

Internet Addiction and its Effects on Fatigue and Sleep Quality among Medical Students

Niti Gahlot¹, Nikita Sharma², Pavi Jain³, Piyush Datt Swami⁴, Mahendra Kumar Verma⁵, Jakir Khan⁶

¹Associate professor, Community Medicine, Mahatma Gandhi Medical College and hospital, Jaipur

²Assistant professor, Department of Community Medicine, SJPMC, Bharatpur (Rajasthan) 321001

³Class -12th (PCBM), Affiliation-Jayshree Periwai International School

⁴Assistant Professor, Department of Community Medicine, SJPMC, Bharatpur

⁵Assistant professor, Department of Community Medicine, RVRS, Government Medical College, Bhilwara 311001

⁶Second Year PG resident, SJPMC, Bharatpur

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Corresponding Author: Dr. Piyush Datt Swami

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Abstract:

Background: The internet has become an integral part of our daily lives, offering a plethora of information, entertainment, and social interaction. In today's digital age, the internet plays an integral role in the lives of young people. The study will help to shed light on a growing concern - the potential negative consequences of excessive internet use.

Material and Methods: It is a cross-sectional observational study, Self-reporting questionnaires and objective measures (e.g., sleep trackers, internet usage logs) were used to collect the data.

Results: The mean age of study participants who are internet addicted was found to be 17.98 ± 1.81 . 11.1% students followed by moderate sleep disturbance. Problem like tiredness, need to sleep more, feel sleepy or drowsy, lacking in energy, less strength in muscle and feeling weak were common in participants who were internet addict.

Keywords: Internet Addict, Sleep Disturbance, Consequences.

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Introduction

The internet has become an integral part of our daily lives, offering a plethora of information, entertainment, and social interaction. While its benefits are undeniable, the excessive use of the internet, often referred to as internet addiction or problematic internet use [1], has emerged as a concerning issue, particularly among young adults. Internet addiction, also known as Internet Use Disorder (IUD) or problematic Internet use, is characterized by an individual's inability to control their online activities, leading to negative consequences in various life domains, including health.

Young adults are particularly vulnerable to this phenomenon due to their extensive use of social media, online gaming, and other digital platforms. Young adults with internet addiction tend to be constantly connected, checking their smartphones, social media accounts, and online games, even during night-time. This continuous engagement can lead to physical and mental fatigue. The internet offers an overwhelming amount of information,

making it difficult for individuals to switch off from their screens. The constant bombardment with news, messages, and notifications can lead to cognitive exhaustion and decision fatigue. Social media platforms often promote social comparison, where individuals compare their lives with the seemingly perfect lives of others. This can lead to feelings of inadequacy and mental fatigue, contributing to overall fatigue [2,3].

Excessive internet use, especially before bedtime, can disrupt circadian rhythms and interfere with the body's natural sleep-wake cycle. The blue light emitted from screens suppresses melatonin production, making it harder to fall asleep. Young adults addicted to the internet are more likely to develop a delayed sleep phase, staying up late into the night and struggling to wake up in the morning. This can lead to irregular sleep patterns and sleep deprivation [4]. The compulsion to check emails, social media, or engage in online gaming during the night can lead to sleep fragmentation. Frequent awakenings to check the screen can result in poor-

quality sleep. The constant exposure to online content, including negative news and social comparisons, can contribute to heightened stress and anxiety levels, making it even more difficult for young adults to relax and fall asleep.

In today's digital age, the internet plays an integral role in the lives of young people. The study will help to shed light on a growing concern - the potential negative consequences of excessive internet use.

Objectives

Primary Objective: To determine the prevalence of internet addiction (IA) among medical students of Mahatma Gandhi Medical College (MGMC), Jaipur.

Secondary Objectives:

1. To find out the relation of internet addiction (IA) with the quality and duration of sleep in the target population.
2. To find out the relation of internet addiction (IA) with fatigue in the target population.

Methodology

Study Design:

- Study Type: Cross-sectional observational study.
- Sampling: Multi-staged stratified random sampling technique.
- Data Collection Period: Done for 3 months to ensure a sufficient sample size.
- Data Sources: Self-reporting questionnaires and objective measures (e.g., sleep trackers, internet usage logs)

Virtual Setting: Online Platforms: Research was conducted through online platforms. This included recruitment through google forms, social media platforms, email lists.

