

## Research Article



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## A CROSS-SECTIONAL STUDY OF INTERNET ADDICTION AND SLEEP QUALITY AMONG ADOLESCENTS ATTENDING A TERTIARY CARE HOSPITAL

**Dr. Mangesh Rathod**

Assistant Professor, Department of Psychiatry, Shree Narayana Institute of Medical Sciences, North Kuthiyathodu, Ernakulam, Kerala

Email Id: [rmangesh49@gmail.com](mailto:rmangesh49@gmail.com)

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### ABSTRACT

**Background:** Increasing internet use among adolescents has emerged as an important behavioural and psychological concern. Although internet access supports education, communication, and entertainment, excessive or poorly controlled internet use may interfere with sleep, academic functioning, physical activity, emotional regulation, and social interaction.

**Aim:** To evaluate the prevalence of internet addiction and its association with sleep quality among adolescents.

**Methods:** A hospital-based cross-sectional study was conducted in the Department of Psychiatry during 2012 among 140 adolescents aged 13–19 years. Adolescents with regular internet access and willingness to participate were included. Participants with known psychiatric illness, neurological disorders, or severe chronic illness were excluded. Sociodemographic details, duration and timing of internet use, academic performance, physical activity, behavioural changes, and sleep-related symptoms were recorded using a structured questionnaire. Internet addiction was assessed using standardized internet addiction assessment scales, and sleep quality was evaluated through sleep-related parameters including sleep duration, sleep latency, night awakenings, and daytime sleepiness.

**Results:** The mean age of participants was  $16.2 \pm 1.8$  years. Male predominance was observed, and the majority belonged to the 16–19-year age group. Internet use exceeding four hours per day was observed in 60 (42.9%) adolescents. Moderate internet addiction was the most common category, observed in 70 (50.0%) participants. Delayed sleep onset and reduced sleep duration were the commonest sleep disturbances. Prolonged internet use, nighttime internet activity, severe internet addiction, and reduced physical activity showed significant association with poor sleep quality.

**Conclusion:** Internet addiction was commonly observed among adolescents and showed significant association with sleep disturbances and behavioural changes. Prolonged internet use, nighttime screen exposure, severe internet addiction, and reduced physical activity were important factors associated with poor sleep quality.

**Keywords:** Adolescents, Behavioural Disorders, Cross-Sectional Study, Internet Addiction, Psychiatry, Sleep Quality.

### INTRODUCTION

Rapid technological advancement has changed the daily life of adolescents. Internet use has become an essential part of learning, communication, recreation, gaming, and social networking. When used appropriately, the internet can support education and social connectivity. However, excessive or poorly controlled internet use may become problematic and may interfere with academic performance, sleep, physical activity, family interaction, and emotional well-being. Internet addiction has been described as an emerging clinical concern characterized by excessive internet use associated with impairment in personal, social, academic, or occupational functioning.<sup>1</sup>

Internet addiction is generally understood as a pattern of uncontrolled or excessive internet-related behaviour associated with preoccupation, inability to reduce use, withdrawal-like discomfort, increasing time spent online, neglect of routine

activities, and continuation despite negative consequences. Problematic use should be understood in relation to functional impairment and behavioural control rather than only the number of hours spent online.<sup>2</sup>

Adolescents are particularly vulnerable to problematic internet use because of developmental, emotional, and social factors. Curiosity, peer influence, online gaming, social networking, academic pressure, and easy access to smartphones or computers may increase time spent online. Online gaming addiction and related problematic internet use are more common among male adolescents and may be influenced by behavioural and psychosocial factors.<sup>3</sup> This is relevant because adolescence is a period during which habits related to screen use, sleep, social interaction, and academic routines are still developing.

Sleep disturbance is one of the important consequences associated with excessive internet use. Internet overuse has been associated with excessive daytime sleepiness, suggesting that problematic internet use may disturb normal sleep patterns and daytime functioning.<sup>4</sup> Adolescents may use the internet late at night for gaming, chatting, videos, or social media, leading to delayed sleep onset, reduced sleep duration, and morning fatigue.

Adequate sleep is essential for growth, learning, memory consolidation, emotional regulation, attention, and physical health during adolescence. Sleep deprivation in adolescents is an important concern because biological sleep patterns, academic demands, and social habits may all contribute to insufficient sleep.<sup>5</sup> Poor sleep can lead to daytime sleepiness, irritability, reduced concentration, poor academic productivity, mood changes, and impaired decision-making.

Internet addiction may also coexist with psychological symptoms. Internet addiction has been associated with depression, anxiety, attention-related difficulties, and other behavioural problems.<sup>6</sup>

Although not every adolescent with high internet use has a psychiatric disorder, excessive use may either contribute to or reflect underlying emotional distress. Electronic media use has been repeatedly associated with altered sleep patterns among children and adolescents. Screen exposure, stimulating content, and bedtime media use may delay sleep and reduce sleep quality.<sup>7</sup> Therefore, evaluation of internet addiction and sleep quality together is important in adolescent mental health assessment.

