



INTERNET ADDICTION AMONG MEDICAL STUDENTS DURING THE COVID-19 PANDEMIC IN DHAKA CITY: PREVALENCE AND ASSOCIATED FACTORS

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Abstract: *Internet addiction is a growing public health concern globally, and the COVID-19 pandemic has exacerbated this problem. This study aimed to determine the prevalence of internet addiction among medical students during the pandemic and identify associated factors. A cross-sectional study was conducted using a semi-structured questionnaire and Young's internet addiction test with 439 medical students from 20 public and private medical colleges in Dhaka city. The study found that 33.7% of the medical students were identified as addicted to the internet. Spending more than four hours per day online, staying in private accommodations, monthly internet expenditure, physical inactivity, and maintaining social distancing were significantly associated with internet addiction. The study highlights the need to strengthen education and provide preventive measures for internet addiction among medical students, especially during the pandemic. Additionally, promoting mental health literacy, psychological warning signs, and adaptive psychiatric services is critical during this challenging time.*

Keywords: internet addiction, COVID-19 pandemic, medical students, prevalence, associated factors, mental health literacy.

Introduction

Internet Addiction (IA), by several sources, has been classified as a psychological reliance on the internet irrespective of the nature of activity engaged to which can also be referred to as an individual's inability to regulate their internet use on their own, later impacting their functionality (Bates et al., 2020; Nath, Naskar & Victor, 2016; Ghosh & Chatterjee, 2018). In 1995, Ivan Goldberg coined the expression "Internet Addiction" for which he suggested a medical criterion marked by (i) Maladaptive Internet Usage that causes pain or impairment



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in psychological, educational, or other essential functions, (ii) Tolerance, defined as the need to extend the duration of an internet connection to achieve the desired level of enthusiasm, and (iii) Withdrawal, defined as psychomotor restlessness or anxiety following the discontinuation or reduction of long-term Internet use. (Nath, et al., 2016; Ghosh & Chatterjee, 2018; Poli & Agrimi, 2012).

Excessive internet usage is reported to create morphological mutations of brain structure which has been reported in many studies. One of the studies found students using 10 hours in front of a computer for 6 days a week possess a smaller dorsolateral prefrontal cortex and rostral anterior cingulate cortex along with other parts of the cerebellum when compared with those of the control group (Uddin et al., 2016). Moreover, addicted people suffer from sleep disturbances, backaches, headaches, Carpal Tunnel Syndrome, blurred vision, dry eyes, and bad eating habits. Excessive use of Internet and addiction-like most other addiction, shelter one from dealing with difficult emotions and make them feel safer when indulged into and change their temporal experience (Salicetia, 2015). There has been found a strong association of Internet Addiction with conditions like depression, anxiety, fatigue, isolation, self-esteem, social connectedness, insomnia, etc (Haand & Shuwang, 2020). Not only this, internet addiction makes people more susceptible to other addictions like drugs, alcohol, tobacco, sex, etc (Uddin et al., 2016).

Globally around 4.57 billion people, which is approximately 59% of the world population, are active internet users until July 2020 while the proportion of adolescent internet users has increased tremendously (Weinstein & Lejoyeux, 2010; Uddin et al., 2016). Like the rest of the world, the no. of internet users is also rising in Bangladesh and the current government is also promoting internet access through the "Digital Bangladesh" movement in the country (Mamun et al., 2019). From 2000 to 2016, the number of internet consumers increased in Bangladesh from 0.1 million to 62 million (Islam & Hossin, 2016).

As the world's use of the Internet grows, Internet Addiction has emerged as a new public health issue and globally Internet Addiction prevalence was found to be ranged from 3 percent to 38 percent in previous surveys (Chaudhari, Menon, Saldanha, Tewari & Bhattacharya, 2015). Similarly, Internet Addiction is gradually becoming a newly emerging problem for Bangladesh with the rise of internet users (Hassan, Alam, Wahab & Hawladar, 2020). In numerous Bangladeshi samples utilizing the Internet Addiction Test (IAT), prevalence rates of IA have been observed to range between 4 percent and 49.7 percent, which is comparable to other Asian countries (Hassan et al., 2020; Karim & Nigar, 2014, Uddin et al., 2016; Islam & Hossin, 2016; Mamun & Griffiths, 2019). The prevalence of Internet Addiction was found 27.1 percent in Hassan et al. (2020) whereas 34.3 percent of the Karim & Nigar (2014) study sample was reported to be moderate Internet users with 1.7 percent as heavy users. Since the onset of the COVID-19 pandemic people have become used to operating their daily lives despite maintaining social distancing (Hall, Laddu, Phillips, Lavie & Arena, 2020). Adolescents are especially affected immensely by the closure of the learning institution, as well as other socio-behavioral changes