Relevant Dates:

- Recruitment Period: The recruitment process was for about a month. It aimed to capture a diverse sample of medical students.
- Exposure and Data Collection Period: The exposure period varies for each participant depending on their level of internet usage. Participants were monitored over a span of 3 months, tracking their internet usage patterns and sleep habits.
- Follow-Up Period: After the exposure period, participants were followed up for an additional 3 months to assess the persistence of any sleep problems or changes in internet addiction patterns.
- Data Analysis and Reporting: Data analysis took place over three months following the data collection phase. This involved statistical

analysis, interpretation of results, and the preparation of research report.

Study Area

The study was conducted in Mahatma Gandhi Medical College and Hospital Jaipur over a period of about 9 months from November 2023 to July 2024.

Eligibility Criteria

Inclusion Criteria:

- Must use the internet regularly
- Must be a medical student of MGMC, Jaipur.

Exclusion Criteria:

- Those who use the internet rarely.
- Individuals with severe medical conditions or medication use that may impact sleep and fatigue.
- Individuals who are not studying in MGMC, Jaipur as medical student.

Sources and Methods of Participant Selection:

1. Online Surveys: Participants were recruited through various online channels, such as social media platforms, email lists, or google forms.
2. Screening Questions: To verify eligibility, we used screening questions at the beginning of the survey or interview to ensure that participants meet the inclusion criteria and do not meet any exclusion criteria.
3. Additionally, obtaining informed consent and maintaining participant privacy and confidentiality were critical ethical considerations when conducting this research.

Variables:

- Independent Variable: Internet addiction (The Internet Addiction Test (IAT)).
- Dependent Variables: Fatigue (measured using The Chalder Fatigue Questionnaire (CFQ) and Sleep problems (assessed through The Epworth Sleepiness Scale (ESS)).
- Covariates: Demographic information (e.g., age, gender, socioeconomic status), internet usage patterns (e.g., daily screen time), and mental health indicators (e.g., depression, anxiety)

Outcomes:

- Fatigue: Fatigue was measured using The Chalder Fatigue Questionnaire (CFQ).
- Sleep Problems: Sleep problems included variables like sleep duration, sleep quality, sleep disturbances, and insomnia symptoms. These were assessed using validated questionnaires like the Epworth Sleepiness Scale (ESS).

Exposures:

- Internet Addiction: Internet addiction was assessed using standardized scales like the Young's Internet Addiction Test (YIAT).

Predictors:

- Demographic Variables: These include age, gender, socioeconomic status, and educational level (year of MBBS).
- Psychological Factors: Variables like depression, anxiety, and stress were considered predictors, as they may contribute to both internet addiction and sleep problems.
- Internet Usage Patterns: The frequency and duration of internet use, types of online activities, and the devices used can be predictors.
- Sleep Hygiene Practices: Sleep-related behaviors and practices, such as bedtime routines and exposure to screens before sleep, can be predictors.

Potential Confounders:

- Physical Health: Chronic health conditions, medications, and physical activity levels can confound the relationship between internet addiction, sleep problems, and fatigue.
- Substance Use: Substance use, including alcohol, caffeine, and recreational drugs, may influence sleep patterns and fatigue.
- Environmental Factors: Noise levels, bedroom environment, and light exposure can impact sleep quality and fatigue.

Effect Modifiers:

- Age: Age may modify the relationship between internet addiction, sleep problems, and fatigue, with younger adults potentially being more susceptible.
- Gender: Gender differences may exist in the relationship, with males and females experiencing internet addiction, sleep problems, and fatigue differently.
- Mental Health Status: Individuals with pre-existing mental health conditions may experience a stronger or different relationship between these variables.
- Cultural Factors: Cultural beliefs and practices can influence internet use, sleep, and fatigue, so they should be considered as potential effect modifiers.

Data Collection:

- Internet addiction, fatigue, and sleep problem questionnaires were administered to participants.
- Objective data was collected on internet usage (e.g., screen time) and sleep patterns (e.g., sleep duration, disturbances) through devices or apps.

- Interviews were conducted to gain qualitative insights if necessary.

Young's Internet Addiction Test (IAT) is a self-reported questionnaire designed to assess the level of internet addiction or problematic internet use in individuals [5]. A simplified version of the Internet Addiction Test (IAT) was used with 20 questions. For each question, individuals were typically asked to rate their responses on a scale upto 100; upto 49 is categorized as normal, 50-79 is categorized as problematic and 80-100 is categorized as significantly problematic. After completing the test, individuals added up their scores, with higher scores indicating a greater likelihood of internet addiction or problematic internet use. People were considered as internet addict if they use the internet more than 35 hrs per week. For the purpose of this study, students were regarded as having internet addiction, if they fulfilled both criteria i.e an IAT score more than 65 and internet viewing of more than 5 hrs per day.