The present study was conducted to evaluate the prevalence of internet addiction and its association with sleep quality among adolescents attending a tertiary care hospital.

## **MATERIALS AND METHODS**

This hospital-based cross-sectional study was conducted in the Department of Psychiatry during the year 2012. A total of 140 adolescents aged between 13 and 19 years were included in the study.

Adolescents with regular internet access and willingness to participate were included. Participants with known psychiatric illness, neurological disorders, or severe chronic illness were excluded. These exclusion criteria were applied because such conditions could independently influence sleep quality, behavioural patterns, and questionnaire responses.

Data were collected using a structured questionnaire. Sociodemographic information included age and gender. Details regarding duration of internet use, timing of internet activity, nighttime internet use, academic performance, physical activity, sleep duration, sleep latency, night awakenings, daytime sleepiness, irritability, social withdrawal, and other behavioural changes were recorded. Daily internet use was categorized as less than two hours, two to four hours, and more than four hours per day.

Internet addiction was assessed using standardized internet addiction assessment scales. Based on assessment scores, internet addiction was categorized as mild, moderate, or severe. Sleep quality was assessed using sleep-related parameters including delayed sleep onset, reduced sleep duration, frequent night awakening, and daytime sleepiness. Poor sleep quality was analyzed in relation to prolonged internet use, nighttime internet activity, severe internet addiction, and reduced physical activity.

The collected data were entered into a structured data sheet and analyzed using SPSS software version 17. Continuous variables were represented as mean  $\pm$  standard deviation, while categorical variables were expressed as frequencies and percentages. The Chi-square test was used to evaluate associations between categorical variables. Independent t-test was applied where comparison of continuous variables was required. A p-value less than 0.05 was considered statistically significant.

Institutional ethical committee approval was obtained prior to commencement of the study. Informed consent was obtained from parents or guardians where applicable, and assent was obtained from adolescent participants. Confidentiality of participant information was maintained.

## **RESULTS**

A total of 140 adolescents participated in the study. The mean age of participants was  $16.2 \pm 1.8$  years.

**Table 1: Demographic Characteristics of Study Participants**

Variable	Frequency (%)
Male	82 (58.6)
Female	58 (41.4)
Age 13–15 years	48 (34.3)
Age 16–19 years	92 (65.7)

Male participants constituted 82 (58.6%) of the study population, while females constituted 58 (41.4%). The majority of adolescents belonged to the 16–19-year age group, indicating that older adolescents formed the larger proportion of study participants.

**Table 2: Duration of Daily Internet Usage Among Study Participants**

Duration of Internet Use	Frequency (%)
<2 hours/day	28 (20.0)
2–4 hours/day	52 (37.1)
>4 hours/day	60 (42.9)

Internet use exceeding four hours per day was observed in 60 (42.9%) adolescents. Another 52 (37.1%) participants used the internet for two to four hours daily, indicating that prolonged daily screen exposure was common in the study group.

**Table 3: Severity of Internet Addiction Among Study Participants**

Severity	Frequency (%)
Mild	48 (34.3)
Moderate	70 (50.0)
Severe	22 (15.7)

Moderate internet addiction was the most common category, observed in 70 (50.0%) adolescents. Severe internet addiction was noted in 22 (15.7%) participants, representing a subgroup at greater risk of functional and sleep-related impairment.

**Table 4: Sleep Disturbances Among Study Participants**

Sleep Parameter	Frequency (%)
Delayed sleep onset	62 (44.3)
Reduced sleep duration	54 (38.6)
Daytime sleepiness	48 (34.3)
Frequent night awakening	30 (21.4)

Delayed sleep onset was the most common sleep disturbance, observed in 62 (44.3%) adolescents. Reduced sleep duration and daytime sleepiness were also frequent, suggesting that internet-related habits may interfere with normal sleep timing and daytime alertness.

**Table 5: Behavioural Changes Among Study Participants**

Behavioural Change	Frequency (%)
Reduced physical activity	58 (41.4)
Irritability	46 (32.9)
Reduced academic performance	42 (30.0)
Social withdrawal	28 (20.0)

Reduced physical activity was the most common behavioural change, followed by irritability and reduced academic performance. Social withdrawal was observed in one-fifth of participants, indicating that excessive internet use may influence routine behaviour and interpersonal interaction.

**Table 6: Association Between Internet Addiction and Sleep Quality**

Clinical Parameter	Poor Sleep Quality n (%)	p-value
Internet use >4 hours/day	40 (66.7)	<0.001
Nighttime internet usage	36 (60.0)	0.002

Severe internet addiction	18 (81.8)	<0.001
Reduced physical activity	28 (48.3)	0.011

Poor sleep quality showed significant association with prolonged internet use, nighttime internet activity, severe internet addiction, and reduced physical activity. Severe internet addiction demonstrated the strongest association with poor sleep quality.

