



Assessment of The Impact of Use of Electronic Gadgets On Sleep Pattern and Daytime Sleepiness Among Nonobese Students in A Selected College At Puducherry, India - A Cross-Sectional Observational Trial.

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Abstract: Humans suffer from various sleep disorders because of using electronic gadgets, especially adolescent college students. Frequent and additional prolonged use of electronic gadgets before bedtime may lead to daytime sleepiness and other sleep disorders such as insomnia, hypersomnia, sleep apnea, etc.,. The study aimed to assess the impact of electronic gadgets on sleep patterns and daytime sleepiness among adolescents with a normal BMI in a selected college in Puducherry. A quantitative research approach and a descriptive cross-sectional research design were adopted for the study. Adolescents in the age group of 16-19 years of each gender were the target population. A total of 298 adolescents participated in the study. The tool consisted of socio-demographic variables, a sleep habits questionnaire to assess the sleeping pattern, and a modified Cleveland adolescent sleepiness questionnaire to evaluate the adolescent experience of daytime sleepiness on a 5-point Likert scale. The results indicate that smartphones and television were the most commonly used electronic gadgets among adolescents. Most adolescents went to bed after 10 pm and woke up after 6 am. The majority of the adolescents felt somewhat sleepy during the daytime. An association existed between the use of smartphones and laptops with daytime sleepiness at $p < 0.05$: Electronic gadgets have become a part of adolescents' life, and it has an impact on the adolescents' sleep habits which needs to be addressed earlier.

Keywords: Electronic Gadgets, Sleep Disorders, Adolescents, Daytime Sleepiness, Sleep Pattern.

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I. INTRODUCTION

Sleep is the naturally recurring state of mind and body characterized by altered consciousness relatively inhibited by sensory activities and reduced interactions with the surroundings. Humans suffer from various sleep disorders using electronic gadgets, especially adolescents, namely college students.¹ Worldwide smartphone users exceeded one billion in 2012, and the global electronic market has shown that 4.55 billion people were using mobile phones by the end of 2014; finally, mobile phone penetration increased from 61.1% to 69.4% between 2013 to 2017. This statistic has risen to around 77 % in 2022. On the one hand, electronic devices and games promote cognitive learning by assisting students in developing innovative thinking, investigation skills, strategic thinking, creativity, and analytical skills; on the other hand, increased exposure to electronic gadgets can be addictive. It can result in sedentary behavior, poor health, poor time management, and poor eating habits.^{1,2} Teens' use of mobile phones is likely to exacerbate the biological factors of sleeplessness. Changes in inherent circadian rhythms occur with the beginning of puberty, culminating in a delay in the daily timing of sleep onset. Because school start times are not correspondingly later, there is less time left for sleep, which is believed to contribute to teenagers' endemic sleepiness. The usage of mobile phones may exacerbate this sleepiness by prolonging waking hours into the night. A survey by the Kaiser Family Foundation found that children spend more than seven hours per day on an electronic device on average.³ Poor sleep is a common and debilitating problem of adolescents, affecting around 25–40% of teenagers at some point in their development.⁴ Researchers have consistently demonstrated that most adolescents do not get enough sleep, with most sleeping between 7.5 and 8.5 hours per night.⁵ Using electronic devices frequently and for an extended period before bedtime may result in daytime sleepiness and other sleep disorders such as dyssomnias, insomnia, hypersomnia, sleep apnea, and so on. Daytime sleepiness in college students can interfere with studies by impairing attention and developing lethargy.⁶ According to one study, 80% of adolescent males and over 90% of adolescent females used their cell phones the hour before bed, and 85% of both male and female adolescents used their computers the hour before bed. That affected adolescent sleep.⁷ There is widespread concern that people are not getting enough physical activity, are doing too much sedentary activity, and are spending too much time in front of screens (e.g., watching the television and using their smartphones). It is troublesome because of the negative health consequences linked with low levels of physical activity and high levels of sedentary activity, such as being overweight, depression, and bad psychosocial behaviors. In another study, internet addiction was strongly associated with excessive daytime sleepiness in adolescents. Cell phone use was associated with insomnia in all adolescent groups and with short nocturnal sleep duration in all adolescent groups.⁸ Preadolescents and adolescents spent more time gaming and watching television, and the number of devices in the bedroom harmed sleep quality.⁹ We are not restricted to only the usage of mobile phones but all electronic gadgets. It is a grave problem, and there is a lack of studies in Puducherry regarding electronic

gadgets. Hence a study was undertaken to assess the impact of these electronic gadgets on the sleep pattern and the daytime sleepiness they experienced during daytime among college students.