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like social distancing, lockdown, online class, etc. (Bates et al., 2020; Garcia-Priego, 2020). In an attempt to contain the pandemic's spread in Bangladesh, the government also issued a countrywide lockdown. As an aftermath, students have been seen to spend a significant amount of time online for academic, leisure, social needs and so on, which, if left unchecked, can lead to Internet Addiction (Dong, Yang, Lu & Hao, 2020).

Currently there is no research in Bangladesh that we are aware of that has looked into the pattern of Internet Addiction among medical students or how the COVID-19 pandemic may exacerbate this problem. During this crisis, assessing Internet Addiction level of medical students is as vital as the identification of the determinants that contribute to it.

Materials and methods

Subheading (10pt Times New Roman, Bold, Justified)

This online-based cross-sectional study was conducted on medical students of 20 different public and private medical colleges in Dhaka city over a period from August 2020 to January 2021. Total 439 sample were selected by using convenient sampling technique. Self-administrated semi-structured online questionnaire was used for the information regarding demographic and internet use variable. The online survey was conducted by using Google Forms, which were distributed through email and social media platforms. Regarding Internet Addiction, Young's 20-item Addiction test was used which is graded on a 5-point Likert scale to determine how much Internet use impacts a person's social life, sleep, academic activities, interpersonal connections, and emotions. The test's 20 questions are graded on a scale of 1 to 5, with 1 being the least severe and 5 being the most severe. The overall score indicates the degree of addiction and gives details on the negative consequences of Internet Addiction in numerous areas of life. Score interpretation:

1. **0 - 20:** are indicate a normal level of internet usage.
2. **21 – 49:** reflect the presence of a mild level of Internet Addiction.
3. **50 – 79:** reflect the presence of a moderate level of Internet Addiction.
4. **80 – 100:** indicate a severe level of Internet Addiction.
- 5.

Since the moderate users are often unable to control their internet use, we considered both moderate and excessive use of Internet (IAT total score ≥ 50) to be considered as IA (Internet Addicted), and who scored between 0 and 49 was considered as a normal user of Internet (Ali, Mohammad & Aly, 2017; Hassan et al., 2020; Islam & Hossin, 2016).

All statistical analysis were done by using the data analysis software SPSS 25.0. The data was summarized using descriptive statistics (frequency, percentage, and mean). To access the degree of association between the dependent and independent variable, Chi-square was applied. Multiple logistic regression analysis was used to



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determine the strength of association for variables that showed significant relationship in chi-square analysis. In all cases, P values of less than 0.05 were considered significant.

Results

The sample was of a total of 439 medical students who were studying at different levels of the academic year of undergraduate medical courses. Majority of the students, 238 (54.2%), were in the age range 18-20 years and 299 students were female (68.1%). 307 (69.9%) were living with family and 308 (70.2%) respondents reported to live in urban area.

Most of the students were using the Internet for more than 5 years ($n = 195$, 44.4%). Among the students, 290 (66.1%) reported to be on the Internet more than 4 hours every day, and the most popular way of using the Internet was Wi-Fi 320 (72.9%). Majority of the students spent less than 800 taka per month on the internet ($n = 245$, 55.8%), and most common gadget was mobile ($n = 418$, 95.2%). Of the respondents, 50.3% said that they were occasionally online and Social media (55.6%) was the most accessed content, followed by academic materials (30.3%). Due to the COVID-19 pandemic, 266 (60.6%) students spent more than 5 hours weekly on online classes and 92.1% of students believed that their internet usage has increased due to maintaining social distancing. Among the students, 247 (56.3%) did not meet up the recommended physical activity; however, 192 (43.7%) students reported to meet the bar.

