
ORIGINAL ARTICLE**Internet addiction status: Its prevalence, factors and effects on medical students***Asha Shirahatti¹, Sangeeta S Kotrannavar^{2*}, Amit Magadum¹*

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Abstract

Background: In today's age of social media and artificial intelligence, internet access has become a new norm and obligatory for students, leading to exponential growth in all professional courses. The study aimed to determine the prevalence of Internet Addiction (IA), its causative factors and effects among medical students. **Material and Methods:** A cross-sectional study was conducted on 170 medical students. Sociodemographic data and IA were tested by a self-administered questionnaire and Young's Internet Addiction Test (Y-IAT), respectively. A Receiver Operating Characteristic (ROC) analysis based on Y-IAT scores identified 43 as the optimal cut-off score to distinguish students with and without IA. The association between IA and various factors were tested by the Chi-square test. **Results:** The present study found a 41% prevalence of IA among medical students. Significant factors associated with IA include: students who spend more than 4 hours online ($p = 0.021$), use ≥ 2 GB of data ($p = 0.021$), residing in a hostel ($p = 0.026$), and always using their mobile while walking ($p = 0.02$). IA showed statistically significant inverse association with academic performance ($p = 0.0001$), negative physical and psychological consequences, such as loss of sleep due to late-night log-ins ($p = 0.0001$), spending more time online than going out with others ($p = 0.0001$), feeling depressed or nervous when offline ($p = 0.0001$), and fear of life being joyless without the internet ($p = 0.003$). **Conclusion:** IA adversely affects students' physical, psychological and social health as well as their academic performance. The study highlights the importance of timely identification, preventive strategies, and promoting awareness to seek counselling and therapeutic assistance, to safeguard students' well-being and professional growth.

Keywords: Internet Addiction, Medical Students, Prevalence, Academic Performance, Risk Factors, Psychological Aspect

Introduction

According to data from February 2025, approximately 67.9% (5.24 billion) of the global population is using the internet. Asia is home to the largest number of online users [1]. Internet usage has both pros and cons. It is a popular medium for sharing information, exchanging knowledge, entertainment, academics, internet gaming, chatting, and social media [2,3]. In modern society, the internet

pervades every aspect of life at home, school, college and workplace, and its excessive uncontrolled use is considered an addiction according to Young KS [4]. Internet Addiction (IA) or Problematic Internet Use (PIU) is similar to substance addiction, such as excessive usage to achieve satisfaction, lying, ignoring responsibilities, withdrawal, repeated failure to reduce and personality

change [4,5,6]. Hence, IA is a public health issue that resembles a silent pandemic [7].

Investigation into the Asian demographic revealed a prevalence of PIU ranging up to 47.4% [8], with a higher number of incidences observed compared to developed countries in Europe [9]. A meta-analysis conducted on college students in India reported an overall prevalence of IA as 40%, and 20-40% of youngsters were at risk of developing IA [10]. A similar result of 46.8% was noticed with South Indian university students [11]. Male sex, adolescent age, staying without parents' supervision, spending more time, and increased frequency of usage were influencers for the development of PIU [2,11]. PIU has the potential to become one of the significant health issues in the future [8]. In a meta-analysis, time spent online, online gaming, depression, stress, maladaptive cognitions, impulsivity, poor sleep quality and consciousness were identified as predictors for IA [12].

IA affects several aspects, including professional, physical, mental, behavioural, and psychological aspects of a person's life. College work and academic performance were negatively linked with IA [11,13,14]. Physical problems like poor sleep quality, daytime sleepiness [8], increased screen time leading to redness, dryness, eye strain, and visual disturbances [15], headache, backache [16], and musculoskeletal pain [2] were often seen in addicts. Recent investigations have explored the strong association of IA with personality and psychological problems like low self-confidence, low self-esteem [5], increased individualism, enculturation, lower sociability [17], maladaptive cognitions [12], loneliness, and even attention deficit hyperactivity disorder symptoms [18]. IA is strongly linked with alcohol use and substance abuse, as in drug addiction [2,12]. IA is contributing

to many psychological problems like depression [11], anxiety and stress [19]. The effects are even deeper, including neurobiological alterations in the prefrontal cortex of the brain, and involving thinning of grey matter volume [6,20]. Due to the widespread impact of IA, therapeutic interventions, preventive strategies, behaviour change communication, and awareness are imperative for the overall well-being of young adults [2,3,16,18,21].

