ISSN: 2091-2889 (online)
2091-2412 (print)

Received: 18 Aug 2024
Accepted: 12 Jun 2025
Published: 31 Aug 2025

DOI: 10.54530/jcmc.1737

OPEN ACCESS

Electronic gadget use and sleep quality among secondary level students, Kavrepalanchok, Nepal

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Peer reviewed

Abstract

Introduction: Excessive electronic gadget use among adolescents often leads to late bedtimes and poor sleep quality. This study assessed the impact of electronic gadget use on sleep quality among adolescents in a semi-urban town setting in Nepal.

Method: A cross-sectional study was conducted among students of grade 12 from 7 schools of Banepa municipality, Kavrepalanchok, Nepal, from 15 to 28 June 2024. A multi-stage cluster sampling technique was used for school and participant selection. Data were collected using self-administered structured questionnaires, including the Pittsburgh Sleep Quality Index (PSQI) and the Digital Addiction Scale Test (DAST) to assess sleep quality and electronic gadget addiction, respectively. Ethical approval was obtained from the Institutional Review Committee of Nobel College (Ref: 080/81/377). Data entry was done in Epi-Data version 3.1 and analysed using SPSS 22. The association between electronic gadget use and sleep quality was determined using Chi-square test, and $p<0.05$ was considered significant.

Result: Out of 288 students, 160(55.6%) were identified as electronic gadget addicts. The majority, 183(63.5%), went to bed after 10:00 PM, and 242(84.0%) reported sleeping less than seven hours per night. Nearly half, 134(46.5%), had poor sleep quality. A significant association was found between late bedtime time (after 10:00 PM) and sleep quality ($p=0.047$). However, no significant association was found between electronic gadget addiction and poor sleep quality ($p=0.279$).

Conclusion: Students with electronic gadget addiction suffered from poor sleep quality. Students, concerned authorities and guardians should be aware of the adverse effects of excessive electronic gadgets.

How to cite

Waiba B, Panta PP, Prajapati S. Electronic Gadget Use and Sleep Quality Among Secondary Level Students, Kavrepalanchok, Nepal. Journal of Chitwan Medical College. 2025;15(54):40-8.

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Introduction

Sleep quality is primarily influenced by four factors: sleep latency, awakenings, wake after sleep onset, and sleep efficiency.[1,2] Adults need 7 to 8 hours of sleep for optimal health.[3] However, electronic device usage at bedtime disrupts sleep by suppressing melatonin and increasing arousal from screen exposure.[4] Among adolescents, insufficient sleep is linked to mood disorders, obesity, poor academic performance, and psychological distress.[5]

While gadgets enhance daily life, excessive use, especially at night, has negative effects on sleep quality.[6,7] Prolonged screen time causes mental stimulation and circadian rhythm disruption through blue light, leading to sleep disturbances.[8,14] In 2022, 73% of the global population aged over 10 owned a mobile phone, with China accounting for over 1.04 billion users.[9] Smartphone use in India and Nepal reached 71% by 2023.[11,12]

Smartphone addiction is now recognised as a growing health concern, particularly among adolescents.[7] Studies show that 75% of children and 70% of adults use devices in bed, impairing sleep.[12] A 2014 study revealed that 62% of youth used phones in bed, 37% texted after bedtime, and 8% were disturbed during sleep.[16] Similarly, 80% of Saudi children watch TV before bed, affecting their health.[5]

The COVID-19 pandemic increased screen time, worsening sleep issues.[14] In Nepal and India, students report poor sleep quality linked to gadget use.[15] This study aimed to assess the impact of electronic gadget use on sleep quality among secondary level students.

Method

A cross-sectional study was conducted among Grade 12 students in Banepa Municipality, Kavrepalanchok District, Nepal, from 15-28 Jun 2024. Ethical approval was obtained from the Institutional Review Committee (IRC) of Nobel College (Ref: 080/81/377).

All 20 schools in the municipality were stratified according to government (n=9) and private (n=11). categories. Using a simple random sampling technique, two government and five private schools were selected. A multi-stage cluster sampling approach was employed overall. All Grade 12 students from the selected schools who were present on the data collection day and provided assent, along with informed consent from their guardians, were invited to participate. The minimum required sample size was calculated as 277 from a total population of 729 students; however, data were successfully collected from 288 participants. The internal consistency of the questionnaires was confirmed with a Cronbach's alpha value of 0.83.