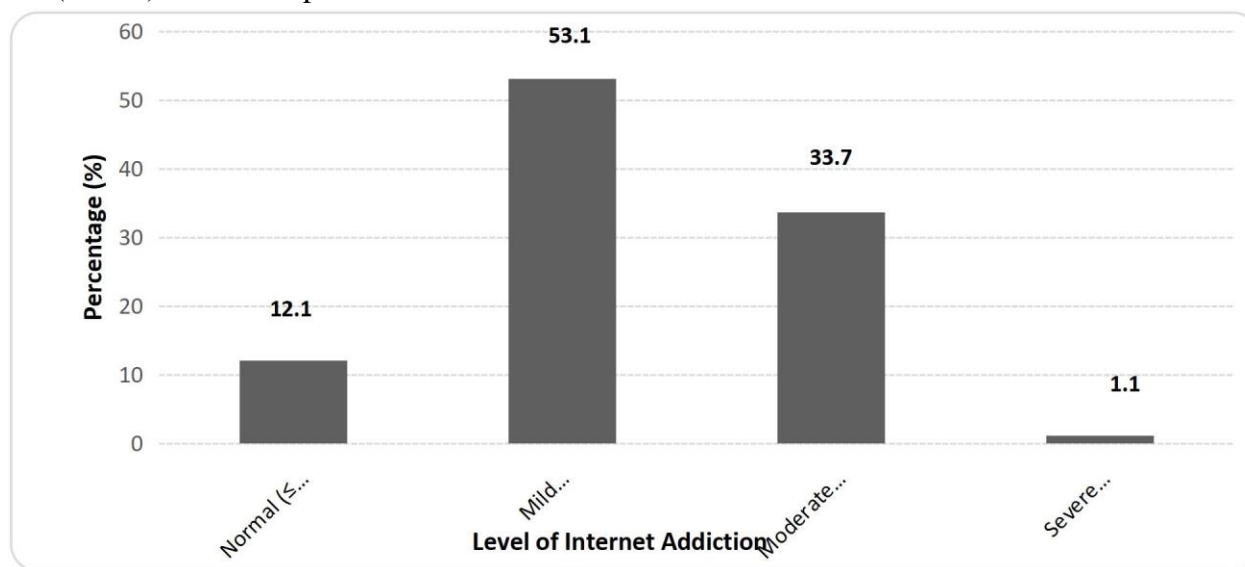


Figure 1: Distribution of the studied medical students according to Internet Addiction level

We considered moderate and severe Internet Addiction as Internet addict (score 50-100), which was 34.9%, and those with lower scores (0-49) were considered as non –Internet Addiction.



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Table 1. Association of demographic variables with Internet Addiction

Variables	n	Addicted (%)	Non-addicted (%)	χ^2 value	P-value
Age					
18-20 years	238	80(33.6%)	158(66.4%)	0.3561	0.553 ^{ns}
21-24 years	201	73(36.3%)	128(63.7%)		
Gender					
Male	140	54(38.6%)	86(61.4%)	1.252	0.263 ^{ns}
Female	299	99(33.1%)	200(66.9%)		
Father's occupation					
Govt. Employee	80	26(32.5%)	54(67.5%)	2.524	0.773 ^{ns}
Businessman	108	36(33.3%)	72(66.7%)		
Doctor	45	16(35.6%)	29(64.4%)		
Retired	27	13(48.1%)	14(51.9%)		
Others	139	49(35.3%)	90(64.7%)		
Teacher	40	13(32.5%)	27(67.5%)		
Mother's occupation					
Housewife	307	108(35.2%)	199(64.8%)	0.989	0.911 ^{ns}
Doctor Teacher	24	9(37.5%)	15(62.5%)		
	66	22(33.3%)	44(66.7%)		
Govt. Employee	16	4(25.0%)	12(75.0%)		
Others	26	10(38.5%)	16(61.5%)		
Academic year					
1 st year	201	73(36.3%)	128(63.7%)	0.351	0.553 ^{ns}
2 nd year	138	38(27.5%)	100(72.5%)	4.744	0.029*
3 rd year	43	14(32.6%)	29(67.4%)	0.111	0.739 ^{ns}
4 th year	34	15(44.1%)	19(55.9%)	1.393	0.237 ^{ns}
5 th year	23	13(56.5%)	10(43.5%)	5.020	0.025*
Residence					
Urban	308	107(34.7%)	201(65.3%)	0.006	0.997 ^{ns}
Semi-urban	74	26(35.1%)	48(64.9%)		
Rural	57	20(35.1%)	37(64.9%)		



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Living setup					
Live with family	307	79(25.7%)	228(74.3%)		
Live with other	132	74(56.1%)	58(43.9%)	37.39	<0.001*

Chi-squared Test (2) was done to analyze the data. *significant

Table 1 Shows Internet Addiction was significantly associated with living setup ($P < 0.001^*$), students who were living with other people were more addicted to Internet than those who were living with family. The Association with Internet Addiction was found to be significant with students being in 2nd ($P = 0.029^*$) and 5th year ($P = 0.025^*$).

