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Internet Addiction among Medical Undergraduates and its Association with Depressive Symptoms

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ABSTRACT

Internet has become an indispensable component in our lives. The emergence of cheaper internet services and smart phones has led to its widespread use among people across all sociodemographic backgrounds. As a result, a new emergence of internet addiction has started gripping our youths and adolescents. Global prevalence of internet addiction is 30.1% among medical students. This high prevalence may contribute towards various mental health issues as the medical students are already struggling with immense pressure due to academic and clinical obligations. A wide range of mental health issues are emerging as a result of internet addiction. Therefore, our study aims to assess the use of internet among medical students and its effect on their mental health. A cross-sectional questionnaire-based study was conducted in a medical college in Bareilly. A total of 340 medical students were included in the study which comprised of medical students from 1st year till internship year. A pre-designed and pre-tested questionnaire was taken to collect socio-demographic information. Internet Addiction was assessed using Young's Internet Addiction Test (YIAT) and depressive symptoms were assessed by Patient Health Questionnaire (PHQ-9). Overall, 51% of students scored above the valid cut off for internet addiction. The mean score of Young Internet Addiction Test was 32. Mild, moderate and severe Internet Addiction was found among 37.8%, 11.9% and 1.2% of students respectively. In our study, 16.5% of students showed moderate to severe depression. Internet addiction was found to be significantly associated with depressive symptoms among the students. Internet usage has grown drastically in the last decade. Our study showed that internet addiction was present among 51% of the participants and it was significantly associated with depression.

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Key Words

Internet addiction, depressive symptoms, mental health, young internet addiction test (YIAT)

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INTRODUCTION

With more than 560 million internet users, India ranks second in the world in terms of the size of the online market. India is expected to have over 600 million internet users by 2021., at the moment, over 71% of internet users are males, compared to 29% women[1]. The Internet has firmly established itself as an indispensable component of our everyday life. Through a variety of applications ranging from Wikipedia to Facebook, it has not only become a ubiquitous entity but has also practically evolved into a necessary modern-day tool for communication, study, research, shopping and keeping in touch with family and friends. The development of inexpensive 3G and 4G-enabled cell phones, together with the quick advancements in wireless Internet technologies like Wi-Fi, 3G and 4G, has made the Internet widely available to people from all socioeconomic backgrounds. As a result, a relatively recent and alarming issue known as Internet addiction has emerged among the adolescents and the youth. Despite the fact that the term addiction is most often associated with drug usage, many authors are increasingly using it to refer to obsessive behavioural problems on the internet[2]. However, an inability to rein in excessive internet use can lower people's living standards and ties among family members, which may cause emotional instability[3,4]. The user's health can benefit from and be harmed by using the internet. Mental health illnesses have become more prevalent as a result of internet addiction[5]. Internet addiction affects not only the quantity and quality of sleep, but it also increases the likelihood of insomnia[6,7], as well as mental illnesses such as depression, anxiety and alcoholism, as well as attention deficit disorder in college students[8]. Additionally, it has harmed sleep quality at night, contributed to daytime fatigue and reduced productivity[9].

One of the foundational elements of thriving human civilizations, mental health is essential to the vitality and effectiveness of every society. Newly arriving university students from distant cities are the first to succumb to internet addiction since university students are among the most respected layers of society and represent the nation's future architects. Raising pupils' learning and scientific knowledge depends on their mental health[10].

The prevalence of mental dysfunction and the costs it places on society have caught the attention of experts in health promotion in today's world where illness patterns are evolving in the direction of non-communicable diseases[11]. In this regard, one of the three main causes of years of life lost owing to disability has been identified by the Global Burden of Disease data as mental diseases[12]. According to studies, female college students have worse quality sleep than male students[9,13]. Female hormone changes during adolescence or menstruation may contribute to poor sleep quality[14,15]. There has been research on the connection between internet addiction and sleep quality[9,16,17].