Data collection was done using structured, self-administered questionnaires (PSQI, DAST) after obtaining formal permission from school administration and informed written consent from participants and parents or guardians. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), and electronic gadget addiction was measured using the Digital Addiction Scale Test (DAST).

A pretest was conducted on 28 participants (10% of the sample) in a school in Panauti Municipality to ensure the clarity and validity of the tools. Based on the pretest results, minor modifications were made to the questionnaires.

Data analysis was performed using SPSS version 22. Data were first entered into Epi-Data version 3.1 and thoroughly cleaned. Descriptive statistics are presented as frequencies and percentages for categorical variables. The association between electronic gadget use (categorised as addiction vs. normal based on DAST) and sleep

quality (categorized as good vs. poor based on PSQI) was analyzed using the Chi-square test. A p-value of <0.05 was considered statistically significant.

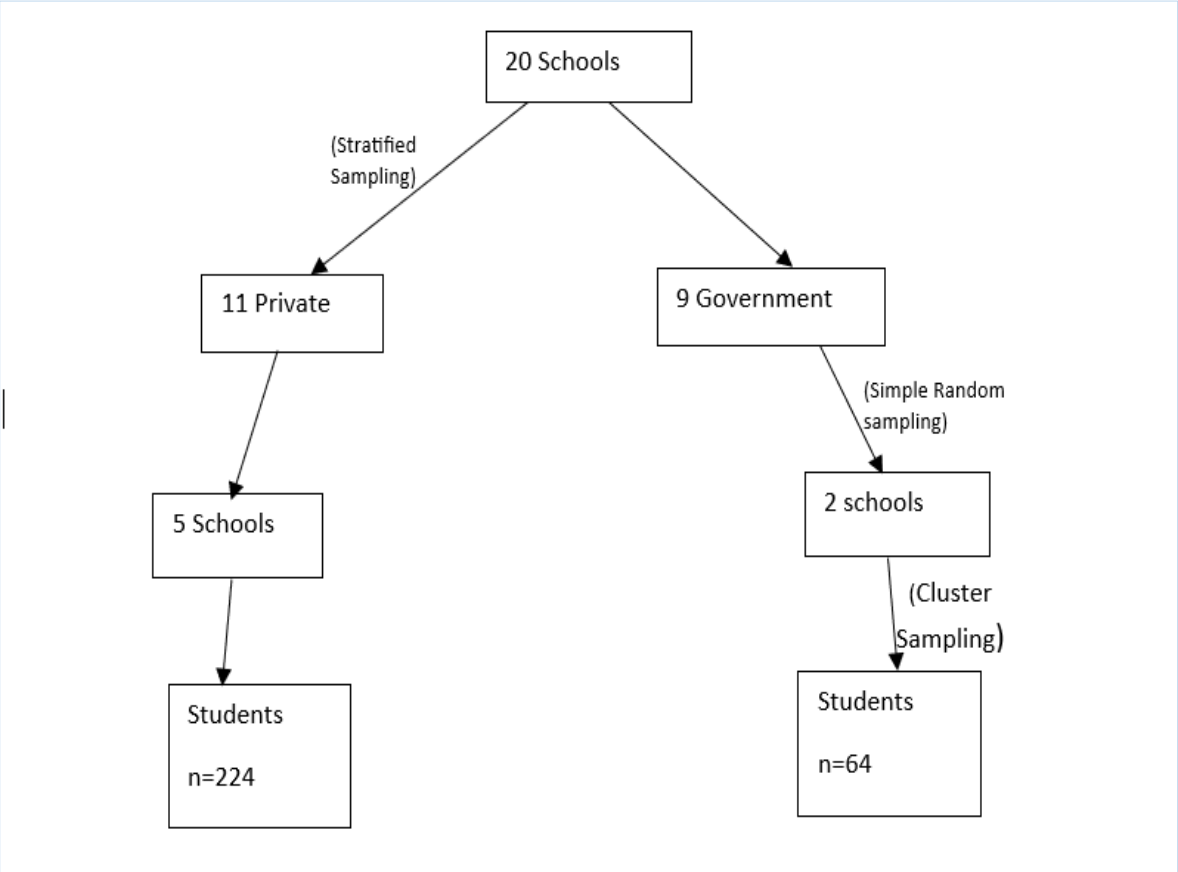

Figure 1. Sampling procedure

Result

There was a total of 288 students, males 142(49.3%), and mean age 17.01±0.78 years. Regarding parental employment, 155(53.8%) of fathers and 68(23.6%) mothers were employed, Table 1. The majority of students, 183(63.5%), went to bed after 10:00 PM, and 242(84%) slept for less than 7 hours, Table 2.

