

Health Data Science

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[AP3-E2-3-03] Factors Associated with Internet Addiction and Depression Among Undergraduate Medical Students in Dhaka City

*Mohammad Niaz Morshed Khan¹, Michiko Moriyama¹, Tanha Tabassum Nunnah², Mohammad Sha Al Imran², Md Jiaur Rahman¹, Nuhad Raisa Seoty³, Sanjana Zaman⁴, Mohammad Delwer Hossain Hawlader⁴, Md Moshir Rahman¹ (1. Graduate School of Biomedical and Health Sciences, Hiroshima University, Japan, 2. Freelance researcher, Bangladesh, 3. Department of Public Health, State University of Bangladesh, Bangladesh, 4. Department of Public Health, North South University (NSU), Bangladesh)

Keywords: Internet Addiction, Depression, Undergraduate Medical Students, Bangladesh

With the globalization, the use of internet has increased many folds in the last decades, and internet addiction has become a severe public health issue among the young population both in developed and developing countries around the world. A total of 350 students using simple random sampling were recruited in this study, of whom 115 were enrolled in 2nd year, 140 in 3rd year and 95 in 4th year of their study. Self-reported questionnaire Young's Inter Addiction scale and Beck Depression Inventory were used to assess internet addiction and depression.

Among the participants, 258 (73.7%) were female and 92 (26.3%) were male. The mean Inter Addiction Score (IAS) was found to be decreasing with increasing year of enrolment. Mean IAS was found to be 60.7 ± 20.4 for 2nd year students, 59.4 ± 14.9 for 3rd year students and 56.5 ± 16.3 among 4th year students. Similarly, the prevalence of addiction was found to peak among 3rd year students and then decrease. Statistical significance in addicted vs. non-addicted was not observed in 2nd and 4th year students, but was observed in among 3rd year students. Aggregating students from all years of enrolment, the difference in percentage of students addicted (76.9%) vs not addicted (23.1%) was not found to be statistically significant ($p > 0.05$). The percentage of students depressed among 2nd years was 73.0%, for 3rd years was 82.9% and for 4th years was 72.6%. Difference in percentage of students depressed vs. not depressed was 82.9% and 17.1% respectively and this difference was statistically significant ($p > 0.05$).

From these findings, intervention needs to be taken for medical students regarding the proper use of internet for both academic and non-academic purposes.

Factors Associated with Internet Addiction and Depression Among Undergraduate Medical Students in Dhaka City

Mohammad Niaz Morshed Khan^a, Michiko Moriyama^a, Tanha Tabassum Nunna^b,
Mohammad Sha Al Imran^b, Md Jiaur Rahman^a, Nuhad Raisa Seoty^c, Sanjana Zaman^d,
Mohammad Delwer Hossain Hawlader^d and Md Moshir Rahman^a

^aGraduate School of Biomedical and Health Science, Hiroshima University, Japan

^bFreelance researcher, Bangladesh

^cDepartment of Public Health, State University of Bangladesh, Bangladesh

^dDepartment of Public Health, North South University (NSU), Bangladesh

Abstract

With globalization, the use of internet has increased many folds in the last decades, and internet addiction has become a severe public health issue among young population in both developed and developing countries around the world. A total of 350 students using simple random sampling were recruited in this study. Young's Internet Addiction scale (IAS) and Beck's Depression Inventory (BDI) were used to assess internet addiction (IA) and depression. Among the participants, 258 (73.7%) were female and 92 (26.3%) were male. The mean IAS was found to be decreasing with increasing year of enrolment: 60.7±20.4 among 2nd year students, 59.4±14.9 among 3rd year students and 56.5±16.3 among 4th year students. Prevalence of IA was found to peak among 3rd year students and then decrease. Statistical significance in addicted vs. non-addicted was not observed in 2nd and 4th year students, but was observed among 3rd year students. Aggregating students from all years of enrolment, the difference in percentage of students addicted (76.9%) vs not addicted (23.1%) was not found to be statistically significant ($p>0.05$). The prevalence of students depressed among 2nd year was 73.0%, for 3rd year was 82.9%, and for 4th year was 72.6% and was statistically significant for 3rd year students ($p<0.05$). From these findings, intervention needs to be taken for medical students regarding the proper use of internet for both academic and non-academic purposes.