Due to the intense academic and clinical obligations, medical students' sleep quality is significantly impacted[15]. Around 3,651 medical students reported having a 30.1% global prevalence of internet addiction[3]. Anxiety was identified in 40,348 medical students worldwide at a rate of 33.8%[18], while depression was found in 62,728 medical students worldwide at a rate of 28%[19]. The user's health can benefit from and be harmed by using the internet. Internet addiction affects not only the quantity and quality of sleep, but it also increases the likelihood of insomnia[6,7], as well as mental illnesses such as depression, anxiety and alcoholism, as well as attention deficit disorder (ADHD) in college students[11]. Additionally, it has harmed sleep quality at night, contributed to daytime fatigue and reduced productivity[20]. However, there are very few studies describing the various effects that internet addiction has on the sleep patterns and mental health of medical students. Thereby this study is aimed to address these issues among the medical students in Bareilly, Uttar Pradesh.

Aims and Objectives: To assess the effects of internet use on mental health of medical students.

- To determine the prevalence of internet addiction among medical students.
- To assess the mental health of medical students.
- To assess the association between internet addiction and depressive symptoms among medical students.

Study Setting: The data was collected from the medical undergraduates and interns of Rohilkhand Medical College, Bareilly, UP.

Study Duration: 6 months.

Study Subjects: Medical students including interns of RMCH, Bareilly who met the inclusion criteria.

Inclusion Criteria:

- Participants who gave consent.

Exclusion Criteria:

- Students who do not give consent.

Sample Size: It was calculated using the formula:

Sample Size: (n) = $([Z_{1-a/2}]^2$ p [1-p])/d^2
Taking prevalence rate of 30.2%[3], allowable error of 5%. The final sample size was 328. A pre-designed and pre-tested questionnaire was taken to collect sociodemographic information like age, education, occupation, locality, family income etc. Internet Addiction was assessed using Young Internet Addiction Test (YIAT)[21,22] and depressive symptoms were assessed by Patient Health Questionnaire (PHQ-9)[23].

Data Collection: Data was collected using a predesigned questionnaire in a medical college in Bareilly city, Uttar Pradesh (India). Every year 150 students are enrolled in the medical college till now but due to recent seat increase there are 250 students in the most recent batch. Calculating all including 150 interns the total medical students at present are 850. Using PPS (Parts proportional to size), number of students to be interviewed were 96 from 1st Professional year students and 58 from 2nd, 3rd, 4th professional students and interns.
Ethical Approval was taken from the Institutional Ethics Committee prior to the study. Informed consent was taken by the participants before the study and confidentiality was maintained at every step of the research process.

Data Analysis: Data were analyzed using SPSS (Statistical Package for the Social Sciences) version 22. Descriptive statistics were used to summarize the socio-demographic characteristics of the participants, as well as the levels of internet addiction and depression.
The Chi-square test of independence was used to examine the association between categorical variables such as socio-demographic factors, internet addiction (categorized as mild, moderate, or severe based on IAT scores) and depression (categorized as none, mild, moderate, or severe based on PHQ-9 scores). The null hypothesis for each Chi-square test was that there is no significant association between the variables being analyzed. A $p<0.05$ was considered statistically significant.

RESULTS AND DISCUSSIONS

A total of 328 medical students and interns participated in the study. The mean age of the participants was 20.91 years (SD=1.69), median 21.0 and mode 20. Among the participants, 45.7% (n=150) were males while 54.3% (n=178) were females. Majority of students i.e. 84.5% (n=277) belonged to urban areas while 15.1% (n=51) belonged to rural areas. Fathers of 47.6% (n=156) of students were professionals, 44.8% (n=147) were graduates, 4% (n=13) had education up to intermediate, while 2.4% (n=8) and 0.9% (n=3) had education up to high school and middle school respectively, while 0.3% (n=1) were illiterate. (Table 1)

Table 1: Socio-Demographic Factors of Study Population.