Among the respondents, 160(55.6%) met the criteria for electronic gadget addicts, and 134(46.5%) had poor sleep quality, Table 3.

Sleep quality was significantly associated with fathers' employment status, with 82(61.7%) children of unemployed fathers having poor sleep quality compared to 103(66.5%) children of employed fathers (p<0.01), Table 4.

Among the electronic gadget addicts, 79(49.4%) experienced poor sleep quality compared to 55(43.0%) without addiction. However, the analysis showed no significant association between sleep quality and electronic gadget addiction (p=0.279), Table 5.

There was a significant association with sleep timing and quality of sleep. Those going to bed after 10:00 had poor sleep 93(50.8%) compared to going to bed late (p=0.047). The time taken to fall asleep (sleep latency), were not significantly associated with overall sleep quality (p=0.116), Table 6.

Table 1. Socio-demographic information of secondary level students surveyed for electronic gadget use and sleep quality, n=288

Variable	Categories	n=288	%
Age (Y), 17.01±0.78(15-19)	15-17	217	75.3
	18-19	71	24.7
Gender	Male	142	49.3
	Female	146	50.7
Family type	Nuclear family	185	64.2
	Joint family	83	28.8
	Extended family	20	6.9
Ethnicity	Brahmin	125	43.4
	Chhetri	69	24
	Janajati	73	25.3
	Others	21	7.3
Religion	Hindu	201	69.8
	Buddhist	56	19.4
	Christian	31	10.8
Father's Education	Literate	258	89.6
	Illiterate	30	10.4
Mother's Education	Literate	237	82.3
	Illiterate	51	17.7
Father's Occupation	Employment	155	53.8
	Unemployment	133	46.2
Mother's Occupation	Employment	68	23.6
	Unemployment	220	76.4

Table 2. Information of secondary level students surveyed for electronic gadget use and sleep patterns, n=288

Variable	Categories	n=288	%
Electronic gadget use			
Screen time per day (average5.41)	<2hours	62	21.5
	2-5 hours	87	30.2
	5-8 hours	105	36.5
	>8 hours	34	11.8
How many hours before bedtime do you use gadgets?	<1 hour	219	76
	2-3 hours	48	16.7
	>3 hours	21	7.3
Sleep pattern category			
Average time gone to bed at night during the past month	Before or at 10 pm	105	36.5
	After10 pm	183	63.5
Average time taken to fall asleep during past month	≤30 minutes	150	52.1
	>30 minutes	138	47.9
Average time to get up in morning during past month	Before 6 am or at 6 am	119	41.3
	After 6 am	169	58.7
Hours of actual sleep at night during the past month	<7 hours	242	84
	≥7 hours	46	16

Table 3. Electronic gadget addiction and sleep quality among secondary level students, n=288

	n=288	%
Electronic gadget addiction		
Yes	160	55.6
No	128	44.4
Sleep quality		
Good sleep quality	154	53.5
Poor sleep quality	134	46.5

Table 4. Bivariate analysis of sociodemographic, electronic gadget uses and sleep quality of students, n=288

