ORIGINAL RESEARCH ARTICLE

Impact of Screen Time and Sleep Duration on Adults' Body Mass Index in A University in Chengalpattu District – A Cross-Sectional Study

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ABSTRACT

Background: The rapid technological advancements of the 21st century have led to significant changes in lifestyle behaviors, particularly among young adults in university settings. One of the most prominent shifts has been the increase in screen time due to widespread access to digital devices. Sleep is mainly being compromised by screen time which can be either for work or for leisure activities. Excessive screen time and short sleep duration has raised concerns regarding its potential negative impact on physical health, particularly on Body Mass Index (BMI). The aim was to estimate the prevalence of under-weight, normal weight, over-weight and obese and to assess the effect of sleep duration and screen time on body mass index of the adults in a university in Chengalpattu district.

Methodology: A descriptive cross-sectional study was conducted among staffs, students and workers from a Private university, Chengalpattu district, Tamil Nadu. Simple random sampling method was used and a sample size of 672 was calculated.

Results: Of 672 respondents, majority were males 364 (54.2%) and 308 (45.8%) were females. Almost more than half were in the age group of 31 - 60 years (392, 58.3%). It was found that almost two-third (470, 69.9%) of the participants had screen time for <4 hours / day. A statistically significant association was found between age of the participants, their screen time and sleep time.

Conclusions: The findings suggest that excessive screen time and insufficient sleep are significantly associated with higher BMI, highlighting the importance of addressing these modifiable behaviors to combat the growing prevalence of obesity among university students.

Key-words: Obesity, Sleep duration, Screen time, Body Mass Index

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INTRODUCTION

The rapid technological advancements of the 21st century have led to significant changes in lifestyle behaviors, particularly among young adults in university settings. One of the most prominent shifts has been the increase in screen time due to widespread access to digital devices such as smart phones, tablets, and computers.[1] While these technologies offer numerous educational and social benefits, excessive screen time has raised concerns regarding its potential negative impact on physical health, particularly on Body Mass Index (BMI).[2]

According to Center for Disease Control and Prevention (CDC) guidelines, adults are recommended to sleep minimum 7 hrs a day.[3] Sleep is intricately connected to various hormonal and metabolic processes in the body and is important in maintaining homeostasis. India is the second most sleep deprived country ranking behind Japan.[4] Sleep is mainly being compromised by screen time which can be either for work or for leisure activities like television, smart phones and laptops. Obesity, itself is a co-morbid condition, which may result into many chronic conditions like hypertension, diabetes mellitus and poly cystic ovarian syndrome. It is need of the hour to know the association between them in our country for better management.[5]

Medical and psychological sequel of obesity contribute to a major share of health-care expenditures and generate additional economic costs through loss of worker productivity, increased disability, and premature loss of life. Sedentary lifestyle mainly due to increase in screen time is one of main reason for obesity. Screen time among adults either for work or for leisure is comparatively more than children. Sleep plays a crucial role in having a physically active day.[6] As age increases the quality of sleep is affected either due to stress or due to untimely recreation activity. Even after many awareness and health education, adults with obesity and sleep deprivation are increasing. Disrupted circadian rhythm and sedentary lifestyle as a result of increase in screen time is a major contributor for weight gain.[7]

Studies are done in children and adolescent population, even though adult population is the most affected. So, a study on adults' present situation is need of the hour. This study aims to contribute to the growing body of literature on lifestyle factors affecting BMI by providing empirical evidence from a specific geographic and demographic context.

Based on the above background, the study was done with the objectives to estimate the prevalence of under-weight, normal weight, over-weight and obese among adults in a university in Chengalpattu district and to assess the effect of sleep duration and screen time on body mass index of the adults in a university in Chengalpattu district.

METHODOLOGY

Study type and study area: A descriptive cross-sectional study was conducted in a Private university, Chengalpattu district, Tamil Nadu.

Study population: The study participants include, staffs, students and workers. Participants who are not willing to give consent were excluded from the study.

Study duration: 3 months (May 2024 – Jul 2024)

Sample size and sampling method: University in which the study was carried out had 6 colleges, among which 2 colleges were chosen by simple random sampling method. From these 2 colleges, list of staff, students and workers was collected and from this list, by simple random sampling method, the participants were chosen.

