Internet addiction and its mental health correlates among undergraduate college students of a university in North India

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ABSTRACT

Introduction: Internet addiction (IA) is an emerging phenomenon among the youth of India. It has been found to be associated with mental health problems. This study was therefore conducted to find out the burden of IA among college students in Delhi, its risk factors and association with depression, anxiety, and stress. **Methods:** A cross-sectional study was conducted, with face-to-face interviews, among the nonprofessional college students of the University of Delhi. Simple random sampling was used to select the students from the list obtained from the three colleges. Young's IA test scale and depression, anxiety, and stress short scale were used to measure IA and the mental health correlates, respectively. Chi-square tests were applied for testing the association of IA with the sociodemographic variables, the variables related to internet usage patterns, and the mental health variables. Independent predictors were determined using logistic regression modeling. **Results:** The prevalence of IA was 25.3%. The mean (standard deviation) age of the participants was 19.1 (1.02) years and 62.1% were males. The median family income was INR 50,000. IA was significantly associated with higher family income, greater screen time, always online status, and greater duration of internet use per week. The independent predictors of IA were greater duration of internet use per week and always online status, depression, anxiety, and stress. **Conclusion:** The burden of IA among the college students was high. depression, anxiety, and stress were found to be independent predictors of IA.

Keywords: Addictive behavior, anxiety, depression, internet, stress disorders, students

Introduction

Internet addiction (IA) has been defined as "excessive or poorly controlled preoccupations, urges or behaviors regarding computer use and internet access that lead to impairment or distress."[1] Validated scales have been developed to quantify IA and of late, research in this domain is becoming increasingly relevant.[2,3] Its risk factors and consequences have been found to be on the lines of substance abuse,[4] and it has been recommended to include it as a specific and distinct mental health disorder in Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.[5] It is a mental health issue which has been found to be affected by the other mental health conditions.[6-8]

The increase in penetration of high-speed internet coupled with affordability of computer devices in India over the last few years has led to emergence of IA as reported by some recent studies.[9,10] There are few studies from India on the burden of IA among school children, but it's prevalence and relationship with mental health in other vulnerable groups such as college students remain to be explored. The evidence thus built will help the primary care givers in deciding to suspect and go for early screening of IA and its associated menta health attributes.

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The aim of the study was to find out the prevalence of IA, and its association with depression, anxiety, and stress among the undergraduate collegiate students of a University of North India.

Methods

A cross-sectional study was conducted from November 2015 to April 2017 among the nonprofessional college students of a University of North India. This university was purposively selected as it is the largest university in the state. For the sake of feasibility, the North campus of the university was included in the study. Out of the nine colleges approached, we obtained permission from the heads of three colleges which were finally studied. The list of students was obtained from all these colleges, which formed the sampling frame of the study.

The sample size of 377, rounded off to 380, was calculated considering an estimated prevalence of IA as 43%,[11] a 95% confidence interval and 5% confidence limit, using the Epi Info for Windows software.[12]

As the primary objective was to estimate the prevalence of IA among the college students, representative sample sizes for each college was decided based on population proportion to size.

Simple random sampling using computer-generated random numbers were used for selecting the participants from the college wise lists of the students. Those students under 18 years of age that is below the legal age for giving consent were excluded from the study. If a particular student was not available in the college, next student on the list was selected from the same college. The study participants were contacted through their class representatives and interviews were conducted in the college premises after lectures, during lunch hour and after college hours.

A semi-structured, pretested and validated interviewer-administered questionnaire, consisting of the following four sections was used for data collection.

Section A – Sociodemographic information of the participants. The characteristics with respect to age, sex, type of family, monthly family income were recorded, type of school attended before joining college.

Section B – Internet usage patterns. This consisted of the participants' duration of computer use per week, duration of internet use per week, years since when using the computers, and the internet, type of device used frequently for internet access, type of computing devices owned, whether they were always or intermittently logged in, and so on.