Socio-demographic				p-value, X^2
		Electronic gadgets use		
		Addiction	Normal	
Age	15-17	121(55.8%)	96(44.2%)	0.903
	18-19	39(54.9%)	32(45.1%)	
Sex	Male	72(50.7%)	70(49.3%)	0.102
	Female	88(60.3%)	58(39.7%)	
Family type	Nuclear family	106(57.3%)	79(42.7%)	0.158
	Joint family	47(56.6%)	36(43.4%)	
	Extended family	7(35%)	13(65%)	
Ethnicity	Brahmin	67(53.6%)	58(46.4%)	0.207
	Chhetri	33(47.8%)	36(52.2%)	
	Janajati	46(63%)	27(37%)	
	Others	14(66.7%)	7(33.3%)	
Father's Education	Illiterate	14(46.7%)	16(53.3%)	0.301
	Literate	146(56.6%)	112(43.4%)	
Mother's Education	Illiterate	32(62.7%)	19(37.3%)	0.255
	Literate	128(54.0%)	109(46.0%)	
Father's Occupation	Unemployment	78(58.6%)	55(41.4%)	0.328
	Employment	82(52.9%)	73(47.1%)	
Mother's Occupation	Unemployment	126(57.3%)	94(42.7%)	0.291
	Employment	34(50%)	34(50%)	
		Sleep quality		
		Good	Poor	
Age	15-17	118(54.4%)	99(45.6%)	0.210
	18-19	36(50.7%)	35(49.3%)	
Sex	Male	75(52.8%)	67(47.2%)	0.826
	Female	79(54.1%)	67(45.9%)	
Family type	Nuclear family	103(55.7%)	82(44.5%)	0.520
	Joint family	40(48.2%)	43(51.8%)	
	Extended family	11(55%)	9(45%)	
Ethnicity	Brahmin	67(53.6%)	58(46.4%)	0.666
	Chhetri	40(58%)	29(42%)	
	Janajati	38(52.1%)	35(47.9%)	
	Others	9(42.9%)	12(57.1%)	
Father's Education	Illiterate	16(53.3%)	14(46.7%)	0.987
	Literate	138(53.5%)	120(46.5%)	
Mother's Education	Illiterate	25(49.0%)	26(51.0%)	0.482
	Literate	129(54.4%)	108(45.6%)	
Mother's Occupation	Unemployment	114(51.8%)	106(48.2%)	0.311
	Employment	40(58.8%)	28(41.2%)	
Father's Occupation	Unemployment	51(38.3%)	82(61.7%)	<0.01
	Employment	103(66.5%)	52(33.5%)	

Table 5. Bivariate analysis of electronic gadget uses and sleep quality among secondary level students, n=288

Electronic gadget addiction	Good sleep quality	Poor sleep quality	p-value X^2 Test
Yes	81 (50.6%)	79 (49.4%)	0.279
No	73 (57.0%)	55 (43.0%)	

Table 6. Bivariate analysis of electronic gadget uses sleep pattern and sleep quality among secondary level students, n=288

Variables	Categories	Sleep quality		p-value
		Good	Poor	X^2 Test
Time on electronic gadgets				
Screen time per day	≤5 hours	84 (56.4%)	65 (43.6%)	0.306
	>5 hours	70 (50.4%)	69 (49.6%)	
Time on gadgets before bed	≤3 hours	144 (53.9%)	123 (46.1%)	0.577
	>3 hours	10 (47.6%)	11 (52.4%)	
Sleep Pattern				
Time to bed at night	Before or at 10 PM	64 (61.0%)	41 (39.0%)	0.047
	After 10 PM	90 (49.2%)	93 (50.8%)	
Hours of actual sleep at night	Less than 7 hours	128 (52.9%)	114 (47.1%)	0.651
	7 hours or more	26 (56.5%)	20 (43.5%)	
Time to get up in morning	Before or at 6 AM	71 (59.7%)	48 (40.3%)	0.077
	After 6 AM	83 (49.1%)	86 (50.9%)	
Time taken to fall asleep	≤10 minutes	62 (59.6%)	42 (40.4%)	0.116
	>10 minutes	92 (50.0%)	92 (50.0%)	

Discussion

This study assessed the electronic gadget use and sleep quality among secondary level students found that 160(55.6%) out of 288 were electronic gadget addicts**,** and 134(46.5%) had poor sleep quality. Nearly half of them, 139(48.3%), used electronic gadgets for >5 hours daily. Although no significant linkage was found between electronic gadget addiction and sleep quality (p=0.279), a significant association was observed between average time going to bed at night and poor sleep quality (p=0.047). Additionally, father's occupation showed a strong association with sleep quality (p<0.01). The findings are consistent with a study conducted in Tansen, Palpa, Nepal, among medical students during the COVID-19 lockdown.[16] They reported that 99(48.77%) of respondents had impaired sleep quality, as measured by the Pittsburgh Sleep Quality Index (PSQI) global sleep score.

Both studies indicate a strong association between electronic gadget use and poor sleep quality, with nearly half of the respondents in both groups experiencing sleep disturbances. The similarity in findings suggests that the negative impact of excessive gadget use on sleep is a widespread issue, affecting students across different educational levels and locations.