A pilot study was conducted in the study area and prevalence of obesity was found to be 42%. Using these values as reference, the sample size of this study was calculated using the formula $n = Z^2 P q / d^2$ where, n is sample size, Z is 1.96 for 95% Confidence Interval, P is Prevalence, q is 100-P and d = Precision.

The "p" value was taken as "42" and the "q" value as "58", taking "d" as "4". On substitution of these values, the sample size has been calculated as 584. With a non – response rate of 15%, the final sample size was 672.

Study Tool: Data was collected using a pre-tested semi-structured questionnaire which included questions regarding sleep time and screen time usage per day, Anthropometric measurements (height and weight) were taken using calibrated equipment and their Body Mass Index (BMI) was calculated.

Screen time Questionnaire (STQ)[8,9]: Screen time refers to the amount of time spent watching television, including videos; playing computer games on video consoles or on computers; and using computers for other purposes. As per the recommendation of AAP, the recommended screen-time is not more than two hours per day. The Screen Time Questionnaire (STQ) is designed to measure the quantity of screen time or use of screened devices which include cellular phone, computer, MP3 player, smart phone, tablet, television, and video game console. The overall reliability for the items in STQ employed in this study is 0.82. The STQ has content validity and construct validity. The STQ asked participants to report their daily screen time for weekdays and weekends separately. The data were categorized into three groups: a) Low screen time: <2 hours/day, b) Moderate screen time: 2–4 hours/day, and c) High screen time: >4 hours/day.

Pittsburgh Sleep Quality Index (PSQI)[10,11]: It is used to assess sleep in the following seven components: 1. subjective sleep quality, 2. sleep latency, 3. sleep duration, 4. sleep efficiency, 5. sleep disturbance, 6. use of sleep medications, and 7. daytime dysfunction.

Each component score has a value of "0" (no difficulty) to "3" (severe difficulty), and a global score was calculated by adding all seven component scores. Subjects with a global PSQI score <5 were considered "good" sleepers, whereas those with a PSQI score ≥5 were considered poor sleepers. PSQI is a widely used and validated questionnaire that assesses sleep quality and patterns. For this study, only the component related to sleep duration was used, asking participants to report their usual sleep duration over the past month. Sleep duration was categorized as: a) Short sleep: <6 hours / night, b) Adequate sleep: 6–8 hours / night, and c) Long sleep: >8 hours / night

Body Mass Index (BMI)[12]: BMI was calculated using self-reported height and weight, which were collected as part of the demographic section. The BMI was computed using the standard formula: BMI=Weight in kilograms / Height in meters square. Participants were classified according to the World Health Organization (WHO) BMI categories: a) Underweight: BMI < 18.5 kg/m^2, b) Normal weight: BMI 18.5–24.9 kg/m^2, c) Overweight: BMI 25–29.9 kg/m^2, and d) Obese: BMI ≥ 30 kg/m^2

Data entry and analysis: Data entry was made in Microsoft Excel. The data entered was cleaned and validated for consistency. Analysis was done using SPSS 26.0 software. Categorical variables were expressed in frequencies and percentage. Association was tested for significance using Chi square test. p – Value < 0.05 was considered statistically significant.

Ethical approval and informed consent: Purpose of the study was explained to the participants. Written and informed consent was obtained from them. They were given an option for quitting from the study if desired by them at any point of time. No element of compulsion was exerted on them. Confidentiality of data collected was assured. The study was approved by the Institutional ethical committee and consent was obtained from participants before the study.

RESULTS

Of 672 respondents, majority were males 364 (54.2%) and 308 (45.8%) were females. Almost more than half were in the age group of 31 - 60 years (392, 58.3%). About 40% (269) were belong to 17 to 30 years of age. Only 1.7% (11) of the participants belong to 61 - 74 years. About 50% (336) of the study participants were in the range of normal BMI (18.5 kg/m2 to 24.9 kg/m2). It was observed that 28% (188) were overweight and almost equal distribution of participants in the categories of underweight and obese (10.3% and 11.7% respectively). (Table 1)

Figure 1 explains about the screen time, i.e. the time spent by the participants on watching TV, mobile phone or computer per day. It was found that almost two-third (470, 69.9%) of the participants had screen time for <4 hours / day. High screen time usage of >4 hours/day was observed in 30% (202) of the study population.