Variable	Frequency (n)	Percentage (%)
Age (in years)		
≤19	144	43.9
20-21	61	18.6
22-23	102	31.1
>23	21	6.4
Gender		
Male	150	45.7
Female	178	54.3
Locality		
Urban	277	84.5
Rural	51	15.5
Father's Occupation		
Professional	227	69.2
Semi-Professional	30	9.1
Clerical/shop/farmer	55	16.8
Skilled worker	14	4.3
Semi-skilled worker	2	0.6
Fathers Education		
Professional	156	47.6
Graduate	147	44.8
Intermediate	13	4
High School	8	2.4
Middle School	3	0.9
Illiterate	1	0.3
BG Prasad Classification		
Upper class (I)		
Income 9,098 & above	278	84.8
Upper middle class (II) Income: 4,549-9,097	29	8.8
Middle Class (III)		
Income: 2,729-4,548	6	1.8
Lower middle class (IV)		
Income: 1,364-2,728	8	2.4
Lower class (V)		
Income: <1,364	1	0.3

According to the BG Prasad Classification, majority of the students i.e. 84.8% (n=278) belonged to the Upper Class (Class I), 8.8% (n=29) in the Upper middle Class (II), 1.8% (n=6) in the Middle Class (III), 2.4% (n=8) in the lower middle class (IV) and 0.3% (n=1) in lower class (V).
Based on the Young's Internet Addiction Test scores, 49.4% (n=162) of students had normal internet usage, 37.8% (n=124), 11.6% (n=38) and 1.2% (n=4) had mild, moderate and severe internet addiction respectively. The mean score of YIAT was 32.39, median 31 and mode was 24.0. Standard deviation was 15.95. (Table 2)

Table 2: Prevalence of Internet Addiction among the Study Population.

Prevalence (%)	YIAT Criteria	Frequency (n)	Percentage
Normal Internet use	Score 0-30	162	49.4
Mild Internet Addiction	Score 31-49	124	37.8
Moderate Internet Addiction	Score 50-79	38	11.6
Severe Internet Addiction	Score >= 80	4	1.2
Total		328	100

According to the PHQ9 Scores, 32.3% (n=106) had no depression while 30.5% (n=100), 21.0% (n=69), 10.4% (5.8% (n=19) had mild, moderate, moderately-severe and severe depression respectively. The mean score of

PHQ9 was 8.15 with a standard deviation of 6.16. (Table 3)

Table 3: Prevalence of Depression among the Study Population.

	PHQ 9 Score	Frequency (n)	Percentage (%)
Normal	0-4	106	32.3
Mild Depression	5-9	100	30.5
Moderate Depression	10-14	69	21.0
Depression			
Moderately Severe	15-19	34	10.4
Severe Depression	20-27	19	5.8
Total		328	100

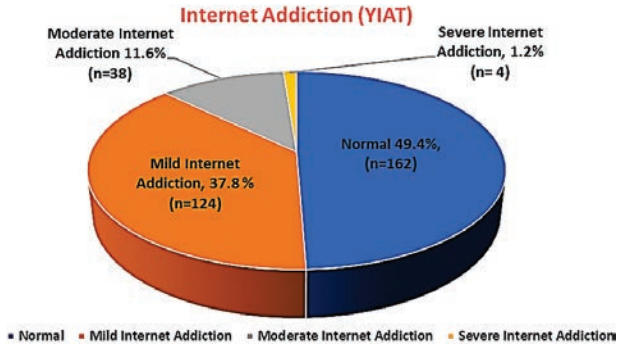

Fig 1: Internet Addition among Students using Youngs Internet Addiction Test Scores

Chi-square analysis was done which showed that internet addiction was significantly associated with depression among the students. [Chi square ($\chi 2$) =31.35, OR=6.96, CI=3.28-14.79 p=0.0001] (Table 4)

Tabe 4: Association Between Internet Addiction and Depression.

	No/Mild	Moderate to Severe	Total n(%)
	Depression n(%)	Depression n(%)	
Normal or Mild Internet Addiction	196 (68.5%)	90 (31.5%)	286 (100)
Moderate-Severe Internet Addiction	10 (23.8%)	32 (76.2%)	42(100)
Total	206	122	328
Chi square (χ 2)=31.35	OR=6.96, CI=3.28-14.79	p=0.0001	

On analysis of socio-demographic factors, it was found that internet addiction was significantly associated with social classification. Students belonging to Upper class (Class I) were significantly at higher risk of internet addiction compared to those belonging to Upper middle to lower class (Class II to V). However, no significant association could be found between internet addiction and other sociodemographic factors like age, gender, locality. (Table 5)

Discussion on Effects of Internet Addiction on Mental Health of Students. This study aimed to explore the association between internet addiction, depression, and socio-demographic factors among medical students, a group particularly susceptible to high levels of stress and mental health challenges. Our findings contribute to the growing body of literature on the mental health of medical students, particularly in the context of increasing internet use.

