

Original Research Article

THE EFFECT OF INTERNET ADDICTION ON SLEEP QUALITY AMONG POST GRADUATE RESIDENTS IN PRIVATE MEDICAL COLLEGE

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ABSTRACT

Background: Internet has become an indispensable part of our daily lives by being a means for socialization, entertainment and information, but recent dramatic increase in internet use has resulted in its addiction that can have a significant impact on sleep quality.

Aim: This study attempt to understand the effect of internet addiction on sleep quality in postgraduate residents.

Materials and Methods: A cross sectional study was conducted among 70 postgraduate residents of Rama Medical College, Kanpur by providing self-administered questionnaire containing Internet Addiction Test (IAT) and Pittsburgh sleep quality index (PSQI). Descriptive statistics were used to analyse sociodemographic characteristics, internet addiction and sleep quality. The association between internet addiction and sleep quality was determined by Pearson correlation coefficient using SPSS.

Results: Out of 70 students, 19 (27.1%), 32 (45.7%), 15 (21.4%), 4 (5.7%) reported normal, mild, moderate and severe internet addiction respectively. 23 (32.9%) had good sleep quality but 47 (67.1%) were poor sleepers. There was a positive correlation of internet addiction with sleep quality (p-value- 0.005) and its components: subjective sleep quality (p-value 0.006), sleep latency (p-value 0.001), sleep duration (p-value <0.001), sleep efficiency (p-value <0.001), sleep disturbance (p-value 0.016) and daytime dysfunction (p value 0.003), but there was no positive relationship with use of sleep medication (p-value 0.551).

Conclusion: Internet addiction was found to be a significant problem for postgraduate residents. Internet addiction was more prevalent among the males and unmarried residents. As the level of addiction increased, sleep quality worsened significantly.

Keywords: Internet addiction, Sleep quality, Internet Addiction Test, Pittsburgh sleep quality index.

INTRODUCTION

Internet has become an indispensable part of our daily lives. Although it has made our lives more convenient due to numerous benefits such as providing faster and easier communication, being a means for socialization and entertainment, facilitating access to information, but recent dramatic increase in internet use has resulted in its addiction. Internet addiction is defined as excessive and uncontrolled use of internet leading to negative consequences impairing an individual's

psychological state and leading to problems in daily life. It is characterized by preoccupation with the internet, loss of sense of time, individual's inability to control internet use, an increasing need for more time online, using internet to escape negative emotions, experiencing withdrawal when attempting to cut down use and neglecting other important activities and responsibilities, to the point where it interferes with their relationships, work or school performance, and overall well-being.^[1]

Internet addiction can manifest in different forms, including excessive use of social media,

entertainment, gaming, online dating, online shopping, streaming content, educational resources, pornography, or general web browsing.

Internet addiction has not yet acknowledged as a disorder in the fifth edition of The Diagnostic and Statistical Manual of Mental Disorders,^[2] or The International Classification of Diseases 11th edition. However, it is presented as a condition on which further research is encouraged under the name of "Internet Gaming Disorder" (commonly referred to as Internet use disorder, Internet addiction, or Gaming addiction). Internet gaming has been reportedly defined as an 'addiction' by the Chinese government, and a treatment system has been set up. It has seemingly high prevalence rates, both in Asian countries and, to a lesser extent, in the West, justifying its inclusion.^[2]

Studies have revealed that Internet addiction can be described as a compulsive-impulsive spectrum disorder, which has four characteristics: excessive use; tolerance (a need for more hours of use, etc.); emotional withdrawal (e.g., tension, depression, and anger); and negative repercussions such as fatigue, arguments, lying, and social isolation.^[4,5]

The prevalence of Internet addiction varies from 1.6% to 18% worldwide and is higher in adolescents and young adults. Among university students, medical residents are a vulnerable group due to the increasing use of technology for learning and clinical care.^[7]

It has considerable adverse psychological, social, and occupational effects including time mismanagement, irregular eating habits, disturbed sleep pattern or insomnia, physical inactivity, vision and musculoskeletal problems, anxiety, depression, mood changes, and suicidal thoughts. These negative effects can influence family relationships, academic performance, and long-term professional goals, and they can have broad and detrimental consequences on society as a whole.^[8]

Sleep is a component of daily life that affect the individual's physical and mental health. Adequate sleep is vital in strengthening physical growth and academic performance. Sleep quality is determined by various factors, such as the duration of sleep, the ability to fall asleep and stay asleep, the absence of disruptions during sleep, and the feeling of being restored and rejuvenated upon waking.^[1]

Several key aspects contributing to good sleep quality are: sleep duration of 6-8 hrs., sleep latency of 15-20 minutes, good sleep continuity (uninterrupted sleep and minimal disturbances), higher sleep efficiency (percentage of time spent sleeping compared to the total time spent in bed), appropriate balance of sleep architecture, individual feeling refreshed, rejuvenated, and mentally sharp upon waking.