Table 1: Frequency distribution of variables:

Variable	Respondents (%)
Gender	
Male	364 (54.2)
Female	308 (45.8)
Age	
17 - 30 years	269 (40)
31 - 60 years	392 (58.3)
61 - 74 years	11 (1.7)
Body Mass Index (BMI) kg/m^2	
<18.5	74 (10.3)
18.5 - 24.9	336 (50)
25.0 - 29.9	188 (28)
>30.0	74 (11.7)

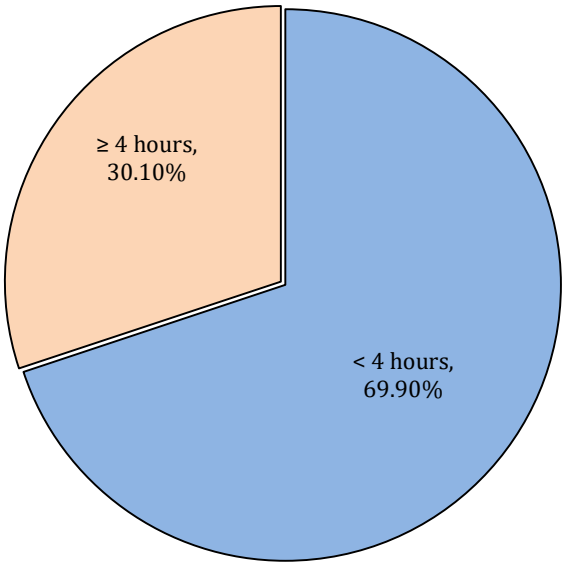

Figure 1: Screen time distribution of the participants:

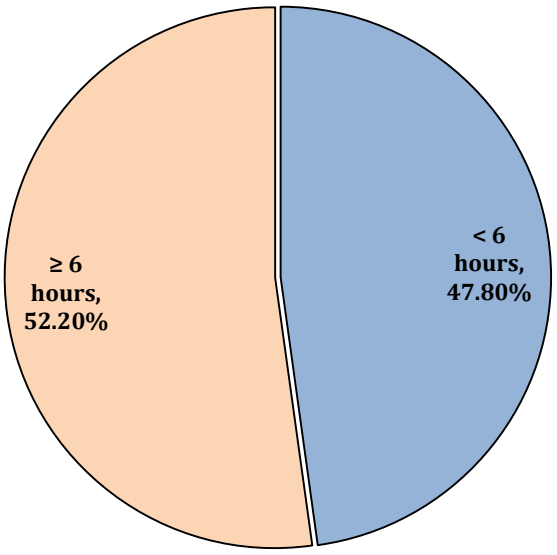

Figure 2: Sleep time distribution of the participants:

Table 2: Association between BMI and other variables

Variable	BMI		Chi square	p value
	<25.0 kg/m2 (n = 410)	>25kg/m2 (n = 262)		
Gender				
Male	190 (61.7)	118 (38.3)	0.109	0.74
Female	220 (60.4)	144 (39.6)		
Age				
<30 years	223 (82.9)	46 (17.1)	90.338	<0.001*
≥30 years	182 (46.4)	216 (53.6)		
Sleep time				
< 6 hours	179 (55.8)	142 (44.2)	7.117	0.005*
> 6 hours	231 (65.8)	120 (34.2)		
Screen time				
<4 hours	270 (57.4)	200 (42.6)	8.254	0.002*
>4 hours	140 (69.3)	62 (30.7)		