The Chadler Fatigue Questionnaire-14 (CFQ-14) is a self-reported questionnaire used to assess and measure fatigue in individuals [6,7]. The CFQ-14 consists of 14 items. Respondents are asked to rate how they have been feeling over the past week in relation to fatigue. Each item is rated on a 4-point likert scale from 0 to 3, with 0 representing "less than usual" and 3 representing "much more than usual."

The questions in the CFQ cover various aspects of fatigue, including physical and mental fatigue, as well as the impact of fatigue on daily activities and functioning. The CFQ-14 includes additional questions related to memory, concentration, decision-making, and motivation compared to the CFQ-11.

The responses to the questionnaire are typically summed to provide a total fatigue score, with higher scores indicating greater fatigue.

Epworth Sleepiness Scale (ESS) is used to assess average daytime sleepiness [8]. The validated ESS comprises of 8 items scored on a 24 point scale. Scores ranging between 1 and 10 are normal and scores between 10-15 are considered as moderate impairment and 16-24 severe impairment.

- Participant anonymity and confidentiality was maintained to encourage honest responses.

Ethical Considerations: Ethical guidelines were adhered to and informed consent was obtained from participants, ensuring they understand the purpose of the study and the potential risks and benefits. Due clearance was taken from ethical committee

Results The overall prevalence of IA among participants was 17.7%. Table 1 shows socio-

demographic characteristics of the studied adolescent school students (N = 2350).

Table 1: Socio-demographics characteristics of the studied adolescent school students (N = 2350)

Variables	IA (N = 415)	NA (N = 1935)	Test value	p value
Age (mean \pm SD)	17.98 \pm 1.81	17.91 \pm 1.91	0.662	0.433
Gender				
Male	225(54.2)	789(40.8)	25.169	< 0.001
Female	190(45.8)	1146(59.2)		
Socio-economic status (B G Prasad Classification)				
Class 1	19(4.6)	427(22.1)	93.436	< 0.001
Class 2	145(34.9)	617(31.9)		
Class 3	123(29.6)	573(29.6)		
Class 4	128(30.8)	318(16.4)		

The mean age of study participants who are internet addicted was found to be 17.98 \pm 1.81. Among all 415 students who are internet addicted, 225 (54.2%) were males and 190 (45.8%) were females. Most of the internet addicted students belonged to class 2 i.e. 145 (34.9%), followed by class 4 i.e. 128 (30.8%), class 3 i.e. 123 (29.6%) and class 1 i.e. 190 (4.6%).

Table 2: The characteristics of average daytime sleepiness between Internet addicts and normal students

Variables	IA (N = 415)	NA (N = 1935)	p value
The Epworth sleepiness scale			
Normal	361 (84.9)	1733(86.2)	0.123
Mild			
Moderate	47(11.1)	226(11.2)	
Severe	11(2.6)	42(2.1)	
	6(1.4)	9(0.4)	

Table 2 shows the characteristics of average daytime sleepiness between internet addicts and normal students. Among 415 internet addict students, mild sleep disturbance was seen in 47 i.e. 11.1% students followed by moderate sleep disturbance among 11 i.e. 2.6% students and severe sleep disturbance among 6 i.e. 1.4% students. But the results were statistically not significant.

Table 3: The comparison of fatigue (physical and mental symptoms) according to Internet addicted and normal subject

11 item Fatigue Scale	IA (N = 415)	NA (N = 1935)	p value
Physical symptoms			
1. Do you have problem with tiredness?	2.80 \pm 1.20	2.41 \pm 1.03	< 0.001
2. Do you need to rest more?	2.73 \pm 1.24	2.50 \pm 1.01	< 0.001
3. Do you feel sleepy or drowsy?	2.71 \pm 2.08	2.43 \pm 1.06	< 0.001
4. Do you have problems starting things?	2.67 \pm 1.10	2.50 \pm 1.12	0.031
5. Are you lacking in energy?	2.93 \pm 1.11	2.51 \pm 1.07	< 0.001
6. Do you have less strength in your muscle?	2.67 \pm 1.09	2.36 \pm 1.10	< 0.001
7. Do you feel weak?	2.81 \pm 1.16	2.52 \pm 1.12	< 0.001
Mental symptoms			
8. Do you have difficulty concentrating?	2.53 \pm 1.13	2.41 \pm 0.99	0.023
9. Do you make lips of the tongue when speaking?	2.66 \pm 1.16	2.39 \pm 1.10	< 0.001
10. Do you find it more difficult to find the correct word?	2.55 \pm 1.27	2.51 \pm 1.13	0.558
11. How is your memory?	2.44 \pm 1.13	2.53 \pm 1.00	0.112