Several factors affecting sleep quality, include lifestyle habits, environmental conditions, physical and mental health, and sleep disorders. Common factors include: Poor sleep hygiene (irregular sleep schedules, excessive caffeine or alcohol consumption, exposure to electronic devices before

bed), stress, anxiety, depression, medical conditions (chronic pain, restless legs syndrome, and gastrointestinal disorders) and environmental factors (excessive light and noise exposure, or extreme temperatures).

Internet addiction can have a significant impact on sleep quality by delaying sleep onset, sleep disruptions, reduced duration, causing sleep related anxiety, daytime sleepiness and fatigue. In turn, poor sleep quality is associated with depressive symptoms, impaired attention, weaker immune system. This can have negative consequences on cognitive performance, productivity, and overall well-being.^[4] The stimulating and engaging nature of online content can make it difficult for individuals to disengage and initiate sleep at a reasonable time. Checking notifications, responding to messages, or engaging in online activities during sleep hours can disrupt the continuity of sleep and result in fragmented sleep.

Individuals with internet addiction may sacrifice their sleep hours to engage in online activities, resulting in chronic sleep deprivation. The worry about missing out on online activities or about disconnecting from the online world can lead to anxiety, leading to heightened arousal and difficulty falling asleep.

A literature review was done surveying research studies from PubMed and ScienceDirect. Research suggests, easy access to internet services, worldwide modernization and increased smartphone use has provided people with the opportunity to use internet frequently and falling easy prey to addiction which interferes with sleep leaving people vulnerable to negative consequences. Various studies have been done worldwide, and some of them are summarised below.

A cross-sectional study was conducted in 2016 in 54 high school students in Japan to look for relationship between internet addiction and sleep disturbance using Japanese version of Pittsburgh Sleep Quality Index and Young Diagnostic Questionnaire. Multiple logistic regression analysis was performed with sleep disturbance as the dependent variable, Internet Addiction as the explanatory variable, and adjustments for eight other variables. It was found that there was a significant independent relationship between Internet Addiction and sleep disturbance.^[9]

In 2017, a cross-sectional study took place in 499 residents of Oman Medical Speciality Board to look for internet addiction and depression among postgraduate residents. Patient Health Questionnaire-9 and Internet Addiction Test were used. It was found that 28.8% had depression and 37.3% were addicted to the Internet; moreover, among those addicted, 36.2% had depression. Internet addiction was clearly detected among many residents, with a significant association with depression.^[10]

A cross-sectional study was conducted in 2021 among 268 students of nursing, operation room, bachelor of science in anaesthesia, medical laboratory sciences, medicine, public health, environmental health engineering, health information

technology, and emergency medical aid from Abadan University of Medical Sciences to look for internet addiction, mental health and sleep quality in students. Young Internet Addiction Test, Depression Anxiety Stress Scales-42 (DASS) (1995), and the Pittsburgh Sleep Quality Index (PSQI) (1989) were used. Results suggested that males were found to be more likely than females to suffer from Internet Addiction, depression, anxiety, stress, and sleep disorders. Furthermore, age was inversely related to Internet Addiction, depression, and stress. Medical sciences students suffered from depression, anxiety, and stress more than students majoring in other fields. The simultaneous occurrence of Internet addiction and depression, anxiety, stress, and sleep disorders in students indicates that Internet addiction is associated with other psychological problems.^[11]

In 2022, a cross-sectional study was conducted in 910 adolescents aged 13-18 yrs. To look for effect of internet addiction and smartphone addiction on sleep quality in Turkey. Data was collected on Short Internet Addiction test,^[12] Smartphone Addiction Scale,^[13] and Pittsburgh Sleep Quality Index.^[14] It was found that 58.7% had poor quality of sleep. Compared to participants with normal internet addiction scores, poor sleep quality was 1.83 times higher in problematic internet addiction and 1.99 times higher in pathological internet addiction. Older adolescents (≥ 16 years), females, poor health perception, and perception of moderate economic status of the family were other factors associated with poor sleep quality.^[1]

After reviewing the prior studies certain limitations were found. The effect of internet addiction on sleep quality has been studied in adolescents and undergraduate students but not among postgraduate residents. Few studies were conducted in postgraduate residents to look for internet addiction but its association with sleep has not been found yet. This study attempt to understand the effect of Internet Addiction on Sleep Quality among Postgraduate Residents of a Private Medical College in India.