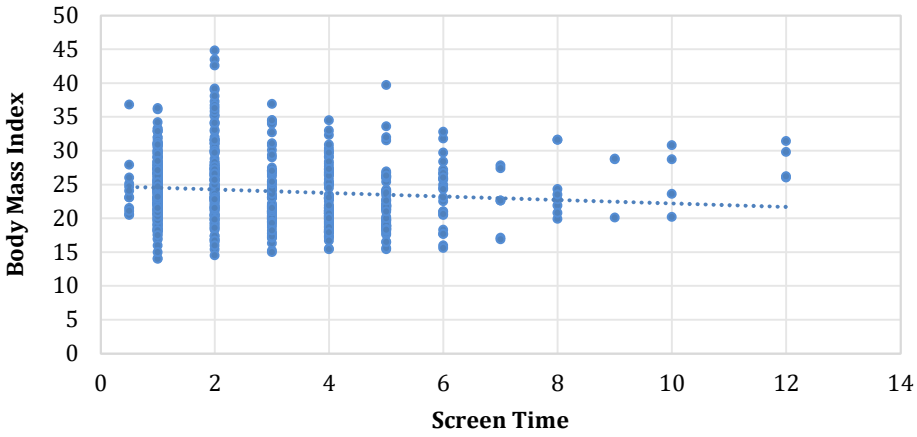

Figure 3: Relationship between screen time and BMI

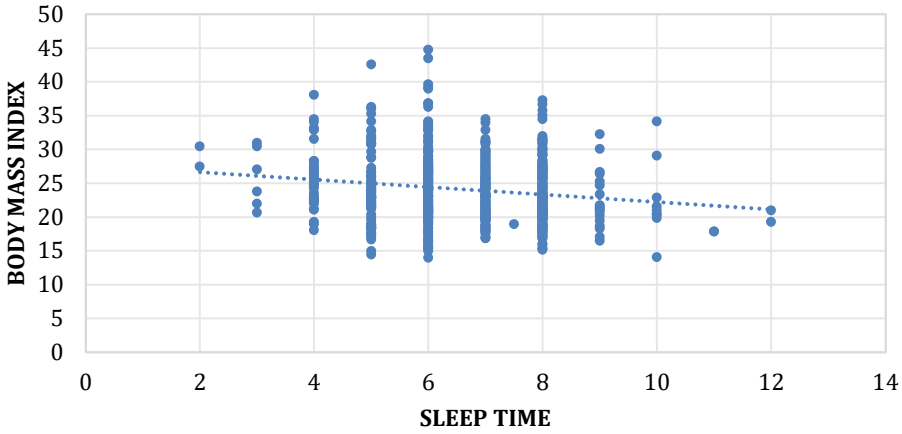

Figure 4: Relationship between sleep time and BMI

Figure 2 describes about sleep time of the participants. Using sleep duration component in PSQI scale, it was found that most of them had sleep of >7 hours and about 48% (321) had sleep of less than 6 hours per day.

Table 2 explains about the association between BMI of the participant and other variables related to it. A statistically significant association was found between age of the participants, their screen time and sleep time. It was observed that increased age, prolonged screen time and short sleep duration increase the BMI of the participants.

Figure 3, the scatter plot diagram illustrates about the relationship between screen time and body mass index of the participants. The BMI values range from approximately 15 to 45, with the majority clustering in the range of 20 to 30. This suggests that most individuals fall within the normal to overweight BMI categories. BMI values are widely distributed across all levels of screen time, indicating variability in BMI re-

gardless of screen time duration. Though there is a statistically significant association between screen time and BMI, there is no strong positive or negative linear relationship between both variables as the trend is almost horizontal. This suggests that changes in screen time may not directly correspond to significant changes in BMI.

Figure 4 explains about relationship between sleep time and BMI. It was observed that most participants had sleep time of range 4 to 8 hours duration. Though a statistically significant association was observed between these 2 variables, no strong linear relationship observed between them in the scattered plot given. This indicates that BMI does not increase or decrease along with increase or decrease in sleep time respectively.

Discussion

This study observed almost an equal distribution between males (54.2%) and females (45.8%) among the participants. This result was similar to findings from a study conducted by Bhattacharya K et al[13], where the gender ratio was also balanced, which indicates that BMI - related factors such as screen time and sleep duration are relevant across both genders. However, study done by Verma Met al[14] reported higher proportion of male participation potentially due to differing health - seeking behaviors between gender.

The majority of the study participants were in the 31-60 years age group (58.3%), followed by the 17-30 years group (40%). This distribution is comparable to a study conducted by Sung M et al[15], where middle-aged adults formed the majority of the study population. The higher prevalence of this age group in both studies may be due to the fact that adults in this age range are more likely to experience lifestyle related health issues, such as obesity, due to factors such as balancing work, family, and other responsibilities. In contrast, a study done by Rao VS et al[16] noted a younger study population, focusing on students and early - career professionals, highlighting the variability in age distribution depending on the target population of the study.