Section C – Young's IA test (IAT). It is a 20-item questionnaire to screen for the presence of various degrees of IA. Cronbach's alpha for internal consistency has been reported as 0.889.[2] It has been validated in various countries including Asian countries and has been used in some studies in India.[11-13] The responses

are based on a 5-point Likert Scale. The severity of impairment index is evaluated in the following manner: scores of 0–30 as no, 31–49 mild, 50–79 moderate, and 80–100 severe impairment. Those having moderate or severe impairments are classified as cases of possible IA.

Section D – Depression, anxiety, and stress scale (DASS-21). It is a 21-item scale with 7 items each to screen for depression, anxiety, and stress. It has been shown to have a high-internal consistency with Cronbach's alpha of 0.94 and has been found to be suitable for screening adults as shown in several international studies.[14] It has been extensively used in India including Delhi.[15] The response to each question varies from "Did not apply to me at all" to "Applied to me very much, or most of the time" and the scores derived from each category are multiplied by two to arrive at the final scores. All these mental health variables, namely, depression, anxiety and stress are classified into normal, mild, moderate, severe, and very severe categories based on their score cutoffs.

Statistical analysis

The data were entered in a computer-based spreadsheet. It was checked for errors and cleaned before being analyzed. SPSS 20.0 software (Armonk, NY, IBM Corp) was used for statistical computations.

Descriptive statistics in the forms of proportions and means and standard deviations (SDs) have been presented. The continuous variables such as age, monthly family income, hours of computer use per week, hours of internet use per week, were each categorized into two categories using the median value as the cutoff. Internal consistency of the Young's IAT scale was found using Cronbach's alpha.

Chi-square tests were applied for testing the association of IA with the sociodemographic variables, the variables related to internet usage patterns, and the depression, anxiety, and stress status.

Independent predictors were determined using logistic regression modeling. The risk factors which were found to have a $P < 0.25$ were included in the binary logistic regression analysis. Around one-third (33.16%) of the respondents refused to disclose their monthly family income, leading to a high proportion of missing values, and therefore this variable was dropped from the multivariate regression models. The two variables, i.e., screen time and duration of internet use were correlated (correlation coefficient ≥0.64) and hence could not be put together in the model. Therefore, the duration of internet use was entered in the model as it was statistically more significant in the bivariate analysis, while screen time was dropped from the model. As depression, anxiety and stress were correlated, we built three separate models including each of them respectively as independent variables. All tests were two-tailed and a $P < 0.05$ was considered as statistically significant.

Approval of the Institutional Ethics Committee (Human Research) of University College of Medical Sciences was obtained before the start of the study. Permissions were obtained from the heads of the respective colleges and from the copyright holders of "Young's IAT" and of "DASS-21." Signed informed consent for participation in the study was obtained from all the respondents.

Suspected cases of mild IA, stress, and anxiety and/or depression were counseled by a trained counselor. Suspected cases of moderate and severe IA, severe or very severe stress, anxiety and/or depression based on the screening were referred to the department of psychiatry of the associated hospital for further evaluation and management.

Results

A total 477 students were approached to complete the predetermined sample size of 380, giving a response rate of 85.0%. There were 192 (50.5%), 136 (35.8%), and 52 (13.7%) students from the three colleges, as per the population proportion to size estimate.

The mean (SD) age of the participants was 19.1 (1.02) years and 62.1% were male. Around half (46.8%) were staying away from home, i.e., in hostels or rented flats or paying guest accommodations. The median (interquartile Range) of the family income was INR 50,000 (30,000–100,000) and their mean (SD) family size was 4.9 (1.99). The proportion of students in the first, second, and 3rd year of study cohorts were 28.7%, 30.3%, and 41.1%, respectively. In terms of the broad domains of the types of courses, lesser (9.5%) number of participants was pursuing Bachelor of Commerce compared to those pursuing Bachelor of Arts (47.1%) and Bachelor of Sciences (43.4%).

The majority of the students was from private (78.7%), and English medium (87.9%) schools.

