Original Article

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Community Section

Impact of Gaming Addiction on Sleep Quality among Medical Students: A Cross-sectional Study from Chengalpattu District, Tamil Nadu, India

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ABSTRACT

Introduction: Games are one of the most common forms of recreation, whether played in solitude or with others. Obsessive video game playing can affect a person's everyday activities, alter their behaviour, and have numerous negative repercussions on their physical and mental health. Addiction to video games has become a public health concern, particularly among youth and college students. It impacts daily functioning, disrupts sleep, and poses physical and psychological risks. According to the National Sleep Foundation, students should get between seven and nine hours of sleep each night; yet, college students often struggle to meet their basic needs, including adequate sleep.

Aim: To estimate the prevalence of gaming addiction and its association with sleep quality among medical college students in Chengalpattu, Tamil Nadu, India.

Materials and Methods: The present cross-sectional study was conducted among 484 medical students in the Chengalpattu district from May to July 2024. A two-stage random sampling method was used for sample selection. A semi-structured questionnaire consisting of sociodemographic details, the Gaming Addiction Scale (GAS), and the Pittsburgh Sleep Quality Index (PSQI) to assess gaming addiction and sleep quality, respectively, were employed to collect data. Data were analysed using SPSS version 26.

Results: The mean age of participants was 21.65±3.17 years. The majority of them came from nuclear families 352 (72.7%), and 268 (55.4%) were hostellers. The mean score for sleep quality was 6.08±2.69. Approximately 49.6% of students reported poor sleep quality. Chi-square tests indicated a statistically significant association (p=0.001) between gaming addiction and sleep quality, with 140 (87.5%) of addicted gamers showing poor sleep. A significant association was also found between age, residence, and addiction status with sleep quality (p<0.05). A regression model showed that addiction, age, and type of family were strong predictors of poor sleep, indicating that older individuals and males had poorer sleep quality.

Conclusion: Gaming addiction was observed in 33.1% of participants, while 49.6% reported poor sleep quality. Among those with gaming addiction, 87.5% experienced poor sleep. The likelihood of poor sleep quality was found to be three times higher in addicted gamers compared to non-addicted individuals.

Keywords: Doctors, Lemmens gaming scale, Pittsburgh sleep quality index, Video games

INTRODUCTION

Playing games represents one of the most prevalent forms of recreational activity, undertaken either individually or in group settings [1]. Various media provide different genres of games, with one of the most common being video games, which are presented via a video playback monitor [2]. In the eleventh revision of the International Classification of Diseases (ICD-11), the World Health Organisation (WHO) officially recognised Gaming Disorder (GD) as a diagnostic entity [3]. Nowadays, people spend significant time on social media, their phones, and other devices for online gaming. While the vast majority of people find these activities to be very beneficial, a small percentage may encounter issues. More specifically, one of the new public health concerns that has emerged is problematic gaming behaviour, particularly among young adults and adolescents. Problematic video game playing can affect a person's everyday activities, alter their behaviour, and have several negative repercussions on their physical and mental health [4].

Numerous studies on the neurology of gaming have shown that when a player "levels up" and acquires more expensive equipment, dopamine is released more frequently in specific brain regions. This helps to explain why some individuals may find gaming to be addictive and promotes the habit [4-7]. An individual who regularly plays online games can become attached to them. In order to reach or maintain the symbols hidden behind their avatar, players of online games may feel compelled to remain online and play longer. If a character in the game possesses powerful, expensive, and high-level equipment, other players will notice and may be intimidated by them. To acquire such powerful equipment, players must strive for high levels (levelling) or seek substantial financial resources. Gamers often do not realise how long they have been playing because they are too focused on leveling up their virtual characters and interacting with other players [5]. The gaming industry has seen significant growth, particularly after the COVID-19 lockdown in 2020 [5].

College students suffering from gaming addiction may experience negative effects on their bodies, particularly on their visual system. This fatigue can make it difficult for them to fall asleep and stay asleep throughout the night [8]. According to the National Sleep Foundation, students should get between seven and nine hours of sleep each night; however, college students frequently struggle to meet their basic needs, including sleep [8]. Sleep issues are more common among college students (50%) than in the general population (20%) [8]. College students who play online games often stay up late into the night, leading to progressive sleep disorders and poor sleep quality [9]. Despite these findings, there is a scarcity of studies in Tamil Nadu that focus on the prevalence of gaming addiction and its association with sleep quality among medical

students [10-12]. Thus, the objective of this study was to estimate the prevalence of gaming addiction and its association with sleep quality among medical college students in Chengalpattu, Tamil Nadu, India.