In today's age of social media and artificial intelligence, internet access has become a new norm and an integral part of students' academic and personal lives, leading to an exponential growth in internet usage across all professional courses. The internet profoundly influences students' academic activities, psychological, behavioural, physical, and mental health. There is a paucity of investigations needed to explore the factors responsible for the development of IA in the Indian population. Hence, a need exists to evaluate IA and its impact on student life. The study aimed to determine the prevalence of internet addiction, its causative factors and effects on academic and psychological aspects among medical students.

Material and Methods

Study design and setting

This cross-sectional study was conducted among medical students at KAHER's J N Medical College, Belagavi, Karnataka, India.

Study population and sample size

The sample size was calculated by conducting a pilot study by taking a convenient sample of 30 students. The prevalence of IA was found to be 31.8%. Based on this, the sample size was estimated as 170 using the formula $n = Z^2pq / d^2$ with 95% confidence and 7% margin of error ($p = 31.8\%$, $q = 1-p$, $d = 7$, $z = 1.96$).

Data collection instruments

Data collection was conducted through a self-administered questionnaire that included demographic data such as age, gender, parents' working status, hometown, and stay. It also included data consumption, purpose of using the internet, time spent on internet, social media, gaming, entertainment, physical activities, hobbies and its effect on their academic and health aspects. IA was assessed using Young's Internet Addiction Test (Y-IAT) [22]. Y-IAT demonstrated strong psychometric properties, serving as a valid and reliable tool for measuring IA among Indian adolescents [23]. Y-IAT is a self-reporting questionnaire consisting of 20-items, with respondents rating each item on a 5-point Likert scale from 1 to 5 (1 = rarely to 5 = always). It evaluates how internet use impacts their daily personal life, social interactions, productivity, academic performance and emotional well-being. The lowest possible score was 20, while the highest was 100. A Receiver Operating Characteristic (ROC) analysis based on Y-IAT scores identified 43 as the optimal cut-off score to distinguish students with and without IA [24]. Consequently, students scoring equal to or more than 43 were classified as internet addicts and less than 43 were categorised as non-internet addicts.

Selection criteria

Those who had been using the internet for the past year or above, and were willing to participate in the study, were included.

Ethical concern

An approval by Institutional Ethics Committee was obtained for the study. Before administering the questionnaire to students, the nature and purpose of the study were explained. Consent was obtained from willing participants, and confidentiality and

anonymity were maintained. Before the study began, a self-administered and Y-IAT questionnaire were pre-tested on ten students. Based on their feedback, questionnaires were corrected for clarity and language.

Statistical analysis

It was performed by using the Statistical Package for the Social Sciences (SPSS) version 20. The continuous data are described in mean, Standard Deviation (SD) and categorical data in percentage. The chi-square test was used for analysing the association between categorical variables. A value of $p < 0.05$ was considered significant.

Results

A total of 170 students were recruited which consisted of 49% (83) male and 51% (87) female students with an average age of 20 ± 1.23 years. According to ROC analysis, 41% (70) of students who were found to be addicted to the internet scored equal to or more than 43. The majority ($n = 153$, 90%) of students resided in urban areas, with a single working parent ($n = 103$, 61%). The present study found that students who spent more than four hours online ($p = 0.021$), used more than 2GB of data ($p = 0.021$), resided in hostels ($p = 0.026$), and always used their phones while walking ($p = 0.02$) were significant factors associated with IA. Other factors were not linked with IA, as presented in Tables 1 & 2.

Table 3 shows the effects of IA on academic and psychological aspects. IA was strongly associated with negative academic behaviours. Those with IA tended to miss more classes due to late-night log-in for non-academic purposes ($p = 0.0001$), spent longer online than intended ($p = 0.0001$), and their college work suffered ($p = 0.0001$), ultimately

affecting their academic performance ($p = 0.0001$), compared to non-addicted students. IA showed statistically significant association to negative physical and psychological consequences, such as loss of sleep due to late-night log-ins ($p = 0.0001$),

spending more time online than going out with others ($p = 0.0001$), feeling depressed or nervous when offline ($p = 0.0001$), and fear of life being joyless without the internet ($p = 0.003$).

