

A study of prevalence of internet addiction and its association with depression and anxiety among medical students

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Abstract

Introduction: With the advent of technology, medical education has been transformed to the extent that internet has become a necessary part of it. The use of Internet ranges from purely academic purposes like acquisition of knowledge and research to completely leisure activities. While proper use of internet has its own benefits, problematic internet use can disrupt occupational and social life. It has been reported to be allied with anxiety disorders, introversion, pathological gambling, personality disorders, bipolar disorder and depression in young people. DSM-V classifies Internet Gaming Disorder in Section III and in the beta draft of ICD-11 it is included as a diagnosis under disorders due to addictive behaviours (6C51).

Aim: To study the prevalence of internet addiction and its association with Depression and Anxiety among Medical Students.

Materials and Methods: Cross sectional study involving 700 medical students who were using internet for more than 6 months duration was conducted. A pretested self-reported questionnaire, Young's Internet Addiction Test, Beck's Anxiety Inventory and Beck's Depression scale were administered. Statistical analysis was done using latest IBM SPSS 2.0 Software.

Results: Majority of the students 51.8 % belonged to 21-25 years age group. The prevalence of Internet Addiction was found out to be 19.1% with moderate addiction of 17.4%, and severe addiction of 1.7%. Among the internet addicts, 58.9% reported anxiety symptoms and 32.8% scored high on Becks Depression Scale.

Conclusion: Around 1/5th of our sample had internet addiction which had positive correlation with Depression & Anxiety, indicating need for preventive measures like proper education, support groups and physical activities etc.

Keywords: Internet addiction (IA), Young's Internet Addiction Test (IAT) Beck's Anxiety Inventory (BAI) and Beck's Depression Scale (BDS).

Introduction

With the advent of technology, medical education has been transformed to the extent that internet has become a necessary part of it. Internet can be used in various ways like to gain information, communication and for scientific research. It can also be used for gaming, pornography and gambling. Problematic internet use can disrupt occupational and social life.¹

As per Shaw M and Black DW, IA can be described as "excessive or poorly controlled preoccupations, urges, or behaviors regarding computer use and Internet access that lead to impairment or distress".² Internet Gaming Disorder is classified under Section III of DSM-V, which conceptualizes it as persistent and recurrent use of internet for gaming with increased preoccupations, withdrawal symptoms, tolerance, unsuccessful attempts to control the use, continued use despite knowledge of harm in a 12 month period which is in line with criteria's for substance use disorder.³ Furthermore, In the beta draft of ICD-11 it is included as a diagnosis under disorders due to addictive behaviours (6C51).⁴ Gaming disorder is characterised by i) impaired control over gaming ii) Increasing priority to gaming over other activities and iii) continuation of gaming despite of negative consequences.

Thus, IA is thought to be a psychiatric disorder with precise diagnostic and management principles. Jerald Block, a psychiatrist from US conceptualized IA as a "compulsive-impulsive spectrum disorder" and argued that the definition should include both online or offline computer usage and

conceptualized that excessive gaming, sexual preoccupations, and email/text messaging are three subtypes of IA.⁵

Young individuals with internet addiction can develop various mental health problems due to excess time spent on online shopping, gaming, chatting, pornographic sites and hobby sites. Internet addiction is also associated with anxiety disorders⁶, personality disorders, bipolar disorder, social phobia and depression and other mental health problems such as pathological gambling, game playing, especially in young individuals.⁷

Depression and Internet addiction are associated with each other. Depressed individuals have low self-esteem, feel lonely, have high need for affiliation all of which can lead to excess use of internet.⁸ On the other hand individuals with excess internet use are usually socially isolated which can lead to depression.⁹ Internet Addiction can lead to anxiety and stress.¹⁰ Individuals suffering from anxiety and stress face difficulties in developing meaningful communications in real world which can lead to more use of social media sites.