Keywords:

Internet Addiction, Depression, Undergraduate Medical Students, Bangladesh

Introduction

With globalization, internet use has increased rapidly around the world, particularly among young people in both developed and developing countries [1]. Nowadays, internet is an essential part of everyday life for social interaction, communication, and information exchange. Its impact and importance have become especially evident during the current COVID-19 pandemic [2]. According to the UNESCO, more than half of the households (55%) have internet connection worldwide; in the developing countries 47% have internet connection compared with 87% in the developed world [3].

A number of studies have reported that internet use was very high among university students for academic and recreational purposes [4-5]. Use of internet in medical education is particularly important as this demographic has a huge potential

gain from using it to remain updated with new knowledge about evidence-based medical practices. Internet usage behavior is considered as an internet addiction (IA) when it is uncontrolled and negatively impacts physical and mental health and social wellbeing. Previous research has reported that IA is significantly associated with impaired academic performance, sleeping disorders, headache, eye strain, depression, anxiety, social isolation and relationship problems [6-7]. Prevalence of IA has been increasing among students and considered as a public health concern which needs to be addressed [8]. Several studies have been conducted on internet use among the university students in Bangladesh; however, there has been a limited focus on medical students. Therefore, this study aims to explore the factors associated with IA and depression among undergraduate medical students in Bangladesh.

Materials and Methods

Study design

This study adopted a descriptive cross-sectional design where a total of 350 undergraduate medical students were enrolled as study participants.

Study sites

Three private medical colleges were selected from Dhaka city namely Bangladesh Medical College and Hospital, Medical College for Women and Hospital, and Anwar Khan Modern Medical College and Hospitals as study sites. The sites were selected based on available evidence and convenient research access.

Data collection

Data were collected from April 2018 to July 2018 from male and female undergraduate medical students enrolled in 2nd to 4th year program and had used internet in the past year. Considering the complexity of adaptation and transition students enrolled in 1st and 5th year of study were excluded. A structured questionnaire was used to collect socio-demographic data and the Young's internet addiction Questionnaire [9] was used to identify experience of IA. Experience of depression was collected to determine the level of depression through a self-administered closed-ended questionnaire named the Beck's Depression Inventory (BDI) [10]. Simple random sampling technique was used to enroll the study participants. The questionnaire was developed initially in English and then translated into Bengali. Lecture galleries of medical colleges

were selected for data collection considering suitability and ensuring quality of data collection.

Data analysis

Data were analyzed with IBM SPSS Statistics software version 22.0 (IBM Corporation and other(s), 1989, 2013.). Descriptive statistics were used to provide frequencies, means, and standard deviations, and bivariate analysis was conducted using chi-square statistics. Univariate and multivariate logistic regression methods were used to determine factors associated with internet addiction.

Results

Socio-demographic Characteristics

A total of 350 students participated in this study, of whom 115 were enrolled in 2nd year, 140 in 3rd year and 95 in 4th year of

studies (Table 1). Among 2nd year students, 105 (91.3%) were 21 years old or younger and 10 (8.7%) were older than 21 years of age. The medical student sample in this study was found to be overwhelmingly female (Table 1). Of the total sample size of 350, 258 (73.7%) were female and 92 (26.3%) were male. However, the population was found to become less and less feminized with progressing years of study, with females representing 87.8%, 72.9% and 57.9% of the population in the 2nd, 3rd and 4th year of studied respectively. Through all years of enrolment, majority of students were found to be living in a hostel (62%), followed by living with family (32.6%), and the smallest percentage lived in a mess arrangement (5.4%). Majority of the sample earned less than 6,000 US \$ per month (59.7%), followed by those who earned between 6,000-12,000 (29.1%) and the smallest percentage (11.1%) earned more than 12,000 US \$ per month.