MATERIAL AND METHODS

This is a cross sectional study conducted in July 2023 among 70 postgraduate residents of Rama Medical College, Hospital and Research Centre, Kanpur. After providing residents with planning document containing study purpose and method, all residents gave consent for participation. During the survey, each resident was provided with a link of google form containing the self-administered questionnaire. The questionnaire collected information on participant sociodemographic characteristics, Internet addiction and sleep quality.

The sociodemographic characteristics included name, age, gender, marital status, PG specialty, residency level, religion and family type.

Internet Addiction Test (IAT) developed by Dr. Kimberly Young was used to measure normal, mild,

moderate and severe levels of Internet Addiction. IAT is a reliable and valid measure of addictive use of Internet consisting of 20 items. The responses are based on 5-point Likert scale and total score ranges from 0 to 100. The higher the score is, the greater the level of addiction is. Total scores that range from 0 to 30 points are considered as normal level of Internet use; scores of 31 to 49 reflect mild level of Internet addiction; 50 to 79 indicate moderate level; and scores of 80 to 100 reflects severe Internet addiction. Pittsburgh sleep quality index (PSQI) helps to evaluate overall sleep quality and following subcategories: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The questionnaire consists of 19 self-reported items with a combination of Likert type and open-ended questions indicating how frequently they have experienced sleep difficulties over the past month. Responses are later converted to scaled scores ranging from 0 to 3 using the guidelines with higher scores indicating more acute sleep disturbances. The suggested cutoff score for total PSQI distinguishes between good sleepers (< 5) and poor sleepers (> 5). of 5 for the global scale as it correctly identified 88.5% of the patient group in their validation study.

Sociodemographic and individual characteristics were presented as numbers and percentages. Descriptive statistics were used to analyse participants' sociodemographic characteristics and the prevalence of Internet addiction and poor sleep quality. The association between Internet addiction and sleep quality was determined using the Pearson correlation coefficient. This measure was also used to evaluate the associations between sociodemographic characteristics with Internet addiction and sleep quality. Statistical analysis was conducted using IBM Statistical Package for Social Sciences version 29.0.1.0 for windows. P-values < 0.05 were considered statistically significant.

RESULTS

70 Junior residents participated in the study. 37 (52.9%) residents were male and 33 (47.1%) were female. Most of the residents, i.e., 46 (65.5%) were between 25-30 years of age. 51 (72.9%) residents were single whereas 19 (27.1%) were married. The frequency distribution of residents' age, gender, marital status, choice of speciality, residency level, religion and family type are presented in. [Table 1] Out of 70 students, 32 (45.7%) reported mild internet addiction, 15 (21.4%) reported moderate internet addiction and 4 (5.7%) reported severe internet addiction. Whereas only 19 (27.1%) reported normal use of internet. The mean score of internet addiction was 1.057 ± 0.843 . [Table 2] 23 out of 70 residents; i.e., 32.9% had good sleep quality but 47 (67.1%) were reported as poor sleepers. The mean score of sleep quality was 0.671 ± 0.470 out of 1. The highest

score was obtained from sleep duration (1.63 ± 1.066 out of 3) and lowest score was obtained from habitual use of sleep medication (0.34 ± 0.634 out of 2). [Table 2]

There was a positive correlation of internet addiction found with PSQI total (p value- 0.005), subjective sleep quality (p value- 0.006), sleep latency (p value- 0.001), sleep duration (p value- <0.001), sleep efficiency (p value- <0.001), sleep disturbance (p value- 0.016) and daytime dysfunction (p value- 0.003), but there was no positive relationship of internet addiction with use of sleep medication (p value- 0.551). [Table 4]

Table 4 shows the correlation between sociodemographic characteristics and internet

addiction. There was a positive relationship of internet addiction with gender (p value- 0.043), marital status (p value- 0.010) and choice of speciality (p value- 0.025). We observed that internet addiction was more prevalent among the males and unmarried residents. Residents in medicine had more internet addiction than the residents in surgical and diagnostic field. No correlation between age and internet addiction was found.