Many studies describe the prevalence of internet addiction among university students in other countries, however only a few studies are there from Indian subcontinent. Studies from Indian subcontinent are mostly from large metro cities and there is lack of data from smaller cities. Lesser facts are available on the association between internet addiction and mental health problems like depression and anxiety specifically among medical students.

Hence through this cross sectional study we describe the prevalence of internet addiction and its association with depression and anxiety among medical students of Kalaburagi district of Karnataka, India.

Aims and Objectives

1. To study prevalence of internet addiction among medical students.
2. To study association between Internet Addiction and Anxiety symptoms.
3. To study association between Internet Addiction and Depressive symptoms.

Materials and Methods

We conducted a cross sectional study among medical students of Kalaburagi with approval from Ethics Committee of the institute from 1st May 2018 to 15th July 2018. Three medical colleges in Kalaburagi district were approached and their students were included for the study. A simple random sampling method was used for recruitment. Consent from all students was obtained. The students were informed about the subject and purpose of the study and 4 page questionnaire was filled under guided supervision. The procedure took approximately 30 minutes. In total 730 students participated in the study, out of which 700 had given completely filled forms. Thus the population of study considered was n=700.

Sampling technique

Simple random sampling method

Inclusion criteria

Medical students from all the four professional years, using internet since at least last six months, who gave written consent were included for the study.

Exclusion criteria

Students who were absent on the day of study.

Tools- A four page self- administered questionnaire based on the purpose of study was developed. It consisted of-

1. Socio demographic details comprising of Age, Gender, Type of family, internet variables like purpose, data used/day, Login status, place of internet access and duration of internet use/day.
2. Young's Internet Addiction Test: It contains 20 questions with 5 options each and scores ranging from 0 to 100 which measures the severity of internet addictive behavior.¹¹ It is evaluated as: < 50 normal internet users, 50–79 moderate addicts, 80-100 severe addicts. Data were analyzed by dividing into two groups, with scores<50 considered as normal users and scores>50 as internet addicts as per study by Ghamari et al.¹²
3. Becks Depression scale: The scale consists of 21 Likert-type questions scored 0 (none) to 3 (severe) with scores ranging from 0-63.¹³ Students with scores of - 17-20 borderline clinical depression, 21-30 moderate depression, 31-40 severe depression and > 40 extreme depression.
4. Beck's Anxiety Inventory: It is a 21 question multiple choice self-report inventory with each answer being scored on a scale value of 0 (not at all) to 3 (severely). Total score range from 0 to 63.¹⁴ 0-7 normal/ minimal anxiety, 08-15 mild anxiety, 16-25 moderate anxiety and 26-63 severe anxiety.

Statistical analysis

All the data was entered and tabulated using SPSS version 20.0 software. Descriptive statistics were calculated. Chi square test and Pearson correlation test was applied and P value was calculated. The significance obtained was of p<0.05 which means variables are strongly correlated with each other.

Results

Of the 700 students comprising the study group, 372 (53.14%) were females and 328 (46.8%) were males. Majority of the participants 51.8 % belonged to 21-25 years age group followed by less than ≤20 years i.e. 42.6%.

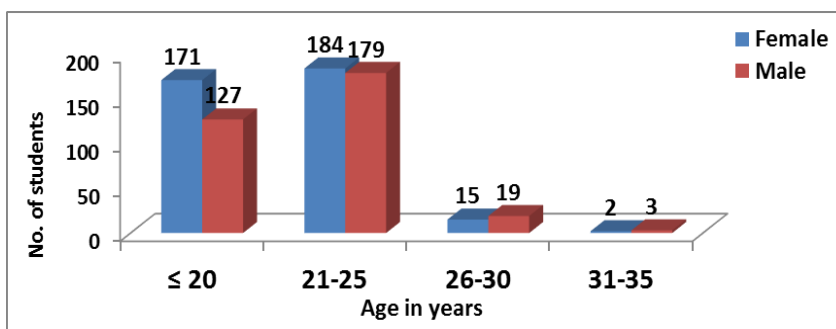


Fig. 1: Age and sex distribution of students

Among 700 students, 134 had internet addiction giving overall prevalence of 19.1%, moderate internet addiction of 17.4% and severe internet addiction of 1.7%.