Table 2. Association of Internet use and COVID-19 related variables with Internet Addiction

Variables	N	Addicted (%)	Non- addicted (%)	χ^2 value	P-value
Length of internet uses (years)					
More than 5	195	69(35.4%)	126(64.6%)	0.566	0.754 ^{ns}
2-5	179	64(35.8%)	115(64.2%)		
Less than 2	65	20(30.8%)	45(69.2%)		
Daily time spent on Internet (hours)					



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More than 4	290	124(42.8%)	166(57.2%)		
2-4	127	22(17.3%)	105(82.7%)	25.26	<0.001*
Less than 2	22	7(31.8%)	15(68.2%)		
The most common way to using the Internet					
Wi-Fi	320	112(35.0%)	208(65.0%)	0.011	0.915ns
Mobile data	119	41(34.5%)	78(65.5%)		
Most used gadget					
Mobile	418	142(34.0%)	276(66.0%)		ns
Personal desktop or laptop	21	11(52.4%)	10(47.6%)	2.984	0.084
Monthly expenditure for internet access (Taka)					
800 or more	206	88(42.7%)	118(57.3%)		
Less than 800	233	65(27.9%)	168(72.1%)	10.87	0.001*
Usual logging status					
Always online	168	83(49.4%)	85(50.6%)		
Occasionally check-in	221	55(24.9%)	166(75.1%)		
Infrequently check-in	46	14(30.4%)	32(69.6%)	25.90	<0.001*
Deactivated or never check-in	4	1(25.0%)	3(75.0%)		
Most accessed content on the Internet					
Social media	244	92(37.7%)	152(62.3%)		
Academic materials	133	42(31.6%)	91(68.4%)		
Downloadable media	40	10(25.0%)	30(75.0%)	6.070	0.194 ^{ns}
Online shopping	4	3(75.0%)	1(25.0%)		
Others	18	6(33.3%)	12(66.7%)		
Duration of online classes (hours/week)					
More than 5	266	90(33.8%)	176(66.2%)		
2-5	128	44(34.4%)	84(65.6%)	1.211	0.546 ^{ns}
Less than 2	45	19(42.2%)	26(57.8%)		
Meets recommended PA					
No	247	103(41.7%)	144(58.3%)		
Yes	192	50(26.0%)	142(74.0%)	11.666	<0.001*

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Believe in the past few months internet usage has increased due to maintaining social distancing

No	35	5(14.3%)	30(85.7%)	7.085	0.008*
Yes	404	148(36.6%)	256(63.4%)		

*Chi-squared Test (2) was done to analyze the data. *significant*

Table 2 shows some variables like daily duration of Internet usage ($P < 0.001^*$) and monthly expenditure for internet access ($P = 0.001^*$) were found significantly associated with Internet Addiction. Internet Addiction is relatively higher in the students who were always online ($P < 0.001^*$) in comparison to others. Students who did not reach the prescribed quantity of physical activity had a much greater rate of Internet addiction ($P < 0.001^*$). Among medical students those who maintained social distancing in the time of pandemic showed significant Association ($P = 0.008^*$) with Internet Addiction.



Table 3. Multiple logistic regression for predictors of Internet Addiction of medical students in COVID-19 pandemic period

Variables	β	S.E.	p-value	AOR	95% CI for OR	
					Lower	Upper
Lives with other people	1.257	.238	.000	3.515	2.203	5.607
Academic year (2nd)	.329	.260	.206	1.389	.835	2.312
Academic year (5th)	-.0767	.494	.120	0.464	.176	1.223
Daily time spend (> 4 hours)	.730	.265	.006	2.076	1.234	3.492
Monthly expenditure for internet access (>800 Tk.)	.549	.229	.016	1.732	1.106	2.713
Always online on social media sites	.844	.228	.000	2.326	1.487	3.639
Doesn't meets recommended PA threshold	.588	.234	.012	1.801	1.139	2.848
Believe in the past few months, your internet usage has increased due to maintain social distancing	1.139	.541	.035	3.123	1.081	9.025
Constant	-1.560	.295	.000	.210		