Additionally, the Tansen study highlighted a significant relationship between most PSQI components and addiction status. While this study does not specify which sleep components were most affected, the comparable percentage of affected respondents implies that similar sleep disturbances, such as difficulty falling asleep, reduced sleep duration, and daytime dysfunction, may be prevalent in both populations.

Overall, these findings reinforce the growing concern regarding electronic gadget addiction and its detrimental effects on sleep quality, emphasising the need for awareness programs and interventions to promote healthier screen-time habits among students.

The findings of this study align with existing research on the relationship between electronic

gadget use and sleep quality. A cross-sectional study conducted in Kirtipur Municipality, Kathmandu, found a significant association between internet addiction and poor sleep quality (p=0.022).[17] This supports the idea that excessive gadget use negatively impacts sleep patterns, consistent with our study's findings.

Regarding bedtime habits, a study at the Academy of Family Medicine in Madinah Al-Monawara reported that 43% of participants, primarily young individuals, went to bed after 10 PM.[5] In comparison, the present study revealed a higher proportion, 183(63.5%), of participants who went to bed after 10 PM, indicating a greater prevalence of delayed sleep onset in this study population. Therefore, it may suggest differences in lifestyle, cultural habits, or academic pressures influencing sleep timing.

When comparing sleep quality, present study found that 134(46.5%) of participants experienced poor sleep quality, slightly higher than the 42.3% reported in a study among undergraduate students of medical and allied sciences, Nepal. Additionally, 8.9% of participants in the latter study screened positive for depression, highlighting a potential link between poor sleep quality and mental health concerns.[18]

A more significant impact of gadget use on sleep quality was observed in a study among nursing students in Indonesia, where 74.1% of respondents who frequently used gadgets reported poor sleep quality.[26] This percentage is significantly higher than present study, suggesting that the extent of gadget use, study-related stress, or differences in sample characteristics may contribute to variations in sleep disturbances.

A cross-sectional study conducted at KLE Society's Raja Lakhamagouda Science Institute, Belagavi, Karnataka, India, revealed that 99(66%) of participants had high smartphone addiction. Additionally, 80(53.33%) of participants reported high levels of sleep disturbances, while 70(46.67%) experienced low disturbances.[7]

These findings suggest a significant proportion of the population experiences sleep disturbances due to excessive gadget use.

Interestingly, the present study found no significant association between electronic gadget use and sleep quality (p=0.279). This contrasts with several previous studies. This may be because relatively small sample size in present study, and relied on self-reported data, which may result in social desirability of over-reporting for positive behaviours. More than 50% of the participants who took >10 minutes to fall asleep had poor sleep quality. This suggests that sleep onset latency plays a crucial role in determining overall sleep quality and may be influenced by lifestyle habits, stress levels, or screen exposure before bedtime.

Additionally, the study found a strong association between the respondent's father's occupation and sleep quality (p<0.01). This could indicate that socioeconomic factors, household environment, and parental work schedules that influence household routines may lead to disruptions in children's sleep patterns.

Raising awareness about how excessive use of electronic devices affects sleep quality is important. Parents and schools should play a key role in efforts to reduce gadget addiction and improve sleep time and quality.

Limitations of this study include a specific population, only grade 12 students from 7 schools in Banepa municipality, and a relatively small sample size, which may limit the generalizability to other regions and populations. This study relied on participants' self-reported behaviour, and there may be a difference between what they report and their actual habits. Some might not fully recognise or admit their level of gadget addiction, leading to underestimation in the findings. Since this is a cross-sectional study, it does not establish cause-and-effect but highlights a link between electronic gadget use and poor sleep quality.

Conclusion

In the study, nearly half of the secondary level students were addicted to electronic gadgets, and had slept less than 7 hours, with poor quality of sleep. A significant association between the average time gone to bed at night and father's occupation with sleep quality highlights the impact of behavioural and socioeconomic factors, suggesting that sleep quality is

influenced more by social and lifestyle factors than by gadget use alone.

Author contribution

Concept design: BRW; Literature search: BRW, Data collection: BRW; Data analysis: BRW, PPP and SP; Draft manuscript: BRW, PPP and SP; Final manuscript and accountability: BRW and PP

Acknowledgment

We extend our appreciation to all the study participants, teachers and the school authorities for their valuable time and support in this study.

Conflict of interest

None

Funding

None

Supplementary material

The data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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