The prevalence of IA was 25.3% (96/380). The level of impairment was mild among 45.0% (171/380), and 29.7% (113/380) of the participants observed were free from IA. The internal consistency of the Young's IAT scale was high (Cronbach's alpha = 0.85) in the present study.

The association of IA with certain demographic and academic characteristics is given in Table 1.

The computing devices owned by the students were smartphone (95.8%), laptop (64.0%), desktop (26.8%), and tablets (15.53%). The mean (SD) years of computer usage and internet usage were 8.4 (3.51) and 6.2 (2.73), respectively. The mean number of hours per day of screen duration, and of internet use, was 5.4 (3.28) and 4.4 (3.34), respectively.

The association of IA with certain computing and internet usage characteristics is given in Table 2.

Those with IA when compared to those without IA, had a significantly higher ($P < 0.001$) proportion of subjects with depression (68.8% vs. 45.8%, odds ratio [OR] = 2.6), with anxiety (74.0% vs. 53.3%, OR = 2.3) and with stress (54.2% vs. 26.1%, OR = 3.4).

The independent predictors as determined by the multivariate logistic regression, from the three models, each for depression, anxiety, and stress are shown in Table 3.

Discussion

We found that around one-fourth of the study participants were addicted to the Internet. Similar findings have been reported from Mumbai in 2009 and even from studies from other countries.[16-18] Thus, the prevalence of IA in the existing literature varies from 6% to 42%.[11,19] Certain studies have reported prevalence of IA different than our study, which can be attributed to different population groups studied,[6,20] variations in cutoffs used for categorizing IA,[11,13] differences in the scales used for measuring IA.[21]

We found no association between age and sex groups of the study participants and IA. Similar findings with respect to age and IA have been reported by studies from certain studies in India[11,13] and even from other countries.[4,7,22] Many studies have reported a higher prevalence of IA among male students, both from India and abroad.[10,18] Sociocultural norms might have played a role in gender difference with respect to internet access.

There are conflicting reports about the year of study course and IA. We did not find any association between the two, however, other studies have reported that the initial years of course work were associated with higher burden of IA.[11,23] Other studies have reported the opposite of this, i.e., higher grades had a higher prevalence of IA.[17] As age increases during the college years, it leads to an increase in cognitive maturity which might explain the decline in IA, whereas it also gives more freedom to the students to decide about their behaviors including internet use, which might explain the increase in IA with increasing grades.

We found no relationship between the educational background of the study participants, type of school, whether government or private, or its medium of instruction, and IA. Seyrek *et al.* have reported similar finding among Turkish adolescents.[24]

In our study, there was no difference in the prevalence of IA between participants who lived at home and those living away from home. A similar finding was observed among college students of Bengaluru,[11] but in a study from Maharashtra,[10] those staying in private accommodations were at a higher risk of IA as compared to home. The differences in internet access, availability, and sociocultural differences may have led to this variation.

Higher family incomes have been found to be associated with a higher prevalence of IA in many studies worldwide.[25,26] This

Characteristics	Internet addiction		Total	P	OR (95% CI)
	Present, *n* (%)	Absent, *n* (%)			
Demographic					
Age in years					
<20	67 (27.68)	175 (72.32)	242	0.150	1.439 (0.875-2.365)
>20	29 (21.02)	109 (78.98)	138		
Sex					
Men	62 (26.27)	174 (73.73)	236	0.335	1.153 (0.712-1.866)
Women	34 (23.61)	110 (76.39)	144		
Current residence					
Home	52 (25.74)	150 (74.26)	202	0.819	1.056 (0.664-1.679)
Others#	44 (24.72)	134 (75.28)	178		
Monthly family income##					
≤50,000	28 (21.71)	101 (78.29)	129	0.017*	0.510 (0.292-0.891)
>50,000	44 (35.20)	81 (64.80)	125		
Academic					
College					
Kirori Mal	58 (30.21)	134 (69.79)	192	0.080	1.818 (0.854-3.869)
St. Stephen's	10 (19.23)	42 (80.77)	52		1
Hindu	28 (20.59)	108 (79.41)	136		1.089 (0.487-2.436)
Study course					
Bachelor of arts	52 (27.37)	138 (72.63)	190	0.544	1.561 (0.644-3.782)
Bachelor of commerce	7 (19.44)	29 (80.56)	36		1
Bachelor of sciences	37 (24.03)	117 (75.97)	154		1.310 (0.530-3.237)
Study year in college					
First	31 (28.44)	78 (71.56)	109	0.205	1.540 (0.871-2.722)
Second	33 (28.70)	82 (71.30)	115		1.559 (0.890-2.732)
Third	32 (20.51)	124 (79.49)	156		1
Type of school attended before					
Public	25 (30.86)	56 (69.14)	81	0.191	1.434 (0.834-2.464)
Private	71 (23.75)	228 (76.25)	299		
Medium of instruction in school attended before					
Hindi	17 (36.96)	29 (63.04)	46	0.052	1.894 (0.988-3.623)
English	79 (23.65)	255 (76.36)	334		