Table 1- Demographic characteristics of the study population.

Characteristics	Sub group	2 nd year, N=115 n (%)	3 rd year, N=140 n (%)	4 th year, N=95 n (%)	Total, N=350 n (%)
Age of the respondents (in years)	≤ 21 Years	105 (91.3)	87 (62.1)	19 (20.0)	211 (60.3)
	> 21 Years	10 (8.7)	53 (37.9)	76 (80.0)	139 (39.7)
	Mean (±SD)	19.9 (±1.2)	21.3 (±1.1)	22.4 (±1.1)	21.1 (±1.5)
	Median (Range)	20.0 (19-20)	21.0 (21-22)	22.0 (22-23)	21.0 (20-22)
Gender	Male	14 (12.2)	38 (27.1)	40 (42.1)	92 (26.3)
	Female	101 (87.8)	102 (72.9)	55 (57.9)	258 (73.7)
Living status	With family	39 (33.9)	39 (27.9)	36 (37.9)	114 (32.6)
	Hostel	73 (63.5)	93 (66.4)	51 (53.7)	217 (62.0)
	Mess	3 (2.6)	8 (5.7)	8 (8.4)	19 (5.4)
Monthly income (US \$)	<6,000	69 (60)	85 (60.7)	55 (57.9)	209 (59.7)
	6,000-12,000	33 (28.7)	38 (27.1)	31 (32.6)	102 (29.1)
	>12,000	13 (11.3)	17 (12.1)	9 (9.5)	39 (11.1)

Table 2- Mean IA score, distribution according to year of study

Year of study	Internet addiction (IA) score Mean±SD	Addicted n (%)	Not addicted n (%)	χ ² test value	p-value
2 nd year N=115	60.7±20.4	84 (73.0)	31 (27.0)	1.40	0.237
3 rd year N=140	59.4±14.9	116 (82.9)	24 (17.1)	4.72	0.030
4 th year N=95	56.5±16.3	69 (72.6)	26 (27.4)	1.31	0.253
Total N=350	59.1±17.3	269 (76.9)	81 (23.1)		
p-value	0.140 ^a	0.094 ^b			

Statistical test applied: ^aKruskal-Wallis test; ^bChi-square test

Internet addiction score

Mean Internet Addiction Score (IAS) was found to be decreasing with increasing year of enrolment (Table 2). Mean IAS was found to be 60.7±20.4 for 2nd year students,

59.4±14.9 for 3rd year students and 56.5±16.3 among 4th year students. Similarly, the prevalence of addiction was found to peak among 3rd year students and then decrease. Statistical significance in addicted vs. non-addicted was not observed among 2nd and 4th year students, but was observed among 3rd year students. Aggregating students from all years of enrolment, the difference in percentage of students addicted (76.9%) vs not addicted (23.1%) was not found to be statistically significant (p>0.05).

Depression

Mean depression score and prevalence of depression was found to be 26.5±11.5 for 2nd year, 27.5±9.7 for 3rd year and 26.9±11.3 for 4th year students respectively (Table 3). The percentage of students depressed among 2nd years was 73.0%, for 3rd years was 82.9% and for 4th years was 72.6%. While the prevalence of students depressed among 3rd year students was statistically significant at 82.9% (p<0.05), prevalence of depression in the total student sample studied at 76.9%, was not found to be statistically significant (p>0.05).