Key Findings: Our study found a significant association between internet addiction and depression among medical students, consistent with previous research that has identified similar trends in other populations[24] (e.g., Kuss and Griffiths, 2017). Students with higher levels of internet addiction were more likely to experience depressive symptoms, highlighting the potential mental health risks associated with excessive internet use.

Table 5: Association Between Internet Addiction and Socio-Demographic Factors.

	No/Mild Addiction n (%)	Moderate to severe addiction n (%)	Total n(%)	
Age (in years)				$\chi 2$=2.28 p=0.10
22 and below	244(88.4)	32(11.6)	276 (100)	
23 and above	42(80.8)	10(19.2)	52 (100)	
Total	286	42	328	
Gender				
Male	130 (86.7)	20(13.3)	150 (100)	$\chi 2$=0.069 p=0.46
Female	156(87.6)	22(12.4)	178(100)	
Total	286	42	328	
BG Prasad Classification				$\chi 2$=9.53 p=0.002
Upper Class (I)	254(89.4)	30(10.6)	284(100)	
Upper middle to lower class (II, III, IV, V)	32(72.7)	12(27.3)	44(100)	
Total	286	42	328	
Locality				$\chi 2$=1.33 p=0.25
Rural	47(92.2)	4(7.8)	51(100)	
Urban	239(86.3)	38(13.7)	277(100)	
Total	286	42	328	

Numerous studies have identified a significant correlation between internet addiction and depression. A meta-analysis by[25] found that individuals with internet addiction are at a higher risk of developing depression compared to those without addiction. Similarly, Kraut[26] in their landmark study observed that greater internet use was associated with increased levels of loneliness and depression among users.

Excessive internet use, particularly in online gaming or social media, can lead to social isolation, reducing face-to-face interactions and increasing feelings of loneliness, which are closely linked to depression Caplan[27].

Gender: In our study, internet addiction was slightly higher among male students. The study revealed gender differences in the prevalence of internet addiction. However, the finding was not statistically significant. This gender disparity aligns with previous studies[28] that suggest males may be more inclined toward online gaming and other addictive internet behaviors.

Age: In our study, internet addiction was higher among students in older age group ($\geq$23 years) compared to those in younger age group ($\leq$22 years). However, this finding was not found to be significant. Some studies have shown that younger students, particularly those in their early years of medical school, showed higher levels of internet addiction. This trend might be

explained by the stress associated with the transition into the demanding environment of medical education Balhara[29].

Implications for Medical Education: These findings have important implications for medical education. The high prevalence of internet addiction and its strong association with depression suggest a need for targeted mental health interventions. Medical schools should consider incorporating programs that address healthy internet use and provide students with tools to manage stress and prevent addiction.

Additionally, recognizing the role of socio-demographic factors can help make appropriate changes in these interventions. For instance, students might benefit from programs focussed on reducing addictive behaviors and providing more support in managing anxiety and depressive symptoms. Understanding these dynamics can lead to more effective, personalized approaches to student mental health.

Limitations and Future Research: While this study provides valuable insights, there are limitations that should be acknowledged. The cross-sectional design limits the ability to establish causal relationships between internet addiction, depression and socio-demographic factors. Longitudinal studies are needed to explore these associations over time and establish causality. Additionally, reliance on self-reported data may introduce biases such as social desirability bias. Future research should consider using objective measures of internet use and explore other potential moderating factors such as personality traits and academic performance.

CONCLUSION

This study underscores the significant association between internet addiction, depression and socio-demographic factors among medical students. By understanding these relationships, medical schools can better support their students' mental health and academic success. Targeted interventions that consider the specific needs of different demographic groups are crucial for promoting healthier internet use and improving overall well-being in this vulnerable population.

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