MATERIALS AND METHODS

A cross-sectional study was conducted from May to July 2024 among medical students from different medical colleges in the Chengalpattu district of Tamil Nadu, India for a period of three months. The study was approved by the institutional scientific and ethical committee (SRMIEC-ST0924-1719). The purpose of the study was explained to the participants, and informed consent was obtained prior to the study.

Inclusion and Exclusion criteria: The study included students enrolled in the MBBS course, specifically from the 1st year to internship. Students who were absent during the study period or did not provide consent were excluded from the study.

Sample size calculation: The sample size was calculated using the formula:

$$n=Z^2\ pq/d^2$$

(where Z=1.96 at 95% confidence; p=prevalence of gaming addiction; q=1-p; d=absolute allowable error). For this study, presuming maximum variability, p=0.5; q=0.5; d=5% of p. The calculated sample size was 400. To account for non-respondents (20%), the total sample size was adjusted to 480. Of the 500 students considered, 16 were excluded because their sleep questionnaires were incomplete, resulting in a final sample size of 484.

A two-stage random sampling method was employed:

- **Stage 1:** A random sampling method was used, and the lot method was employed to select three medical colleges from a list of colleges in Chengalpattu. Probability proportionate to size was applied to account for differences in population sizes among the selected medical colleges.
- **Stage 2:** After obtaining a comprehensive list of students from each selected college, a unique number was assigned to each student. Participants were selected as study subjects using a computer random number generator.

Study Procedure

Data was gathered using a standardised and validated semi-structured questionnaire derived from Lemmens' Gaming Scale [13] and the Pittsburgh Sleep Quality Index (PSQI) [14]. Both the Lemmens' Gaming Scale and PSQI questionnaires are available for academic use without restrictions, so no formal permission was required for their inclusion in this study.

The survey was divided into the following three sections:

1. **Demographics:** Participants' age (in years), gender (male or female), type of family, and whether they were day scholars or hostellers were recorded in this section. Additionally, there were two questions about whether or not participants played online games.
2. **Evaluation of gaming addiction:** The Gaming Addiction Scale (GAS), developed by Lemmens JS et al., consists of seven items that assess different aspects of gaming addiction (i.e., salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems) [13]. Each item is scored on a five point Likert scale, with 1 denoting "never" and 5 representing "very often". A higher GAS score indicates more problematic online gaming use. For this study, four categories were simplified into two: (i) addicted and (ii) non-addicted (which includes problem gamers, engaged gamers, and normal gamers) [15].
3. **Assessment of sleep quality:** Sleep quality was assessed using the PSQI [14]. The PSQI comprises 19 questions that evaluate a variety of aspects of sleep quality over the previous month, such as frequency, duration, latency, and severity of specific sleep-related issues. Each PSQI item is rated on a scale of 0 to 3, with higher scores indicating more sleep issues. A global score is calculated by adding the scores of the seven items, with total scores ranging from 0 to 21. Individuals can also be categorised as having good or poor sleep based on their PSQI ratings, with poor sleep defined as a total score of 6 or higher.

STATISTICAL ANALYSIS

The collected data was analysed using statistical software Statistical Package for Social Sciences (SPSS) version 26.0. In the descriptive statistics, mean (SD) for continuous variables and frequencies (percentage) for categorical variables were utilised. Chi-square and regression analyses were performed to analyse the data. A p-value of <0.05 was considered statistically significant. Results were presented in relevant tables and charts.

RESULTS

The study participants numbered 484, of which 236 (48.8%) were male and 248 (51.2%) were female. The mean age of the participants was 21.65 years, with a standard deviation of 3.17. The majority were from nuclear families 352 (72.7%) and 268 (55.4%) were hostellers. In this study, the mean score for sleep quality was 6.08±2.69.

[Table/Fig-1] demonstrates the sleep quality among the students, revealing that 50.4% had good sleep quality and 49.6% exhibited poor sleep quality. The prevalence of gaming addiction was found to be 33.1%, indicating that one-third of the sample experienced gaming addiction, while the majority did not show addictive gaming behaviour. The participants' addiction scores were evaluated using the Lemmens Gaming Scale based on events that occurred in the past six months. 72 (14%) of the students reported using gaming as an escape from reality (mood modification), followed by 64 (13%) who spent most of their time playing games (tolerance).