Table 3- Mean depression score and distribution according to year of study

Year of study	Depression Score Mean±SD	Depression (%)	Not depressed (%)	χ ² test value	p-value
2 nd year N=115	26.5±11.5	84 (73.0)	31 (27.0)	1.40	0.237
3 rd year N=140	27.5±9.7	116 (82.9)	24 (17.1)	4.72	0.030
4 th year N=95	26.9±11.3	69 (72.6)	26 (27.4)	1.31	0.253
Total, N=350	27.0±10.7	269 (76.9)	81 (23.1)		
p-value	0.165 ^a	0.094 ^b			

Statistical test applied: ^aKruskal-Wallis test; ^bChi-square test

Purpose for and mode of using internet

It was found that 47.8% of 2nd year students, 52.1% of 3rd years students and 42.1% of 4th year students self-reported having a good academic history (Table 4). Students were most likely to use internet for the purpose of recreation (43.7%) or time pass (40.0%), followed by study and communication (9.7%) and the smallest percentage in each year used the internet to gain knowledge (6.6%). Among 3rd year students, 44.3% of students used the internet for a duration of 4-7 hours and 24.3% used the internet for more than 7 hours daily. Among both 2nd and 4th year students, the highest percentage of students reported using the internet for 1-3 hours daily (56.5% and 48.4% respectively) followed by 4-7 hours (32.2% and 34.7% respectively). Regardless of the year of enrolment, the largest group of students used the internet at night and the smallest group used it in the morning. An overwhelming majority of students in each year reported using a smartphone to access the internet- 97.4% of 2nd years, 97.1% of 3rd years and 87.4% of 4th years. Most students accessed the internet via a Wi-Fi connection (82.9%) and an overwhelming majority reported facing no academic problems (90.9%).

Table 4- Pattern of internet use and academic performance of the study population.

Characteristics	Subgroup	2nd year, N=115 Number (%)	3rd year, N=140 Number (%)	4th year, N=95 Number (%)	Total, N=350 Number (%)
Good academic history	Yes	55 (47.8)	73 (52.1)	40 (42.1)	168 (48.0)
	No	60 (52.2)	67 (47.9)	55 (57.9)	182 (52.0)
Purpose of internet use per day	Study and communication	16 (13.9)	11 (7.9)	7 (7.4)	34 (9.7)
	Time pass	36 (31.3)	58 (41.4)	46 (48.4)	140 (40.0)
	Recreation	53 (46.1)	63 (45.0)	37 (38.9)	153 (43.7)
	Knowledge	10 (8.7)	8 (5.7)	5 (5.3)	23 (6.6)
Average time of internet use per day	1-3 hours	65 (56.5)	44 (31.4)	46 (48.4)	155 (44.3)
	4-7 hours	37 (32.2)	62 (44.3)	33 (34.7)	132 (37.7)
	>7 hours	13 (11.3)	34 (24.3)	16 (16.8)	63 (18.0)
Using time of internet per day	Morning	1 (0.9)	4 (2.9)	1 (1.1)	6 (1.7)
	Afternoon	23 (20.0)	25 (17.9)	8 (8.4)	56 (16.0)
	Evening	22 (19.1)	29 (20.7)	13 (13.7)	64 (18.3)
	Night	51 (44.3)	48 (34.3)	52 (54.7)	151 (43.1)
	Midnight	18 (15.7)	34 (24.3)	21 (22.1)	73 (20.9)
Access device to internet	Desktop	3 (2.6)	1 (0.7)	8 (8.4)	13 (3.4)
	Tablet	0	2 (1.4)	3 (3.2)	5 (1.4)
	Smart phone	112 (97.4)	136 (97.1)	83 (87.4)	331 (94.6)
	Multiple device	0	1 (0.7)	1 (1.1)	2 (0.6)
Connection used for internet	Broadband	0	0	7 (7.4)	7 (2.0)
	Wi-Fi	102 (88.7)	120 (85.7)	68 (71.6)	290 (82.9)
	Mobile data	11 (9.6)	20 (14.3)	19 (20.0)	50 (14.3)
	Multiple connection	2 (1.7)	0	1 (1.1)	3 (0.9)
Currently problem faced in academic performance	Yes	7 (6.1)	7 (5.0)	18 (18.9)	32 (9.1)
	No	108 (93.9)	133 (95.0)	77 (81.1)	318 (90.9)

