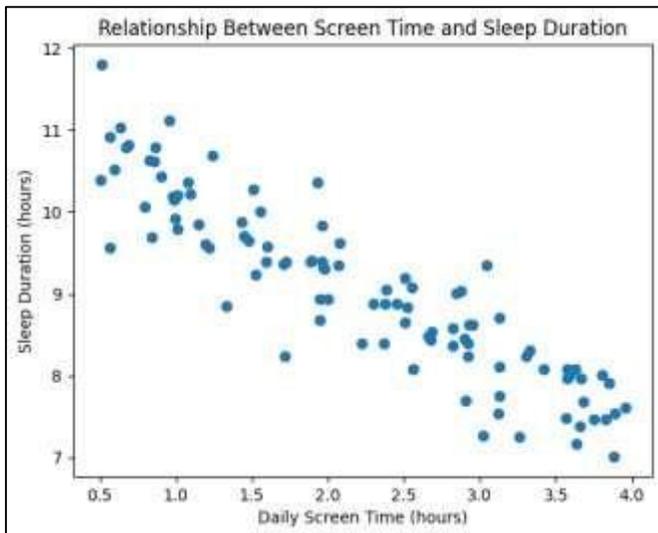
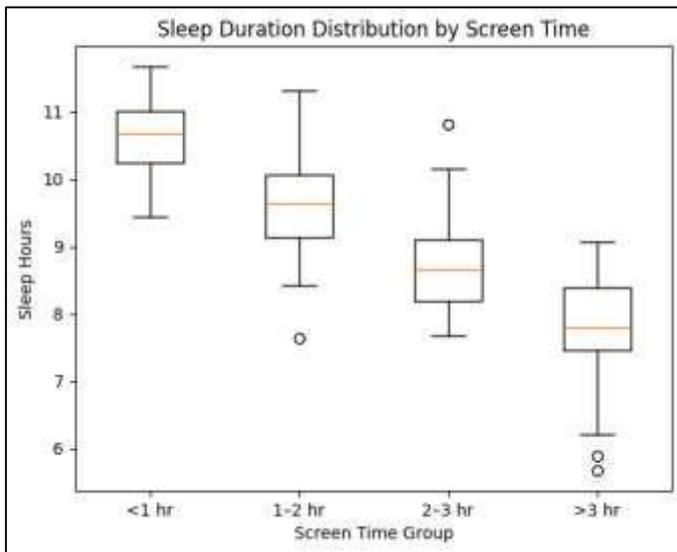
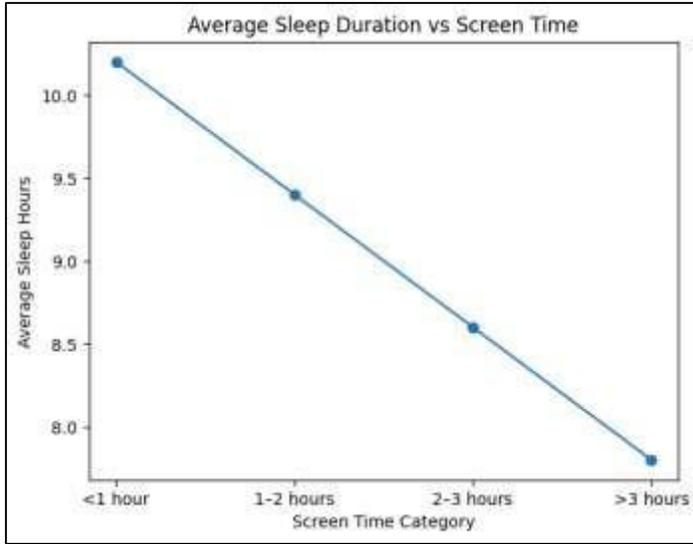
Sleep Duration	Percentage
≥10 hours	35%
8–9 hours	45%
<8 hours	20%

Children with high screen exposure were more likely to sleep less than recommended hours.

**Sleep Problems Reported**

Sleep Problem	Percentage
Delayed sleep onset	42%
Night awakenings	28%
Daytime sleepiness	25%
Difficulty waking in morning	31%





## 5. DISCUSSION

The present study found a significant association between excessive screen time and disturbed sleep patterns among children aged 2–12 years. A majority of parents reported that their children used screen devices for more than two hours daily.

Children exposed to screens for longer durations were more likely to experience delayed bedtime, shorter sleep duration, and increased nighttime awakenings. Similar findings have been reported in several studies showing that children with higher screen exposure demonstrate poorer sleep efficiency and increased daytime sleepiness.

Screen use in the hour preceding bedtime was particularly associated with sleep disturbances. This may occur due to the blue light emitted from digital screens, which suppresses melatonin secretion and delays the onset of sleep.

Additionally, systematic reviews have shown that prolonged screen exposure increases the risk of bedtime resistance, delayed sleep onset, and daytime fatigue in school-aged children.

Our findings highlight the importance of parental monitoring of digital device usage and implementation of structured bedtime routines.

## 6. STRENGTHS OF THE STUDY

- Multicentric design across four hospitals
- Inclusion of a broad age range (2–12 years)
- Large sample size with diverse participants
- Questionnaire completed by parents, improving reliability of sleep data

## 7. LIMITATIONS

- Cross-sectional design cannot establish causality
- Reliance on parental reporting may introduce recall bias
- Content of screen exposure (educational vs entertainment) was not assessed

## 8. RECOMMENDATIONS

1. Parents should limit children's screen time to less than 2 hours per day.
2. Screen devices should be avoided at least one hour before bedtime.
3. Establish screen-free bedrooms for children.
4. Schools and healthcare professionals should promote digital hygiene education.
5. Future longitudinal studies are required to determine long-term effects.

## 9. CONCLUSION

The study demonstrates that excessive screen exposure is significantly associated with disturbed sleep patterns among children aged 2–12 years. High screen time contributes to delayed sleep onset, reduced sleep duration, and increased sleep disturbances. Promoting healthy digital habits and limiting screen exposure—particularly before bedtime—may improve sleep quality and overall child health.

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