Table 1: Prevalance of internet addiction

IAT* scores	Category	Medical students	
		Number	Percentage
0—49	Normal	566	80.9
50—79	Moderate addiction	121	17.4
≥80	Severe addiction	13	1.7
Total students		700	100

*IAT is Internet Addiction Test

The reason for internet use was reported as Entertainment by majority 81 % of students. 36.1% used internet for academics, 35% involved themselves in social friendships online whereas 11.4 % reported their loneliness as the reason. 51% kept their phone next to bed while sleeping at night and 50.6% checked their phone on getting up in the morning even before brushing their teeth/going for toilet.

Association of internet addiction with anxiety

Out of 700 students 191 (27.2%) reported anxiety symptoms. Whereas out of total 134 internet addicts 79 (58.9%) students had anxiety symptoms. Study reveals that, there was statistically very high significant association between internet addiction and anxiety (P<0.001).

Table 2: Association of internet addiction and anxiety symptoms

*IAT Categories		Anxiety categories			
		Mild	Moderate	Severe	Total anxiety cases
Normal User (No IA)	566	91	19	2	112
Total IA	134	53	19	07	79
1. Moderate addiction	121	50	15	2	67
2. Severe addiction	13	3	4	5	12
Total students	700	144	38	9	191
Chi-square, P value	$\chi^2=86.7, P<0.001, \text{Very High Significant}$				
Correlation coefficient	r = 0.380				

*IAT is Internet Addiction Test

Out of 238 students who used internet for >4 hours daily, 78 (32.8%) students had anxiety symptoms as compared to 194 students who used internet for 0-2 hours daily among them 43 (22.1%) students reported anxiety symptoms. As the number of hours spent online increased, the anxiety symptoms also increased which showed statistically very high significance.

Table 3: Association of time spent daily online & anxiety symptoms

Internet use hours/ day	Total students		Anxiety symptoms				Chi-Square test	P Value
	No.	%	Present		Absent			
			No.	%	No.	%		
0-2 hours	194	27.7	43	22.2	151	77.8	54.41	<0.001
2-4 hours	268	38.3	70	26.1	198	73.9		
>4 hours	238	34	78	32.8	160	67.2		
Total	700	100	191	27.2	509	72.7		

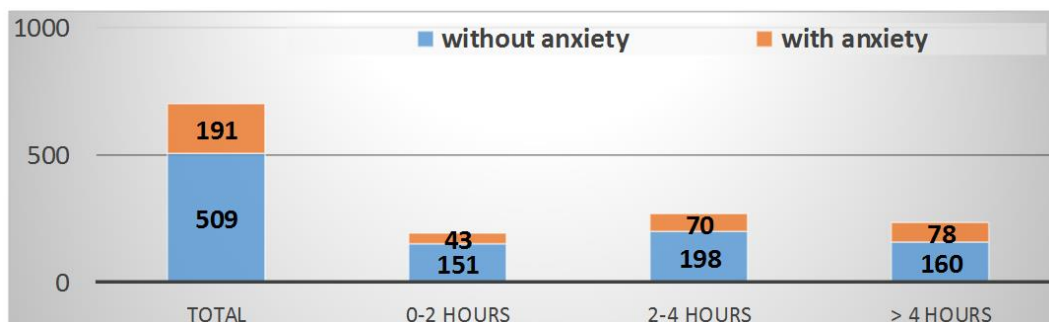


Fig. 2: Number of students with and without anxiety symptoms and its association with time spent daily online

Out of 700 students, 304 (43.5%) stayed on line permanently, among them 110 (36.2%) developed anxiety symptoms. Whereas out of 396 students logging on occasionally, 81 (20.4%) reported anxiety symptoms. Students who permanently logged on various social media sites developed anxiety symptoms more than those occasionally logged on which was statistically significant.