1.1 Statement of The Problem

Assessment of the impact of electronic gadgets on sleep pattern and daytime sleepiness among students in a selected College at Puducherry, Tamilnadu.

1.2 Aim

To determine the impact of electronic gadgets on sleep pattern, daytime sleepiness, and their association with selected demographic variables.

2. MATERIAL AND METHODS

2.2 Study primer

The study was conducted in a selected college in Puducherry, India, after permission from college authorities and students, including parents, needed samples.

2.3 Ethical concerns

Institutional Ethical clearance was obtained for the study. (KGNC/IHEC/2017/0023). The study was conducted in accordance with the declaration of Helsinki. The study involved data collection without intervention and came under very minimal risk under ICMR risk guidelines 2017. Therefore, a Quantitative and qualitative research approach and a descriptive cross-sectional research design were adopted for the study.

2.4 Samples – inclusion and exclusion criteria:

Adolescents in the age group of 16-19 years of both gender were the target population. A total of 298 adolescents participated in the study. The students who were willing and not having any systemic illness were included. Any student with neurological deficit, mental illness, obesity, and obstructive sleep apnea syndrome with night snoring or intake of sedative drugs was excluded.

2.5 Data-collection:

The tool consisted of three sections that included

1. The type of electronic gadget:
2. Socio-demographic variables such as age, gender, year of study, education of the parents, occupation of the parents, hobbies, relaxation techniques, available electronic gadgets at home, use of gadgets before bedtime, etc.,
3. A sleep habits questionnaire, a self-report tool comprising eight questions on sleep, where the respondents were asked to mention their sleep pattern for a week, and the Modified Cleveland adolescent sleepiness questionnaire, a self-report questionnaire that consisted of 15 items

designed to evaluate the adolescent experience of sleepiness. They were asked to rate the level of sleepiness on a 5-point Likert scale ranging from never, rarely, sometimes, often & almost every day.¹⁰

2.6 Score Interpretation

- 50-75 = Feeling more sleepy
- 26-49 = Feeling somewhat sleepy
- <25 = Feeling alert

3. STATISTICS

In an estimated student population of 7 % of a population of a small city, the sample of 256 needed an alpha error of 0.05 and a beta error of 80 % to get statistical significance. We recruited 298 to overcome noncompliance and in between dropouts. To investigate the relationship between electronic screen device usage and falling asleep quality, the mean hours of use were divided into various strata if needed. ANOVA was used to compare the differences in scores among the groups. Both linear and curve estimation models were used to demonstrate the nature of the relationship between using electronic devices and sleep quality. The data was collected in an excel sheet and transferred to SPSS software 20 version (USA) for analyses using mean descriptive analyses and chi-square tests for ranking data.