Table 5 shows a positive correlation between internet addiction and sleep quality. As the level of internet addiction increased, sleep quality worsened significantly (p value- 0.005). [Table 6]

Table 1: Participant's characteristics (n=70)

Demographic Characteristics	Categories	n (%)
Age	<25	9 (12.9%)
	25-30	46 (65.7%)
	31-35	11 (15.7%)
	>35	4 (5.7%)
Gender	Male	37 (52.9%)
	Female	33 (47.1%)
Marital status	Single	51 (72.9%)
	Married	19 (27.1%)
Choice of speciality	Medicine	32 (45.7%)
	Surgical	25 (35.7%)
	Diagnostic	13 (18.6%)
Residency level	Junior Resident 1	35 (50%)
	Junior Resident 2	35 (50%)
Religion	Hindu	60 (85.7%)
	Muslim	6 (8.6%)
	Sikh	2 (2.9%)
	Christian	2 (2.9%)
Family type	Nuclear	60 (85.7%)
	Joint	10 (14.3%)

Table 2: Frequency distribution of Internet addiction and sleep quality among residents

Variables	n (%), Mean score \pm S.D.	Minimum	Maximum
Internet addiction			
Normal use (0-30)	19 (27.1%)		
Mild addiction (31-49)	32 (45.7%)		
Moderate addiction (50-79)	15 (21.4%)		
Severe addiction (80-100)	4 (5.7%)		
Mean score \pm SD	1.057 \pm 0.843	0	3
Sleep quality			
Good sleepers (PSQI Total <5)	23 (32.9%)		
Poor sleepers (PSQI Total >5)	47 (67.1%)		
Mean score \pm SD	0.671 \pm 0.470	0	1
Subjective sleep quality	1.14 \pm 0.839	0	3
Sleep latency	1.07 \pm 0.968	0	3
Sleep duration	1.63 \pm 1.066	0	3
Sleep efficiency	1.53 \pm 1.126	0	3
Sleep disturbance	1.20 \pm 0.694	0	3
Use of sleep medication	0.34 \pm 0.634	0	2
Daytime dysfunction	1.10 \pm 0.995	0	3

Table 3: Pearson correlation coefficients between internet addiction and components of sleep quality

Variables	Internet addiction	
	Chi-square value	P value
PSQI Total	12.781	0.005
Subjective sleep quality	23.077	0.006
Sleep latency	26.947	0.001
Sleep duration	30.759	<0.001
Sleep efficiency	29.831	<0.001
Sleep disturbance	20.351	0.016
Use of sleep medication	4.946	0.551
Daytime dysfunction	24.630	0.003

Notes: Significant p values are shown in bold.

Table 4: Relationship between sociodemographic characteristics of residents and Internet addiction

Characteristics		Internet addiction				Chi-square value	P value
		Normal use (n=) n (%)	Mild addiction (n=) n (%)	Moderate addiction (n=) n (%)	Severe addiction (n=) n (%)		
Age (years)	<25	4 (44.4%)	2 (22.2%)	2 (22.2%)	1 (11.1%)	7.891	0.545
	25-30	9 (19.6%)	22 (47.8%)	12 (26.1%)	3 (6.5%)		
	31-35	4 (36.4%)	6 (54.5%)	1 (9.1%)	0 (0%)		
	>35	2 (50%)	2 (50%)	0 (0%)	0 (0%)		
Gender	Male	6 (16.2%)	17 (45.9%)	10 (27.0%)	4 (10.8%)	8.169	0.043
	Female	13 (39.4%)	15 (45.5%)	5 (15.2%)	0 (0.0%)		
Marital status	Single	10 (19.6%)	22 (43.1%)	15 (29.4%)	4 (7.8%)	11.282	0.010
	Married	9 (47.4%)	10 (52.6%)	0 (0.0%)	0 (0.0%)		
Choice of speciality	Medicine	12 (37.5%)	15 (46.9%)	5 (15.6%)	0 (0.0%)	14.464	0.025
	Surgical	1 (4.0%)	13 (52.0%)	8 (32.0%)	3 (12.0%)		
	Diagnostic	6 (46.2%)	4 (30.8%)	2 (15.4%)	1 (7.7%)		
Residency level	Junior Resident 1	10 (28.6%)	16 (45.7%)	7 (20.0%)	2 (5.7%)	0.119	0.989
	Junior Resident 2	9 (25.7%)	16 (45.7%)	8 (22.9%)	2 (5.7%)		
Religion	Hindu	18 (30.0%)	26 (43.3%)	12 (20%)	4 (6.7%)	5.216	0.815
	Muslim	1 (16.7%)	3 (50%)	2 (33.3%)	0 (0%)		
	Sikh	0 (0%)	1 (50%)	1 (50.0%)	0 (0%)		
	Christian	0 (0%)	2 (100%)	0 (0%)	0 (0%)		
Family type	Nuclear	14 (23.3%)	30 (50.0%)	12 (20.0%)	4 (6.7%)	5.000	0.172
	Joint	5 (50.0%)	2 (20.0%)	3 (30.0%)	0 (0%)		