Table 1: Results of bivariate analysis showing the association of internet addiction with certain demographic and academic characteristics (*n*=380)

OR: Odds ratio, CI: Confidence Interval, *Statistically significant, #Others included classroom, campus, travel and library, ##*n*=254 for which income data was available

is consistent with our findings too. This may have occurred because the participants who belonged to the higher income group had more resources which gave them more freedom to access the internet in the form of higher spending per month and possessing a larger number of high-end internet-enabled devices.

We found no association between the years of computer or internet use and IA. Bhatia *et al* reported a similar finding from among adolescents of Gwalior.[27] However, certain other studies have reported that more number of years of internet usage was associated with higher risk for IA.[11,28]

We found that higher number of hours of internet use, and always online status, was significantly associated with increased risk of IA. The association between duration of internet use and IA has been observed in adolescents from Vadodara[29] and from college students of Mumbai.[10] Outside India, similar association has been found in studies done among such diverse populations as from South East Asia,[9,18] Europe,[8] and Middle East.[23]

We found no association between IA and the type of device and the type of internet connection most commonly used for accessing the internet. These studies also have not found any association between these two.[11] Some authors have reported that owning a smartphone is a significant risk factor for IA.[7,13]

We found a strong positive association between depression and IA. IA and depression were found to be significantly associated among adolescents of Mumbai.[10] Numerous studies conducted outside India among diverse population groups in various countries have also found depression to be associated with the risk of IA.[6,17,30] Depressives might find online communication easier and less intimidating than real-world communication owing to anonymity, absence of nonverbal cues and physical presence. These factors help them overcome their interpersonal difficulties, often seen in depression. Those suffering from depression may have a tendency to use the internet excessively to relieve low mood and escape the feelings of guilt and hopelessness.

Table 2: Association of internet addiction with certain computing and internet usage characteristics (*n*=380)

Characteristics	Internet addiction		Total	P	OR (95% CI)
	Present, *n* (%)	Absent, *n* (%)			
Years since using computers					
≤8	51 (25.76)	147 (74.24)	198	0.817	1.056 (0.664-1.679)
>8	45 (24.73)	137 (75.27)	182		
Screen time per day (h)					
≤4	37 (19.37)	154 (80.63)	191	0.008*	0.529 (0.330-0.849)
>4	59 (31.22)	130 (68.78)	189		
Years since using internet					
≤6	55 (25.11)	164 (74.88)	219	0.938	0.982 (0.615-1.567)
>6	41 (25.47)	120 (74.53)	161		
Internet use (h/week)					
≤24.5	35 (17.68)	163 (82.32)	198	<0.001*	0.426 (0.264-0.687)
>24.5	61 (33.52)	121 (66.48)	182		
Internet connectivity status					
Always	50 (32.68)	103 (67.32)	153	0.006*	1.910 (1.196-3.049)
Intermittent	46 (20.26)	181 (79.74)	227		
Most common type of internet connection					
Wi-Fi	77 (26.55)	213 (73.45)	290	0.299	1.351 (0.764-2.387)
Others#	19 (21.11)	71 (78.89)	90		
Most commonly used device for accessing internet					
Mobile phones and tablets	85 (25.00)	255 (75.00)	340	0.731	0.879 (0.421-1.835)
Personal computers	11 (27.50)	29 (72.50)	40		
Most common location for internet access					
Residence	87 (25.97)	248 (74.03)	355	0.387	1.403 (0.650-3.030)
Others$	9 (20.00)	36 (80.00)	45		