Table 1: Association between socio-demographic and internet addiction

Variables /features	Without internet addiction N = 100(%)	With internet addiction N = 70(%)	Total count	Chi-square	<i>p</i>
Gender					
Male	53 (64%)	30 (36%)	83	1.695	0.193
Female	47 (54%)	40 (46%)	87		
Parent working status					
Single	62 (60%)	41 (40%)	103	0.203	0.653
Both	38 (57%)	29 (43%)	67		
Type of residence					
Rural	08 (47%)	09 (53%)	17	1.079	0.299
Urban	92 (60%)	61 (40%)	153		
Type of stay					
Home	15 (83%)	03 (17%)	18	4.993	0.026*
Hostel	85 (56%)	67 (44%)	152		
Interaction with parents/day					
Nil	27 (48 %)	29 (52%)	56	6.940	0.139
<30 min	61 (67 %)	30 (33%)	91		
<60 min	10 (53 %)	09 (47%)	19		
<90 min	02 (67%)	01 (33%)	03		
>2 h	00 (0 %)	01 (100%)	01		

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Time spent on physical activity/day					
Nil	15(60%)	10(40%)	25	1.303	0.729
<30 min	47(63%)	28 (37%)	75		
60 min	20(57%)	15(43%)	35		
>60 min	18(51 %)	17(49%)	35		
Time spent on hobbies/day					
Nil	07(58 %)	5(42%)	12	5.398	0.249
<30 min	33(57%)	25(43%)	58		
60 min	27(75%)	09(25%)	36		
90 min	09(50%)	09(50 %)	18		
120 min	24(52%)	22(48%)	46		

Table 2: Association between mobile and internet usage patterns with internet addiction

Using a mobile while walking					
No	11 (65%)	6 (35%)	17	11.724	0.02*
Occasionally	58 (65%)	31 (35%)	89		
Frequently	22 (59%)	15 (41%)	37		
Often	08 (44%)	10 (56%)	18		
Always	01 (11%)	08 (89%)	09		
Using a mobile while eating					
No	21 (68%)	10 (32%)	31	1.595	0.81
Occasionally	43 (56%)	34 (44%)	77		
Frequently	23 (61%)	15 (39%)	38		
Often	11 (55%)	09 (45%)	20		
Always	02 (50%)	02 (50%)	04		

Continued...

Time spent on the internet/day					
Nil	02 (100%)	00 (0%)	02	11.517	0.021*
<1 h	04 (50%)	04 (50%)	08		
2 h	36 (72%)	14 (28%)	50		
3 h	34 (63%)	20 (37%)	54		
>4 h	24 (43%)	32 (57%)	56		
Data Usage /day					
<1gb	18 (82 %)	04 (18%)	22	11.597	0.021*
1gb	47 (65%)	25 (35%)	72		
2gb	25 (45%)	30 (55%)	55		
3gb	05 (42%)	07 (58%)	12		
4gb	05 (56%)	04 (44%)	09		
Purpose of using internet					
Academic	02 (67%)	01 (33%)	03	2.712	0.258
Non-academic	19 (73 %)	07 (27 %)	26		
Both	79 (56 %)	62 (44%)	141		
Frequency of using internet for academic purposes/day					
Nil	09 (56%)	07 (44 %)	16	2.234	0.693
3 times	54 (56%)	42 (44 %)	96		
8 times	26 (63 %)	15 (37%)	41		
15 times	05 (83 %)	01 (17 %)	06		
>15 times	06 (55%)	05 (45 %)	11		
Time spent on internet gaming/day					
Nil	54 (61%)	35 (39%)	89	3.188	0.527
<30 min	32 (60 %)	21 (40%)	53		
<60 min	12 (52 %)	11 (48%)	23		
<90 min	01(25%)	03(75%)	04		
>2 h	01(100%)	00(0%)	01		

Continued...