Table 3 presents the result from multiple logistic regression which tied students who lived with other people to Internet Addiction (AOR: 3.515, 95% CI: 2.203- 5.607, $p = .000$). Within the criteria we defined, daily time spend (> 4 hours) (AOR: 2.076; 95% CI: 1.234- 3.492, $p = 0.006$); monthly expenditure (>800Tk) (AOR: 1.732; 95% CI: 1.106-2.713, $p = .016$); and always logging status in social medial (AOR: 2.326; 95% CI: 1.487-3.639, $p = .000$) were the most significant predictors of medical students' Internet Addiction. Students who did not meet recommended physical activities threshold were more prone to be addicted (AOR: 1.801; 95% CI: 1.139 -2.848, $p = 0.012$) in comparison to those who meet recommended physical activity. Furthermore, students who reported greater internet usage as a result of maintaining social distance were shown to be more likely to acquire Internet Addiction (AOR: 3.123, 95% CI: 1.081 - 9.025; $p = 0.035$). The academic year of the students (2nd Year and 5th Year) failed to show any significant statistical association with respect to Internet Addiction in this regression model, but this one is significant in chi-square analysis.



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Discussion

In this survey, we discovered that 34.9 percent of people are addicted to the internet. Hassan et al. (2020) reported a prevalence of 27.1 percent among graduate students at Dhaka University in a study which was conducted in the three divisions of Bangladesh: Dhaka, Chittagong, and Sylhet, and Islam and Hossin (2016) reported a prevalence of nearly 24 percent among graduate students at Dhaka University in another study. The current findings, however, are significantly more prevalent among students than prior research, which can be related to the COVID-19. The research also revealed that students who stayed with others, as in a dormitory or a mess, have a higher possibility for developing an Internet addiction comparing to students living with their families. This results aligns with Hassan et al. (2020), who found that students who live with others have a higher Internet Addiction score. Loneliness, a lack of family bonding, online privacy, and a lack of monitoring and care are all possible contributing factors (Chaudhari et al., 2015; Uddin et al., 2016).

Internet addict students were shown to spend much more money and time on the Internet than non-addict students in this study. This conclusion is consistent with earlier research (Ghosh & Chatterjee, 2018; Chaudhari et al., 2015; Hassan et al., 2020). Internet addicts' increased spend of money and time may result in financial issues and a lack of focus on academic goals.

A significant statistical association between Internet Addiction and those who preferred to always stay online was present in the data. Nath et al. (2016), in their study among medical students in Northeastern India, reported that permanent login status highly associated with Internet Addiction.

Internet addiction was also shown to be more prevalent among those who did not engage in any physical exercise. A previous study focused on young adults and graduate students of Bangladesh also found physical inactivity as a risk factor for Internet Addiction (Hassan et al., 2020; Islam and Hossin, 2016). Furthermore, because to the COVID-19 epidemic, the maintaining of social distance has risen in recent months. However, unlike many other countries, Indonesia did not implement a mandatory "lockdown" throughout the nation during the COVID-19 epidemic, and social distance was not shown to be a risk of Internet Addiction among adult Indonesians (Siste et al., 2020)

Fifth-year students were shown to be more hooked than other students in our study. A recent study by Uddin et al. (2016) confirmed the findings, demonstrating that fourth-year undergraduate students are more hooked than those in prior years (1st, 2nd, and 3rd). However, this is due to excessive searching of study materials for their final year exam preparation, which makes them more prone to Internet. During this time, they may be more addicted to the Internet than other year medical students.

Conclusion

The result from this study unfolds the severity and spread of Internet Addiction among medical students, and this requires timely remedial actions. It is imperative to provide anticipatory actions and fortify education on Internet

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Addiction among medical students while directing combined effort in mainstreaming mental health literacy. Strict observation and close monitoring are needed to overcome the long time use of Internet for recreational purposes. That there are a high possibility and risk of Internet Addiction should be conveyed with emphasis to the students, their guardians, and other concerned authorities. Awareness programs targeting all of the mentioned groups of people will ease the process of intervention and implementation of required policies at every levels of the society. Although Internet use for research and creative purposes should be encouraged and promoted, awareness about the demerits of uncontrolled and extended internet use should be spread among the young generation. Ultimately, we must be well acquainted with the advantage of the Internet, which should not be outweighed by the unhealthy consequences borne by its addiction.

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