#Others included mobile phone internet, internet dongle, landline broadband, $Others included classroom, campus, travel and library. OR: Odds ratio; CI: Confidence interval, *Statistically Significant

Table 3: Predictors of internet addiction from the multivariate logistic regression for depression, for anxiety, and for stress (*n*=380)

Variable	Reference category	MLR with depression		MLR with anxiety		MLR with stress	
		AOR (95% CI)	P	AOR (95% CI)	P	AOR (95% CI)	P
Age							
<20 years	>20 years	0.987 (0.465-2.092)	0.972	0.939 (0.443-1.989)	0.868	0.921 (0.426-1.991)	0.834
Year of course							
First	Third	1.627 (0.715-3.704)	0.246	1.817 (0.798-4.137)	0.155	1.821 (0.787-4.209)	0.161
Second		1.228 (0.573-2.631)	0.597	1.307 (0.610-2.797)	0.491	1.303 (0.598-2.839)	0.506
School type							
Public	Private	1.446 (0.762-2.743)	0.259	1.421 (0.760-2.657)	0.271	1.415 (0.740-2.705)	0.293
Private (reference)							
School medium							
Hindi	English	1.890 (0.902-3.968)	0.092	1.799 (0.865-3.745)	0.116	1.669 (0.779-3.571)	0.188
Internet connectivity status							
Always	Intermittent	1.766 (1.056-2.956)	0.03*	1.675 (1.007-2.788)	0.047*	1.533 (0.910-2.583)	0.109
Intermittent (reference)							
Weekly Internet use in hours							
>24.5	≤24.5	2.899 (1.672-5.025)	<0.001*	2.915 (1.686-5.025)	<0.001*	2.506 (1.684-5.155)	<0.001*
College							
Kirorimal	St. Stephen's	1.946 (0.845-4.480)	0.118	1.711 (0.747-3.919)	0.204	1.763 (0.763-4.075)	0.185
Hindu		0.935 (0.394-2.219)	0.879	0.856 (0.360-2.034)	0.725	0.888 (0.372-2.122)	0.790
Depression							
Present	Absent	3.040 (1.802-5.128)	<0.001*	-	-	-	-
Anxiety							
Present	Absent	-	-	2.585 (1.490-4.486)	<0.001*	-	-
Stress							
Present	Absent	-	-	-	-	3.529 (2.094-5.947)	<0.001*

*Statistically significant. AOR: Adjusted odds ratio; CI: Confidence interval; MLR: Multivariate logistic regression

We found a strong positive association between anxiety and IA. Anxiety and IA were found to be associated among college students of Mumbai.[10] Studies done outside India have also found anxiety to be associated with the risk of IA.[6,17,30] The individuals who suffer from IA may experience increased levels of anxiety as a withdrawal symptom as well as due to often found, comorbid depression. Those suffering from anxiety may start using the internet excessively as a coping mechanism to relieve dysphoric mood.

We found a strong positive association between stress and risk of IA. Other authors have also found stress to be positively associated with risk of IA, thus confirming our study finding.[6,8,23] Some individuals with avoidant style of coping may start using the internet excessively to escape the stress arising out of real-world problems, leading to addiction.

Conclusion

We conclude that the prevalence of IA among undergraduate college students of was high and it is associated with depression, anxiety, and stress. IA should be considered among college students reporting to primary care physicians for common mental health problems such as depression, anxiety, and stress.

Conflicts of interest

There are no conflicts of interest.

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