Variables		Frequency	Percentage
Age (years)	≤20	228	47.1
	>20	256	52.9
Gender	Male	236	48.8
	Female	248	51.2
Type of family	Nuclear	352	72.7
	Joint	40	8.3
	Three generation	92	19
Residence	Day scholar	216	44.6
	Hosteller	268	55.4
Addiction score	Not addicted	324	66.9
	Addicted	160	33.1
Sleep quality	Good sleep	244	50.4
	Poor sleep	240	49.6

[Table/Fig-1]: Sociodemographic distribution among study participants (N=484).

The prevalence of gaming addiction was again noted as 33.1% [Table/Fig-2]. [Table/Fig-3] displays the association between various sociodemographic characteristics and sleep quality categories. The chi-square test showed a statistically significant association (p=0.001) between gaming addiction and sleep quality, with 140 (87.5%) of addicted gamers demonstrating poor sleep. An association between age and sleep quality, as well as residence and sleep quality, was observed. However, there was no significant association found between gender or type of family and sleep quality categories.

According to [Table/Fig-4], the multiple linear regression model explained 30.8% of the variance in global PSQI (R^2=0.308),

Item	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Very often n (%)
Salience: Did you think about playing a game all day long?	184 (38)	108 (22.3)	140 (28.9)	32 (6.6)	20 (4.1)
Tolerance: Did you spend increasing amounts of time on games?	160 (33.1)	160 (33.1)	100 (20.7)	44 (9.1)	20 (4.1)
Mood modification: Did you play games to forget about real life?	228 (47.1)	88 (18.2)	96 (19.8)	56 (11.6)	16 (3.3)
Relapse: Have others unsuccessfully tried to reduce your game use?	268 (55.4)	68 (14)	104 (21.5)	28 (5.8)	16 (3.3)
Withdrawal: Have you felt bad when you were unable to play?	204 (42.1)	144 (29.8)	96 (19.8)	28 (5.8)	12 (2.5)
Conflict: Did you have fights with others (e.g., family, friends) over your time spent on games?	252 (52.1)	104 (21.5)	88 (18.2)	24 (5)	16 (3.3)
Problems: Have you neglected other important activities (e.g., school, work, sports) to play games?	212 (43.8)	140 (28.9)	108 (22.3)	12 (2.5)	12 (2.5)

[Table/Fig-2]: Response of students to Lemmens gaming scale for gaming addiction.

Variables		Good sleep n (%)	Poor sleep n (%)	Total (N=484)	p-value
Age (years)	≤20	132 (57.9)	96 (42.1)	228	0.02
	>20	112 (43.8)	144 (56.3)	256	
Gender	Male	112 (47.5)	124 (52.5)	236	0.23
	Female	132 (53.2)	116 (46.8)	248	
Residence	Day scholar	96 (44.4)	120 (55.6)	216	0.02
	Hosteller	148 (55.2)	120 (44.8)	268	
Type of family	Nuclear	176 (50)	176 (50)	352	0.41
	Joint	24 (60)	16 (40)	40	
	Three generation	44 (47.8)	48 (52.2)	92	
Gaming addiction	Addicted	20 (12.5)	140 (87.5)	160	0.001
	Non addicted	224 (69.1)	100 (30.9)	324	

[Table/Fig-3]: Association between various sociodemographic variables and PSQI categories.
Chi-square test

indicating a moderate fit. Among the predictors, addiction status was identified as the strongest predictor (B=2.997, p<0.001), indicating a significant negative impact on sleep quality. The age category (B=0.527, p=0.017) and gender (B=0.306, p=0.023) also showed significant associations, suggesting that older individuals and males had poorer sleep quality. Type of family was also a significant factor (B=0.298, p=0.023). However, day scholar or hostel status was not significantly associated with sleep quality (p=0.105). Collinearity diagnostics indicated that all predictors had Variance Inflation Factors (VIF) <1.2, suggesting no significant multicollinearity issues. The Analysis of Variance (ANOVA) test confirmed that the regression model was statistically significant (F=42.472, p<0.001). This analysis highlights addiction status, age, and gender as key determinants of sleep quality in the study population.

habits contribute to widespread sleep issues among students, regardless of geographic location.