Table 4: Login status & association with anxiety symptoms

Login Status	Total students		Anxiety symptoms				Chi- Square test	P Value
			Present		Absent			
	No.	%	No.	%	No.	%		
Occasional	396	100	81	20.4	315	79.6	21.44	<0.001
Permanently	304	100	110	36.2	194	63.8		
Total	700	100	191	27.3	509	72.7		

The students who used > 4 GB were 9, and among them 4 students (44.4%) reported anxiety symptoms. Whereas 200 students who used 1-2 GB data/day among them 69 (34.5%) reported anxiety symptoms. Thus as the amount of data used increased, the anxiety symptoms also increased which was statistically significant.

Table 5: Data used/day and its association with anxiety

Data/day	Total students		Anxiety symptoms				Chi- Square	P Value
			Present		Absent			
	No.	%	No.	%	No.	%		
1-2 GB	200	28.6	69	34.5	131	65.5	13.215	<0.01
2-4 GB	42	6	13	30.9	29	69.1		
>4 GB	9	1.3	4	44.4	5	55.5		
Total	700	100	191	27.3	509	72.7		

357 (51%) students kept phones next to bed while sleeping at night and they checked phones repeatedly, among them 110 (30.8%) reported anxiety symptoms. Similarly 354 (50.6%) students checked their phones as soon as they got up from bed, among them 117 (33%) reported anxiety symptoms. Thus more Anxiety symptoms were noticed in those who kept their phones next to bed while sleeping and checked their phone immediately when they got up in the morning which was statistically significant.

Table 6: Variables associated with anxiety

Demographic variables	Category	Students		Anxiety cases		Chi square	P value
		No.	%	No.	Ratio %		
Phone at night	Another room	51	7.3	12	23.5	$\chi^2=6.53$	P<0.05, Significant
	Away from bed	292	41.7	71	24.3		
	Next to bed	357	51.0	110	30.8		
1 st thing in the morning	Check up your phone	354	50.6	117	33.0	$\chi^2=9.131$	P<0.05, Significant
	Brush	286	40.8	61	21.3		
	Tea/coffee	17	2.4	4	23.5		
	Other	47	6.7	9	19.1		

Association of internet addiction with depression

Out of 700 students, 97 (i.e. 13.8%) reported depressive symptoms. Out of 700 students, 134 were internet addicts and among them 44 (32.8%) reported depressive symptoms. As the severity of internet addiction increased, higher depressive symptoms were noted. In our study, very high statistical significant association is seen between internet addiction and Depression (P<0.001).

Table 7: Internet addiction & correlation with depression

*IAT Categories		Depression categories				
		Mild	Moderate	Severe	Extreme	Total depression cases
Normal User (No IA)	566	30	17	6	0	53
Total IA	134	17	7	7	3	44
1. Moderate addiction	121	16	13	6	1	36
2. Severe addiction	13	1	4	1	2	8
Total students	700	47	34	13	3	97
Chi-square, P value	$\chi^2=43.38, P<0.001, \text{Very High Significant}$					
Correlation coefficient	r = 0.330					

Out of 700 students, 194 (27.7%) used internet for 0-2 hours/day and among them 13 (6.7%) reported depressive symptoms. Whereas 238 students assessed internet for more than 4 hours daily and among them 50 (21%) reported depressive symptoms. Thus the students who spent more hours online reported more depressive symptoms which was statistically highly significant.