Association between depression, IA and risk factors

Duration of internet use, using mobile phone to use internet, academic problems, and spending time with family were statistically significantly associated ($p<0.05$) with depression

and internet addiction. Students who used internet for 4 hours or more each day were 3.1 times more likely to suffer from depression and IA than those who used it for less than 4 hours and the difference was statistically significant ($p<0.05$). Similarly, students using mobile phone to access the internet, as opposed to other devices were 3.2 times likely to suffer from depression and IA at statistical significance ($p<0.05$). Suffering

from academic problems also increased the risk of depression and IA by 5.0 times, and this ratio was statistically significant ($p<0.05$). On the other hand, spending time with family reduced the risks of suffering from depression and IA to 0.4 and this ratio was significant ($p<0.05$).

Logistic regression analysis was performed to identify the strength of association and returned three statistically significant risk factors associated with depression and internet use. By adjusted odds ratio, duration of internet use (aOR=2.9, $p<0.05$), use of mobile phone to access internet (aOR=3.4, $p<0.05$) and facing academic problems (aOR=7.3, $p<0.05$) were significantly associated with depression and IA.

Table 5- Bivariate and multivariate analysis of risk factors associated with depression and internet addiction

Characteristics	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Academic year 2 nd year & 3 rd year 4 th year (RC)	1.4 (0.8-2.4) 1	0.254 ^{NS}		
Age in years ≤ 21 >21 (RC)	0.9 (0.5-1.4) 1	0.574 ^{NS}		
Sex Male Female (RC)	0.9 (0.5-1.5) 1	0.623 ^{NS}		
Living status With family Hostel or mess (RC)	0.6 (0.4-1.0) 1	0.075 ^{NS}		
Duration of internet use <4 hours (RC) ≥4 hours	1 3.1 (1.8-5.2)	0.000 ^{Sig}	2.9 (1.7-50)	0.000 ^{Sig}
Purpose of internet use per day Study & knowledge Time pass & recreation (RC)	1 1.2 (0.6-2.4)	0.535 ^{NS}		
Mobile phone used to access internet	3.2 (1.3-8.3)	0.014 ^{Sig}	3.4 (1.2-9.7)	0.026 ^{Sig}
Wi-Fi connection used for internet	0.9 (0.5-1.8)	0.766 ^{NS}		
Academic problems	5.0 (1.2-21.2)	0.031 ^{Sig}	7.3 (1.6-33.9)	0.011 ^{Sig}
Difficulty in peer relationships	1.5 (0.8-2.7)	0.204 ^{NS}		
Spending time with peers physically	1.0 (0.6-1.6)	0.979 ^{NS}		
Spending time with friends virtually through online chatting	1.3 (0.7-2.4)	0.478 ^{NS}		
Difficulty in love relationships	0.4 (0.1-1.1)	0.084 ^{NS}		
Spending time with family	0.4 (0.2-0.8)	0.005 ^{Sig}	0.6 (0.2-1.9)	0.345 ^{NS}
Family problems	0.6 (0.2-1.8)	0.344 ^{NS}		
Health problems	1.5 (0.7-3.3)	0.282 ^{NS}		
Financial problems	0.6 (0.2-1.7)	0.374 ^{NS}		

^{NS}, not significant at least at 5% level; ^{Sig}, statistically significant difference at 5% level; OR, odds ratio; RC, reference category;