A more recent study by Mannikko N et al., in Finland found that 23% of adolescents aged 15-19 years were addicted to gaming, with strong associations between gaming addiction and both delayed sleep onset and daytime sleepiness [17]. Poor sleep quality was tied to longer gaming sessions. The correlation between prolonged gaming and difficulty falling asleep due to heightened adrenaline was evident in both this research and the broader literature. In this study, 75% of addicted participants reported poor sleep quality, which backs this relationship, suggesting that excessive gaming behaviour significantly affects sleep health across diverse populations.

In Indonesia, Gunawan W et al., showed that 61.3% of college students experienced gaming addiction, and 65.8% reported poor sleep quality, similar to this study's results. Another study by Zaman M et al., found that according to the Gaming Addiction Scale (GAS), 7.1% of people had a gaming addiction, and an additional 25.2% were classified as problematic gamers [4,15]. Previous studies conducted among medical students concluded that gaming addiction was associated with poor sleep quality [18-21]. These global patterns suggest that the problem of gaming addiction transcends geographical boundaries, affecting sleep quality in various countries internationally.

In India, the gaming addiction landscape is still emerging, with limited studies on its impact. In contrast to this study, Basu S et al., concluded that Internet Gaming Disorder (IGD) has a low prevalence among medical students, and the problem is negligible among female students. However, IGD and gaming addiction are two different scales and thus cannot be used for comparison [22]. Another study by Solanki SR et al., found the prevalence of gaming addiction to be 32%, which had a significant association with poor sleep [12]. This consistency between the studies suggests that

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	95.0% Confidence interval for B		Collinearity statistics	
	B	Std. Error	Beta			Lower bound	Upper bound	Tolerance	Variance Inflation Factor (VIF)
Constant	4.012	0.675		5.948	0.000	2.687	5.337		
Age category	0.527	0.220	0.099	2.395	0.017	0.095	0.960	0.855	1.170
Gender	0.002	0.210	0.000	0.009	0.993	-0.410	0.414	0.940	1.064
Type of family	0.298	0.131	0.089	2.279	0.023	0.041	0.555	0.958	1.044
Day scholar or hostel	-0.356	0.219	-0.066	-1.626	0.105	-0.787	0.074	0.869	1.150
Addiction status	2.997	0.223	0.528	13.438	<0.001	2.559	3.435	0.937	1.067

[Table/Fig-4]: Multiple linear regression analysis of factors influencing global Pittsburgh Sleep Quality Index (PSQI).

DISCUSSION

The present study found that 33.1% of medical students in Chengalpattu were addicted to gaming, with a higher prevalence among males and those aged 20 and above. Furthermore, gaming addiction was significantly associated with poor sleep quality. A study conducted by Kim D et al., (2021) in South Korea found that 40.1% of college students exhibited signs of gaming addiction, and those addicted to gaming reported significantly shorter sleep durations and poorer sleep quality [16]. This suggested that gaming gaming addiction is becoming a significant health concern among Indian medical students, warranting attention from public health authorities.

Both studies highlight the heightened risk among medical students, with demanding academic schedules further complicating sleep quality. Programs aimed at reducing screen time and encouraging healthy sleep practices could mitigate the negative effects of gaming addiction. Most online games require an account to log in and play; all progress made in the game will be saved in that

account. Implementing time limits for gaming, after which the account becomes inaccessible for 24 hours, could be a method used to prevent long hours of gaming and thus help improve sleep quality. Public health efforts in India must also address the emerging trends of online gaming and its impact on students' mental and physical health.

Limitation(s)

While this study sheds light on the relationship between gaming addiction and sleep quality, it has limitations. The cross-sectional design prevents causality from being established, and the reliance on self-reported data introduces potential bias. Future research should use objective measures, such as actigraphy or polysomnography, to assess sleep quality more accurately. Longitudinal studies could explore the long-term consequences of gaming addiction on sleep health.

CONCLUSION(S)

The present study concluded that 33.1% of the participants were addicted to gaming, and 49.6% reported having poor sleep quality. Among the addicted gamers, 87.5% showed poor sleep, and it was found that those with gaming addiction were three times more likely to experience poor sleep quality than those without gaming addiction. The results emphasise the need for greater awareness and intervention strategies, particularly in academic environments, to manage gaming behaviours and their impact on health. Future research should further explore the long-term impacts of gaming addiction and examine intervention methods that can be employed to promote healthier gaming habits and improve sleep quality among students.

Authors' contribution: BGSC, AH, RMP, VVA - Study conception and manuscript preparation. BGSC, AH, RMP, VVA - Study design, data collection, data analysis, and interpretation.

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