Table 3 shows the comparison of fatigue (physical and mental symptoms) according to Internet addicted and normal subjects. Among physical symptoms, statistically significant results were found in those IA students who have problem with tiredness, need to sleep more, feel sleepy or drowsy, lacking in energy, less strength in mus-

cle and feeling weak. Mental symptoms with statistically significant results include those who make lips of tongue when speaking.

Table 4: The comparison of IA, fatigue and sleepiness score between Internet addicts and normal students

Variables	IA (N = 415)	NA (N = 1935)	p value
IA (mean \pm SD)	71.28 \pm 5.70	43.80 \pm 12.95	< 0.001
Fatigue physical symptoms	21.92 \pm 3.80	19.73 \pm 4.47	< 0.001
Fatigue mental symptoms	15.29 \pm 3.34	13.67 \pm 3.73	< 0.001
The Epworth sleepiness scale	6.23 \pm 4.21	6.11 \pm 3.75	0.570

Table 4 shows the comparison of IA, fatigue and sleepiness score between Internet addicts and normal students. The results were significant for comparison scores of internet addicted, physical symptoms of fatigue and mental symptoms of fatigue.

Table 5: Multiple stepwise regression analysis predictors for determinants of Internet addiction affect

Independent variables	B	Standard error	Beta	t test value	p value
Internet use in hours	0.048	0.114	0.008	0.422	< 0.001
Sleeping in hours	- 3.127	0.221	- 0.264	- 14.177	0.041
Fatigue physical symptoms	0.236	0.067	0.066	3.549	< 0.001
Fatigue mental symptoms	0.652	0.081	0.152	8.001	< 0.001
Epworth Sleepiness Score	0.407	0.074	0.098	5.534	< 0.001
Mental disorders	- 2.590	1.351	- 0.034	- 1.916	0.038
Headaches	3.115	0.633	0.095	4.919	< 0.001
Blurred vision	1.857	0.661	0.056	2.811	0.005
Double vision	- 2.204	0.997	- 0.044	- 2.210	0.027
Eyes hurt	5.338	0.651	0.162	8.195	< 0.001
Eye tired	- 4.303	0.768	- 0.115	- 5.606	< 0.001
Dizziness	- 1.949	0.656	- 0.059	- 2.973	0.003
Hearing problem	- 4.306	0.735	- 0.107	- 5.860	< 0.001

Table 5 shows multiple stepwise regression analysis of predictors for determinants of Internet addiction affect. Statistically significant result was shown by number of hours of internet use, fatigue physical symptoms, fatigue mental symptoms and Epworth Sleepiness Score. Other symptoms showing statistically significant results are headache, eyes hurt and tired and hearing problem.

Discussion

The present study clearly demonstrated that IA was related to many factors. The prevalence of IA in the pre-sent study came out to be 17.7% which is almost similar to study done in Taiwan by Liu et al [9] which showed 17% prevalence and another study done by Li et al for university students of USA showing approximately 1.2% to 26.3% were affected with IA.[10] Another cross sectional study of 1156 Turkish students re-ported that 175 students (15.1%) were considered as having IA.[11] All these findings from different studies are in line with the present study. Positive relation between IA and sleep problems has been shown by studies done by Ekinici et al [12] and Bhandari et al [13]. Many studies have suggested that IA has negative effects on individual's physical activity as shown in study done by Kuss et al [14] and Bener

et al [15]. This is confirmatory with the present research.

The present study showed that sleep is adversely effected due to IA. This has been supported by studies done by Ekinici et al [12] and Bhandari et al [13]. Another study done by Bener et al reported that IA has negative impact on sleep including sleep deprivation and fatigue.[16]

This study used confirmatory factor analysis and the results support reliability and validity of the study.

Conclusion

In adolescents, a significant independent relationship was found between IA, fatigue and sleep disturbance. In some cases, early identification of problematic internet use may help prevent more severe addiction issues from developing, leading to better mental and physical health outcomes.

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