Discussion

The current study identified the prevalence of IA to be 76.9%. This is more than twice the global prevalence of 30.1% among medical students estimated by Zhang and colleagues in 2017 [11]. However, studies in the past have found diverse rates of IA varying from 9% to as high as 80% [4], [8-10]. The mean internet addiction score (IAS) was highest among 2nd year students. Other studies have reported that students in their earlier years of education exhibit higher IAS and these scores decrease with years of enrolment [12-13]. It can be postulated that as younger students are more likely to have leisure time, they are more prone to engage in behavior that culminates in developing internet addiction. Aggregate mean IAS in the present study was 59.1 ± 17.3 and this was nearly double the score of 26.7 ± 18.4 reported among Turkish students in Faculty of Education [14]. On the other hand, Ardic and colleagues (2018) have reported a mean IAS of 47.1 ± 13.8 among medical students in Turkey [15]. The differences in scores may be attributed to social, economic and cultural the differences. While previous studies have found differences in IAS to be statistically significant between students aged under 21 and students 21 or older [13], [16], the current study found no significant difference. This study observed the prevalence of depression to be 76.9% among medical students in Dhaka. This is much higher than the prevalence found among Indian students in dental studies at 21.5% and among university students (including medical) in Turkey at 26.4% [17]. Prevalence of depression was found to be highest (82.9%) among 3rd year students at statistically significant levels. This finding is in agreement with a study in India that evinced the highest prevalence of depression among third year students [13]. The current study did not find significant difference in the mean depression score between different years of study. In contrast, Kumar and colleagues have reported significant difference in the mean depression score with different academic years of studies in India [13]. However, they also reported that students in advanced years of studies score higher than younger students, which is in agreement with findings of this study. It can be postulated that students further along in medical academic career face higher academic pressure and workload, and consequently face higher prevalence of depression. Previous studies have found that IA is associated with mental health problems, especially depression [18-20]. Our study identifies that prevalence of IA and prevalence of depression coincide perfectly among medical students in each year of enrolment. Indeed, previous studies have reported significant positive correlation between the BDI scores and the YIA scores, independent of student's socioeconomic characteristics [17], [21]. Students who self-reported facing academic problems were significantly more likely to suffer from depression and IA. Similar findings have been separately reported in India and Malaysia [8], [13]. Indeed, it was found in this study that students used internet mostly for recreation (43.7%) or passing time (40.0%), and a minority in total used it for study and communication or to gain knowledge (15.13%). Spending time with family was found to be protective from IA and depression at statistically significant levels at the bivariate analysis, but not at multivariate analysis. It has been reported that lack of social skills, loneliness and social support variables are associated with IA which may all contribute to development of depressive disorders [22-23] which may be a predictor for depression. This study has shown by multivariate analysis that longer daily duration of internet use is associated with depression and IA and this is supported by previous literatures [17], [24-27]. Indeed, long hours spent on the internet may reduce time available to participate in other leisurely and social activities which are known to reduce experience of depressive moods.

Operating mobile phone to use the internet, practiced by most participants, was found to be associated with IA and depression by multivariate analysis. Similar findings were reported in Jordan [12] and among dental students in India [13] and it has also been identified earlier that problematic cell phone usage is associated with depression, among other psychological disorders [25].

Implications for academic administrators and counsellors

Based on the findings of this study efforts need to be made to counsel medical students regarding the proper use of internet for both academic and non-academic purposes. It is also important to educate medical students about coping strategies that may assist them in alleviating possible isolation while living in a dormitory or alone and to reduce dependency on internet for communicating with virtual friends that may have a negative impact on psychological state.

Limitation

This study sample included private medical college students only. Students from public medical colleges, could not be enrolled due to access barriers. Due to added costs of private medical education, it is generally assumed that students in these colleges hail from financially solvent families. In addition, among the three selected medical colleges two were women medical colleges. Therefore, findings of this study may not accurately reflect the status of all medical students in Bangladesh.

Conclusion

In essence, the findings evinced this study about internet addiction and depression among the undergraduate medical students in Dhaka city is multifaceted and crucial. Multi-sectoral involvement is required e.g. education ministry, college regulatory bodies, mental health professional and ICT experts to develop a comprehensive action plan to tackle these issues based on the findings of this research. If these findings are overlooked these problems would not only endanger the medical students' community but may also affect the country's health systems since they would be the future backbone of that system. On the other hand, if an appropriate intervention could be launched based on the mentioned action plan medical students from other low-and middle-income countries might be benefitted alongside Bangladeshis.

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Address for correspondence

Dr. Md Moshir Rahman

Graduate School of Biomedical and Health Science

Hiroshima University, Japan

E-mail: moshir@hiroshima-u.ac.jp