## DISCUSSION

The present cross-sectional study evaluated internet addiction and sleep quality among 140 adolescents attending a tertiary care hospital. Moderate internet addiction was the most common category, and poor sleep quality was significantly associated with prolonged internet use, nighttime internet activity, severe internet addiction, and reduced physical activity.

Male predominance was observed in the present study. Ko et al. reported that male adolescents may be more vulnerable to problematic internet use, particularly in relation to online gaming and prolonged screen exposure.<sup>8</sup> In the present study, males constituted 58.6% of participants. This may reflect greater use of online gaming, entertainment platforms, or unsupervised internet access among male adolescents, although gender patterns may vary according to social and cultural context.

The majority of adolescents belonged to the 16–19-year age group. Older adolescents usually have greater independence, academic pressure, smartphone access, peer interaction through online platforms, and reduced parental supervision compared with younger adolescents. This may contribute to longer duration of daily internet use and greater risk of problematic use.

Moderate internet addiction was the most common category. Cao and Su reported internet addiction among adolescents and highlighted its association with psychological symptoms and behavioural difficulties.<sup>9</sup> The present findings are comparable and suggest that problematic use may be present even before severe addiction develops. Adolescents with moderate addiction may still benefit from counselling, parental involvement, and structured digital habits before more severe impairment appears.

Internet use exceeding four hours per day was observed in 42.9% of participants. Yen et al. reported that internet addiction may coexist with psychiatric symptoms and behavioural problems among adolescents.<sup>10</sup> Prolonged daily internet use may reduce time available for study, sleep, physical activity, hobbies, and family interaction. However, duration alone should be interpreted carefully because academic internet use differs from compulsive gaming or late-night social media use. Functional impairment and loss of control remain important features.

Delayed sleep onset was the most common sleep disturbance, followed by reduced sleep duration and daytime sleepiness. Higuchi et al. demonstrated that playing computer games using bright monitors can influence sleep physiology and may delay normal sleep patterns.<sup>11</sup> The present findings support the concern that evening and nighttime screen exposure may disturb sleep initiation among adolescents.

Nighttime internet use was significantly associated with poor sleep quality. Late-night use may delay bedtime through prolonged engagement, emotional arousal, exposure to bright screen light, and difficulty disengaging from online content. Van den Bulck reported that television viewing and computer game playing were associated with later bedtime and reduced sleep time among adolescents.<sup>12</sup> In the present study, nighttime internet activity was one of the important predictors of poor sleep quality.

Severe internet addiction showed the strongest association with poor sleep quality. Morrison and Gore reported a relationship between excessive internet use and depressive symptoms, suggesting that problematic use may interact with emotional health.<sup>13</sup> Sleep disturbance may both result from and worsen psychological distress. Adolescents with poor sleep may experience irritability, low mood, poor attention, and reduced academic performance, which may further increase online escape behaviour.

Reduced physical activity was significantly associated with poor sleep quality. Adolescents spending more time online may have less time for outdoor play, exercise, and face-to-face social activities. Reduced physical activity may contribute to delayed sleep, poor sleep depth, weight gain, and reduced daytime energy. Encouraging regular physical activity is therefore an important component of healthy lifestyle counselling.

Academic performance was reduced in 30.0% of participants. Dewald et al. reviewed the association between sleep quality and academic performance and reported that poor sleep is linked with reduced school functioning.<sup>14</sup> In the present study, reduced academic performance may be related to late-night internet use, daytime sleepiness, reduced concentration, poor time management, or excessive involvement in online entertainment.

Irritability and social withdrawal were also reported among participants. Punamäki et al. reported that intensive information and communication technology use may be associated with poor sleep habits and waking-time tiredness among adolescents.<sup>15</sup> Such behavioural changes should not be dismissed as ordinary adolescent behaviour when accompanied by excessive internet use, sleep disturbance, and academic decline.

The present study has practical implications for adolescent mental health. Screening for internet use patterns should include duration, timing, type of use, nighttime activity, loss of control, academic impact, sleep disturbance, physical activity, and family concerns. Counselling should focus on balanced internet use, avoiding screens before bedtime, fixed sleep schedules, supervised device access, regular exercise, and encouragement of offline social and recreational activities.

## CONCLUSION

Internet addiction was commonly observed among adolescents in the present study, with moderate addiction being the predominant category. Prolonged internet use, nighttime internet activity, severe internet addiction, and reduced physical activity were significantly associated with poor sleep quality. Delayed sleep onset, reduced sleep duration, and daytime sleepiness were common sleep-related complaints. Behavioural changes included reduced physical activity, irritability, reduced academic performance, and social withdrawal. Early identification, parental supervision, counselling regarding healthy internet use, sleep hygiene education, and promotion of regular physical activity are important for reducing adverse behavioural and psychological effects among adolescents.

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