Time spent on the internet/day					
Time spent on social media/day					
Nil	05(71%)	02(29%)	07	8.279	0.082
<30 min	30(70%)	13(30%)	43		
<60 min	34(62 %)	21(38%)	55		
<90 min	21(55 %)	17(45 %)	38		
>2 h	10(37 %)	17(63%)	27		
Time spent on entertainment/day					
Nil	07(58 %)	05(42%)	12	3.658	0.454
<30 min	28(56 %)	22(44%)	50		
<60 min	36(68 %)	17(32%)	53		
<90 min	18(58 %)	13(42%)	31		
>2 h	11(46 %)	13(54%)	24		

*=*significant*

Table 3: Effects of internet addiction on academic and psychological aspects

Features	Without internet addiction n = 100(%)	With internet addiction n = 70(%)	Total count	Chi-square	<i>p</i>
Missed classes due to late-night log-in for non-academic purposes					
Rarely	92 (69%)	41 (31%)	133	30.044	0.0001*
Occasionally	05 (19%)	21 (81%)	26		
Frequently	02 (25%)	06 (75%)	08		
Often	00 (0%)	02 (100%)	02		
Always	01 (100%)	00 (0%)	01		
Staying online longer than intended					
Rarely	10 (83%)	02 (17%)	12	29.078	0.0001*
Occasionally	41 (77%)	12 (23%)	53		
Frequently	34 (60%)	23 (40%)	57		
Often	11 (44%)	14 (56%)	25		
Always	04 (17%)	19 (83%)	23		

Continued...

College work suffers because of time spent online					
Rarely	50 (83%)	10 (17%)	60	43.167	0.0001*
Occasionally	35 (64%)	20 (36%)	55		
Frequently	12 (39%)	19 (61%)	31		
Often	03 (23%)	10 (77%)	13		
Always	00 (0%)	11 (100%)	11		
Academic performance suffers because of the Internet					
Rarely	44 (86%)	07 (14%)	51	48.160	0.0001*
Occasionally	39 (65%)	21 (35%)	60		
Frequently	16 (44%)	20 (56%)	36		
Often	01 (7%)	14 (93%)	15		
Always	00 (0%)	08 (100%)	08		
Lose sleep due to late-night log-ins					
Rarely	57 (84%)	11 (16%)	68	40.037	0.0001*
Occasionally	25 (58%)	18 (42%)	43		
Frequently	80 (28%)	21 (72%)	29		
Often	10 (40%)	15 (60%)	25		
Always	00 (0%)	05 (100%)	05		
Spending more time online over going out with others					
Rarely	63 (78%)	18 (22%)	81	31.572	0.0001*
Occasionally	24 (51%)	23 (49%)	47		
Frequently	12 (41%)	17 (59%)	29		
Often	00 (0%)	09 (100%)	09		
Always	01 (25%)	03 (75%)	04		
Fear of life being joyless without the internet					
Rarely	39 (76%)	12 (24%)	51	16.079	0.003*
Occasionally	28 (61%)	18 (39%)	46		
Frequently	19 (56%)	15 (44%)	34		
Often	10 (42%)	14 (58%)	24		
Always	04 (27%)	11 (73%)	15		

*=significant

Feeling depressed or nervous when offline					
Rarely	63(82%)	14 (18%)	77	49.201	0.0001*
Occasionally	27 (61%)	17 (39%)	44		
Frequently	8 (26%)	23 (74%)	31		
Often	01 (6%)	15 (94%)	16		
Always	01 (50%)	01 (50%)	02		

Discussion

Prevalence

The present study found a 41% prevalence of IA in medical students in the Indian population. Research conducted on medical students in other parts of India, showed a prevalence of 66.9% in Karnataka [21], 61.4% in South India [3], 68.64% in Uttar Pradesh [25], 52.63% in Andhra Pradesh [14], 42.9% in Madhya Pradesh [26], 33.94% in Rajasthan [27], and 59% in Kerala [16]. The findings of the current study align with those of the Madhya Pradesh study [26]. A meta-analysis of college students in India reported a prevalence of 40% [10], which confirms the present study result. The prevalence rate varies from 34-68%, and this difference in prevalence may be due to variations in grouping structure based on Y-IAT score, sample size, instruments used, different regional cultures, age of participants, duration and the time involved in internet usage, which are likely factors.