Table 8: Time spent online /day and its association with depression

Internet use hours/ day	Total students		Depressive Symptoms				Chi-Square test	P Value
	No.	%	Present		Absent			
			No.	%	No.	%		
0-2 hours	194	27.7	13	6.7	181	93.3	13.429	<0.05
2-4 hours	268	38.3	34	12.7	234	87.3		
>4 hours	238	34	50	21.1	188	78.9		
Total	700	100	97	13.8	603	86.2		

Out of total 700 students, 536 (76.6%) were from nuclear families, among them 82 (15.3%) reported depressive symptoms. 30 (4.3%) were from divided families, among them 4 (13.3%) had depressive symptoms and 134 (19.1%) were from joint families, among them 11 (8.2%) reported depressive symptoms. Out of 97 students who reported depressive symptoms, 82 were from nuclear and 4 from divided family and 11 from Joint family. Thus Depressive symptoms were seen more in students from Nuclear than joint families which was statistically significant.

Table 9: Family type and its association with depression

Family Type	Total students		Depressive Symptoms				Chi-Square test	P Value
	No.	%	Present		Absent			
			No.	%	No.	%		
Nuclear	536	76.6	82	15.3	454	84.7	4.01	<0.05
Joint	134	19.1	11	8.2	123	91.8		
Divided	30	4.3	4	13.3	26	86.7		
Total	700	100	97	13.9	603	86.1		

Out of 700 students, 449 were using up to 1 GB of data, among these 46 (10.2%) reported depressive symptoms. Whereas 51 used more than 2 GB data and 11 (21.7%) were found to have depressive symptoms. Thus students who were using >2 GB of data daily were found to have more co morbid Depressive Symptoms which was statistically significant.

Table 10: Data used/ day and its association with internet addiction

Data Used per day	Total students		Depressive Symptoms				Chi-Square test	P Value
	No.	%	Present		Absent			
			No.	%	No.	%		
Up to 1GB	449	64.1	46	10.2	403	89.8	13.69	<0.01
1-2 GB	200	28.6	40	20	160	80.0		
2-4 GB	42	6.0	8	19	34	81.0		
>4 GB	9	1.3	3	33.3	6	66.7		
Total	700	100	97	13.9	603	86.1		

Out of 700 students, 304 (43.4%) stayed on line permanently, among them 63 (20.7%) developed depressive symptoms. Whereas out of 396 (56.6%) students logging on occasionally, 34 (8.6%) reported depressive symptoms. Thus the students who stayed permanently on logged reported more depressive symptoms as compared to occasionally logged on which was very high statistically significant. ($p > 0.01$ VHS)

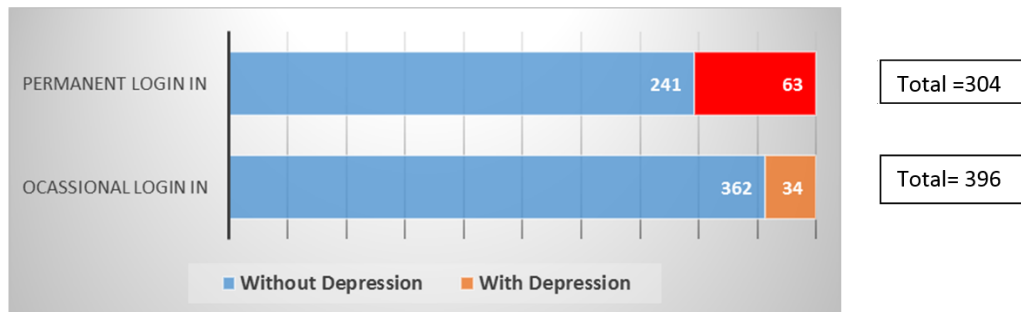


Fig. 3: Number of students with without depressive symptoms and its association with login status

Out of 700 students, 80 students reported Loneliness to be their reason to use excessive internet. Among them 27 (33.8%) were found to have depressive symptoms which was statistically significant when compared to others reasons to internet access. ($\chi^2 = 13.69$ $P < 0.01$).