Notes: Significant p values are shown in bold.

Table 5: Relationship between Internet addiction and sleep quality

Internet addiction	Sleep quality				Chi-square	P value
	Good		Poor			
	n	%	n	%		
Normal use	12	63.2%	7	36.8%	12.781	0.005
Mild addiction	7	21.9%	25	78.1%		
Moderate addiction	2	13.3%	13	86.7%		
Severe addiction	2	50%	2	50%		

Notes: Significant p values are shown in bold.

DISCUSSION

The purpose of this study was to determine the effect of internet addiction on sleep quality among postgraduate residents. This study also examined the association between sociodemographic characteristics and internet addiction. We found an association between internet addiction and sleep quality being more prevalent in unmarried male residents. The result of statistical analysis revealed significantly higher odds of sleep disturbance in residents with high score on Internet Addiction Test. The prevalence of Internet addiction recorded in this study (72.9%) is higher than that reported in other studies conducted among students of medicine and nursing, i.e., around 50%.^[17,18] The high rate of internet addiction could be due to the increasing use of internet, especially due to engaging in social networks, easy access to internet and gaming. Moreover, poor coping mechanism and lack of offline recreational activities can escalate internet use.^[19]

We found more prevalence of internet addiction in males, unmarried participants and residents studying medicine compared to surgical or diagnostic field. This may be ascribed to more males studying

medicine and more females in surgical field in the sample size. Additionally, more prevalence in males may be attributable to lifestyle. Sleep disturbance and internet addiction are associated with various lifestyle factors,^[20,21] therefore, this relationship needs further investigation. Added longitudinal surveys can be used to develop health education programs to reduce the prevalence of internet addiction and sleep dependence.

Despite the importance of sleep, poor sleep quality was present in more than half, i.e., 67.1% of residents. The high proportion of sleep disturbance is in accordance with results of recent studies using the Pittsburgh sleep quality index.^[22,23] We observed a positive correlation of internet addiction with various components of sleep including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance and daytime dysfunction. Excessive use of internet increased sleep latency, reduced the duration, quality and efficiency of sleep leading to daytime dysfunction.

A study conducted among 511 students at King Abdulaziz University, Jeddah revealed a significant correlation between Internet addiction and poor sleep quality ($P < 0.001$).^[24] Another study found that Internet addicts and possible addicts were more likely to neglect adequate sleep to remain online

($P = 0.006$).^[25] In Egypt, IA was more likely associated with poor sleep quality ($P = 0.004$) among students at Al-Azhar University. Similarly, IA was correlated with poor sleep quality among a sample of Indian medical students ($P < 0.001$).^[26]

There are several possible mechanisms for the relationship between internet addiction and sleep disturbance. A study found that internet addiction was associated with a disturbed circadian rhythm, leading to sleep disturbance and conversely, disturbed sleep is a predictor of internet addiction.^[27] Several studies on adults using brain imaging have confirmed that internet addiction and sleep disturbance cause reduction in the gray matter volume, reduced volume of the entire cortex and frontal lobes.^[28,29] These findings suggest that internet addiction may cause structural changes in sleep-related neural pathways.

The present study has a few limitations. The sample size was not adequate to ensure statistical power. This was a cross-sectional survey, so it is not possible to formulate any conclusion regarding the direction of causality. Data was collected through self-report questionnaires, which may have affected the accuracy of data. Furthermore, the sample consists of students from a single private medical college, so the results cannot be considered as being representative of all postgraduate residents.

CONCLUSION

In this study, internet addiction was found to be a significant problem for postgraduate residents in private medical college. More specifically, internet addiction had adverse effects on sleep quality. Future large-scale studies should continue to investigate the underlying risk factors and mechanisms behind these problems.

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