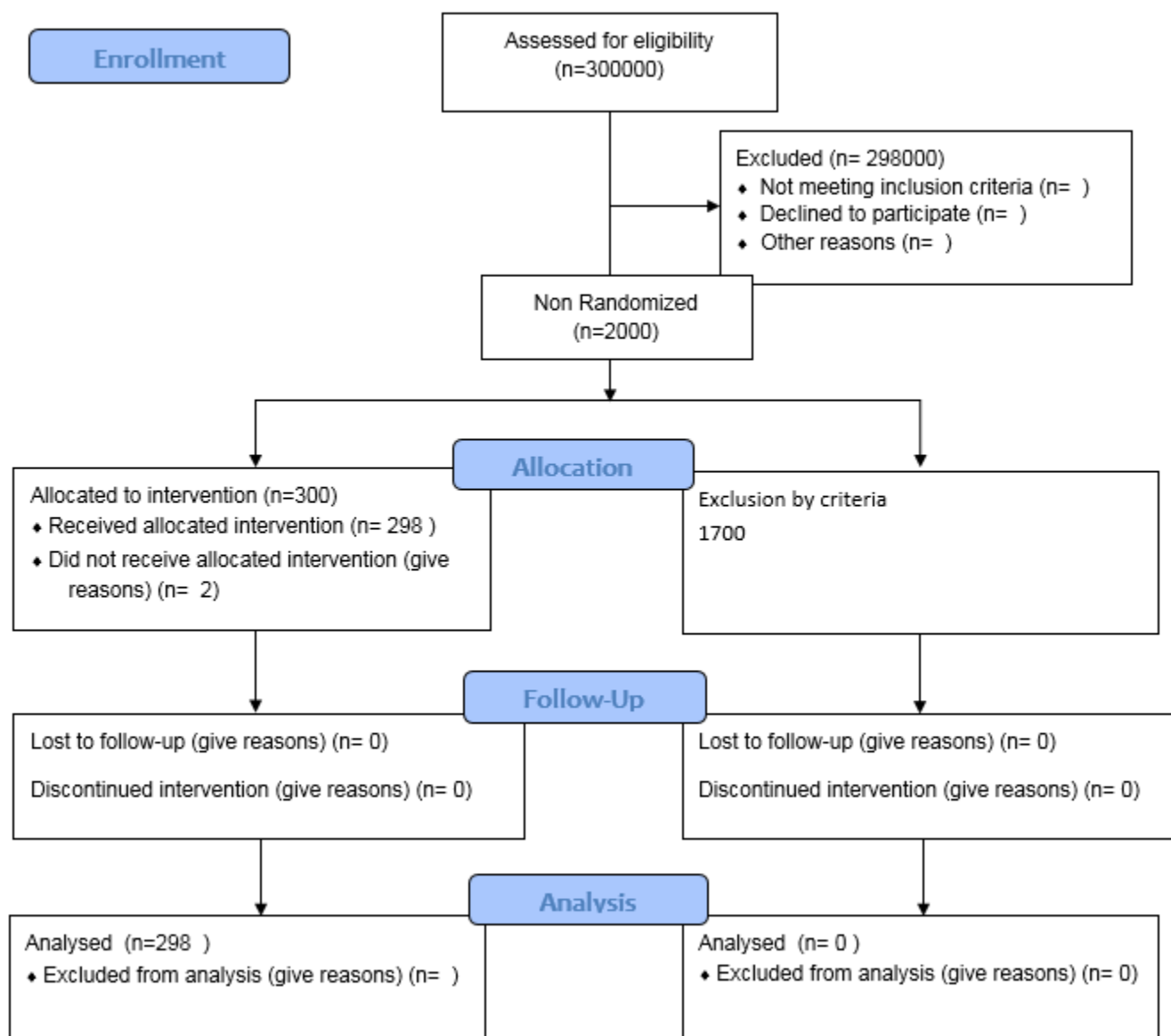


Fig I: CONSORT 2010 Flow Diagram

4. RESULTS

Out of 298 adolescents, 39(13.10%) were in the age group of 16 years, 46(15.40%) were in the age group of 17 years, 35(11.70%) were in the age group of 18 years, and 178(59.70%) were in the age group of 19 years. 72(24.2%) were boys and 226(75.8%) were girls. The results revealed

that majority of the students 275(92%) of the students had television at home, 197(66%) possessed smart phones, 82(27.5%) had laptops 45(15.1%) possessed computers, 21(7%) were having tablets, 17(5.7%) were having iPods, 32(10.7%) possessed radios and 16(5.4%) were having video game consoles.