Factors

In the present study, factors related to IA, such as sex, parents' working status, hometown, stay, data used, frequency, time spent online, gaming, social media, entertainment, use of mobile while walking and eating were assessed. The present study showed that people who spent more time on the internet (>4 hours, 57%) and used higher data ($\geq$ 2GB/day) were associated with a greater risk of IA. Other research has also revealed comparable findings

among medical students within the Indian population [3,7,11,27]. The present study observed that addicted students used the internet while walking, showing a behavioral change.

Several studies have indicated that male students are more likely to develop IA [11,14,25]. In contrast, another study conducted in Delhi [7] noticed that females tend to be more addicted to the internet. In the current study, a higher number of females were found in the addicted group; however, no significant differences were observed related to gender. This trend shows that internet usage is increasing among females.

Research on medical students showed that those who resided in the hostel were associated with IA, which is consistent with the findings of the current study [7,11,19]. The present study noticed that a higher number of students in the non-addicted group interacted with parents for 30-60 minutes daily and stayed at home. Hence, students who spent time with family and under supervision were prevented from IA.

Watching online videos, social networking, mainly WhatsApp and Facebook, are prominent risk factors for developing IA [3,7,25]. A higher proportion of students using social media, gaming and entertainment were in the IA group, but the difference did not reach a significant level in the present study. Interestingly, even though students whose frequency of using the internet for academic

purposes was higher, they were not addicted. Medical students had displayed a significant relationship between reduced physical activity and elevated BMI with IA [28]. In the same manner, we observed that a higher number of students who engaged more time in daily physical activities and hobbies were not addicted, although this did not reach a significant level.

Effects

Kerala and Uttar Pradesh medical students used the internet for both academic and non-academic purposes, which is in agreement with the present study [15,25]. Students with IA stayed online for a longer time than intended, which was statistically significant in the current study, leading to sleep disturbances, missing classes and affecting their college work. Thus, academic performance had a negative relation with IA, aligning with the findings of Asokan *et al.*, (2019) and Subhaprada & Kalyani (2017) [3,14].

The present study revealed that IA is linked to negative emotional and physical impacts, such as losing sleep due to late-night log-ins, prioritizing online activities over social interactions, and feeling depressed or nervous when offline. Those with IA were more likely to fear that life would be joyless without the internet, emphasizing their excessive usage to achieve satisfaction and emotional reliance on the internet. All the behaviors showed statistically significant differences ($p < 0.01$), indicating a strong correlation between IA and its negative impacts on personal and social well-being. Similar results were seen in other studies conducted on Indian medical students [14,15,19]. Depression is a serious mental health issue interfere with working ability, family, and social relationships [29].

Recent investigations involving neuroimaging techniques have displayed the microstructural alterations, such as a reduction in the grey matter volume within the bilateral Dorsolateral Prefrontal

Cortex (DLPFC) and orbitofrontal cortex [20], along with functional impairment in reward processing areas (striatum, insula, amygdala), which were associated with IA [30].

The alterations observed in executive functions (DLPFC, frontal/parietal/occipital) among internet addicts resemble those found in behavioural addiction. These changes have led to compromised executive functioning in areas related to planning and reasoning, ultimately resulting in a diminished ability to control internet usage [6,30].

Limitation of the study

It was limited to a single centre; a multicentric study, which includes participants from various sociodemographic and cultural backgrounds, would be more reliable. Because it was based on a questionnaire, responses were subjective and self-reporting; therefore, they might not fully reflect the scenario. The present study population consisted only of first-year MBBS students; findings might vary if final-year students were included, as they have had a longer history of internet use.

Conclusion

IA has a negative impact on students' academic performance as well as their social, psychological, and physical well-being. The study recommends that medical educators reevaluate preventable risk factors, like excess internet usage, by restricting night-time Wi-Fi, blocking or controlling illicit websites, and social media on campus in order to address this growing problem. Encouraging regular physical activity, yoga, and cultural events may help divert attention from screens. Early detection, counselling, and raising awareness of the detrimental effects of internet use are crucial for promoting students' well-being and professional growth.

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