This study reported half of the participants were in the normal BMI range (18.5–24.9 kg/m^2). This finding aligns with the results of a study conducted by Ramesh A et al[17], which also found that a significant portion of their study population maintained a normal BMI. However, the prevalence of normal BMI in this study is slightly higher than in Patel SK et al[18] where only about 45% of participants were within the normal BMI range. This difference might be due to regional differences in diet, physical activity, and socioeconomic factors.

The present study found that nearly 70% of participants reported screen time of less than 4 hours per day, while 30% had screen time exceeding 4 hours daily. Similar findings have been observed in a study done by Singh S et al[19], where a significant portion of college students reported high screen time, particularly for non-academic activities like social media and gaming. The majority of participants in this study reported that they sleep more than 7 hours per night. This finding is consistent with the findings of a study conducted by study by Patel SK et al[18] which found that nearly 50% of university students reported insufficient sleep (less than 6 hours per night).

A statistically significant association was found between BMI and age of the participants in this study. Similar findings were observed in studies conducted by Kaur H et al[20] and Singh A et al[21] in which BMI significantly increased with age, particularly after 30 years. It may be due to the fact that younger individuals generally maintain a higher metabolic rate and engage in more physical activities, which helps keep their BMI lower. In contrast, the aging population showed a decline in physical activity, increased sedentary behavior, and a higher prevalence of obesity.

This study showed a statistically significant association between BMI of the study participant and screen time used by them. Similar results were observed in a study conducted by Kaur H et al[20] which assessed the relationship between screen time and BMI among college students and noted that students with higher screen time, particularly those engaged in non-academic screen activities like social media and gaming, exhibited higher BMI levels. Another study done by Madan J et al[22] also reported that prolonged screen time was associated with higher BMI among young adults. These results highlighted the role of digital media consumption displacing time spent on physical activities and disrupting sleep patterns, where excessive screen use contributes to sedentary behavior and reduced physical activity, thereby increasing the risk of obesity.

In this study, a statistically significant relationship was observed between sleep duration and BMI. A study conducted by Patel SK et al[18] in Mumbai found that short sleep duration was significantly associated with increased BMI among university students. Similarly, a study by Reshi A et al[23] revealed that students who slept less than seven hours per night were more likely to have higher BMI compared to those with longer sleep duration. This coincides with the observation of this study that insufficient sleep is a significant risk factor for higher BMI, possibly due to its impact on metabolism and energy imbalance. The study suggested that insufficient sleep might lead to hormonal imbalances, which can increase appetite and food intake, contributing to weight gain.

Strength and Limitations

The study focuses on a specific population providing insights into the unique lifestyle factors affecting this group. This targeted approach allows for more relevant and actionable recommendations for the uni-

versity setting. The findings have significant implications for public health, particularly in designing interventions for young adults on the aspects of abnormal screen time and sleep time.

The cross-sectional study design limits the ability to establish causality between screen time, sleep duration, and BMI. Risk of recall bias due to inaccurate reporting or recall issues as the study likely relies on self-reported measures of screen time and sleep duration. The generalizability of the findings to other populations may be limited as the study is confined to a specific university population. The study may not fully account for other factors that influence BMI, such as diet, physical activity, and stress levels. These variables could confound the observed relationships between screen time, sleep duration, and BMI. Controlling for these factors in future studies could provide a more comprehensive understanding of the associations.

Conclusion

This cross-sectional study on the impact of screen time and sleep duration on Body Mass Index (BMI) among adults in a university in Chengalpattu District has provided valuable insights into the lifestyle factors that influence health outcomes in this specific population. The findings suggest that excessive screen time and insufficient sleep are significantly associated with higher BMI, highlighting the importance of addressing these modifiable behaviors to combat the growing prevalence of obesity among university students.

The study underscores the need for targeted interventions that promote balanced screen time and adequate sleep duration. By fostering healthier habits, universities can play a crucial role in enhancing the well-being of their students, potentially reducing the risk of obesity-related health complications. Furthermore, the results of this study contribute to the broader understanding of how modern lifestyle choices affect physical health, offering a foundation for future research and public health strategies.

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