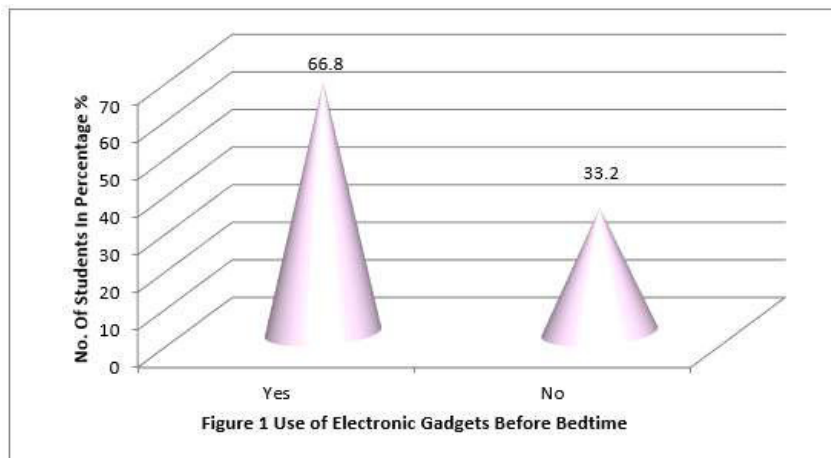
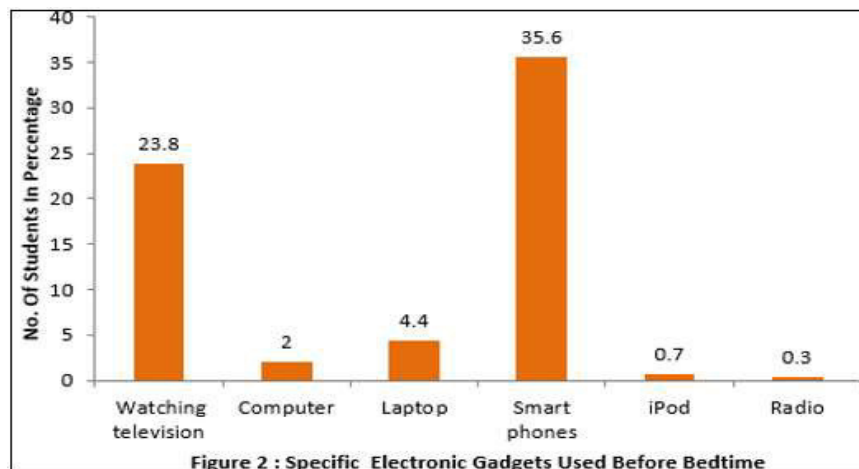


Fig 1 & 2 indicates that 66.8% of adolescents used electronic gadgets before bedtime, and the most commonly used gadget was their smartphones (35.6%).



Regarding the sleep pattern, most adolescents go to bed after 10 pm and woke up after 6 am. (Figures 3 & 4) and 67.8% of the adolescents had a sleep duration of 6-8 hours.

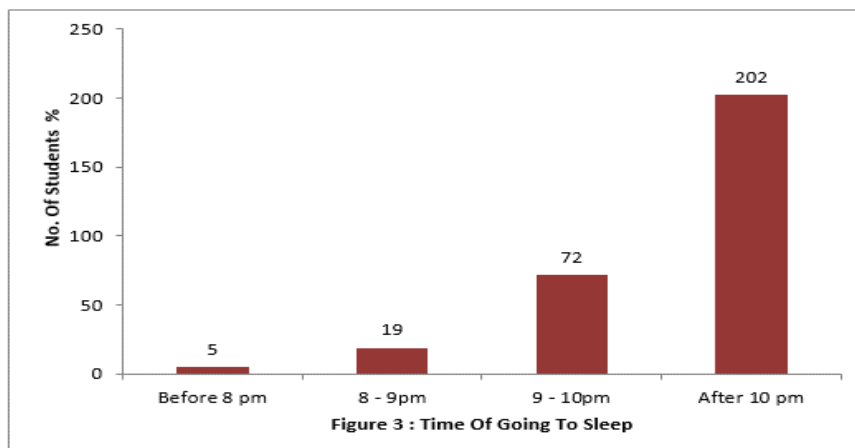
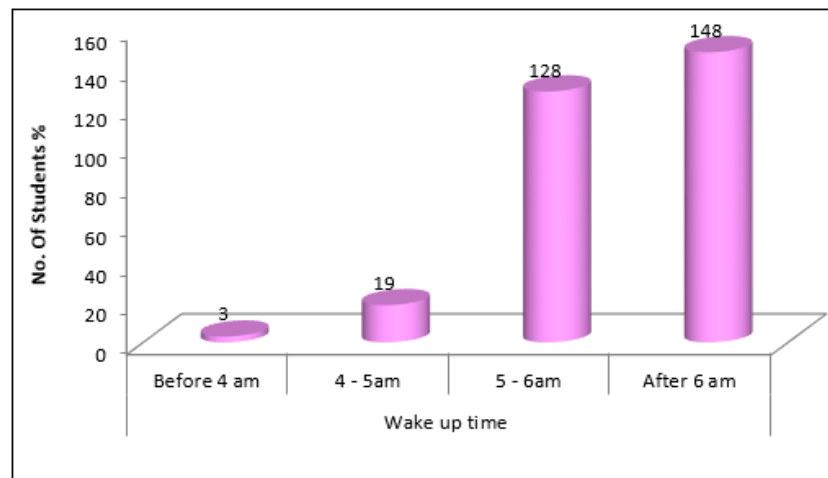


Fig 4 shows the wake-up time.



Most of the students, 272(91.3%) felt somewhat sleepy during the daytime, while 8(25%) felt more sleepy (Table I).

Sl.No.	Level of sleepiness	Frequency (n)	Percentage %
1	More sleepy (50-75)	25	8.4
2	Somewhat sleepy (26 -49)	272	91.3
3	Alert (< 25)	1	0.3

Variable		50-75	26-49	<25	Total	Chi-square	p-value
Use of electronic gadgets	Watching television	19	183	1	203	1.271	0.53
	Computer	4	41	0	45	0.194	0.908
	Laptop	13	69	0	82	8.523	0.014*
	Tablet	2	19	0	21	0.112	0.946
	Smartphones	21	176	0	197	5.761	0.05*
	iPod	2	15	0	17	0.324	0.851
	Radio	6	26	0	32	5.102	0.078

A significant association was observed between the use of laptops and smartphones with daytime sleepiness at $p < 0.05$, which indicates that these devices alter the circadian rhythm and compromise alertness during daytime. (Table 2). $P < 0.05$ Also, a significant association was seen between the mother's occupation and smartphones and tablets at $p < 0.05$.

5. DISCUSSION

5.1 Common gadget

The current study findings indicate that adolescents' most commonly used electronic gadgets were smartphones and television. The findings are consistent with a similar study where the most commonly used electronic device was 90% cell phones, and 50% reported watching TV.^[7] This indicates that adolescents today are more lured to electronic devices and cannot resist using them.

5.2 Sleep time

This study finding reveals that 202(67.8%) went to bed; only after 10 pm, as they used electronic gadgets before bedtime, and 148(49.7%) woke up only after 6 am. The findings are consistent with a similar study which revealed that high media

use in adolescents is related to late bedtime⁷. The current study findings also report that 25(8.4%) students felt sleepier during the daytime, and the majority, 272(91.3%), felt sleepy. A significant association also existed between daytime sleepiness and smartphones and laptops. The study findings are coherent with another study which illustrated that the use of mobile phones was associated with insomnia in all groups of adolescents and with short nocturnal sleep duration in all groups of adolescents.^[1] Thus it is evident that smartphones are widely used among adolescents, affecting sleep quality.

5.3 Variables and sleep

The study findings reveal a significant association between the mother's occupation and the use of smartphones and tablets at $p < 0.05$. The results are supported by a similar study, where students whose mothers were self-employed or had a

government job spent much more time on these phones/games¹².

5.4 Health impact

The current study's objectively assessed smartphone use patterns may shed some light on the health impact of smartphone-based screen time accumulation. Overall, the findings show that a high incidence of our sample spent more than two hours per day using their smartphone. Screen time, particularly smartphone use, is a popular pastime among today's youth and has harmed their health. In addition, high screen time use is associated with an increased risk of being overweight.

5.5 Limitations

The limitation of the present study is that the sleep measurements were solely based on self-reports, where the results have a greater susceptibility to influence from the common method bias.¹³ But however recent studies have shown that self-report sleep assessments can be recommended for the characterization of sleep parameters in clinical and population-based research.¹⁴ Also, the accuracy of self-reported sleep questionnaires by adolescents is generally

better than in older adults¹⁵, and a study of young adolescents in Hong Kong recently found good agreement between actigraphy-measured and questionnaire-reported sleep durations¹⁶. As this is a cross-sectional study design, the study restricts causal attributions, and prospective studies are still needed to disentangle the temporal relationship.

6. CONCLUSION

We concluded that smartphones and television were the most commonly used electronic gadgets among adolescents. Most adolescents went to bed after 10 pm and woke up after 6 am. The majority of the adolescents felt somewhat sleepy during the daytime. An association existed between the use of smartphones and laptops with daytime sleepiness at $p < 0.05$: The study findings depict that the use of electronic gadgets have become a part of adolescents' life and has an impact on the sleep habits of adolescents, which needs to be rectified. Some awareness programs need to be initiated to minimize sleep disturbances among adolescents.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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