LONELINESS & ITS ASSOCIATION WITH DEPRESSION

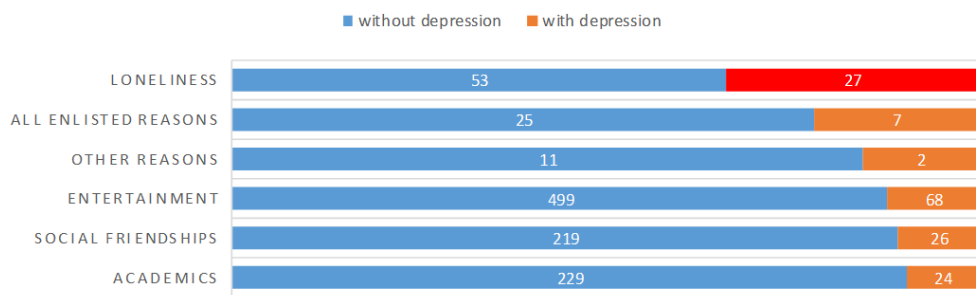


Fig. 4: Loneliness & association with depression

Out of 700 students, 357 (51%) kept phones next to bed while sleeping at night, among them 62 (17.4%) reported depressive symptoms. Similarly, out of 700 students, 354 (50.6%) checked their phones as soon as they got up from bed, among them 62 (17.5%) reported depressive symptoms. Thus more Depressive symptoms were noticed in those who kept their phones next to bed while sleeping and checked their phone immediately when they got up in the morning which was statistically significant. ($P < 0.01$)

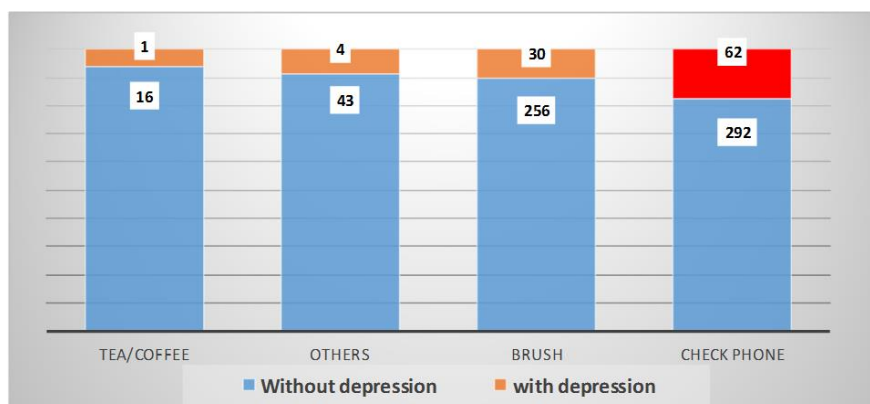


Fig. 5: Number of students with & without depressive symptoms and association with first thing done in the morning

Discussion

In our study, we found out 19.1% as overall prevalence of internet addiction with moderate addiction being 17.4% and severe addiction of 1.7% which is in accordance to Lam et al study where moderate internet addiction prevalence was 10.2% and severe internet addiction was 0.6%.¹⁵ Among Indian studies, study conducted by Deepak Goel et al in Mumbai reported 24.8% of the sample size as possible addicts,¹⁶ study by Krishnamurthy et al in Bangalore suggested 45.8% as prevalence of internet addiction¹⁷ and study by Chaudhari et al reported 58.87% of overall internet addiction.¹⁸ The level of internet addiction differs from one study to another. These discrepancies can be explained by the differences in methods used for the diagnosis of internet addiction and differences in study populations.

In our study group, IA, anxiety and depression was higher among students from Nuclear and Divided families than Joint families. It is well known that although individuals may have "real social support" from their families and society, they may also have "virtual social support" from the internet.¹⁹ Individuals separated from their families, use the internet frequently to satisfy their need for interpersonal relationships and to create alternative social channels.

In diagnosing Internet Addiction, time spent on the internet is one of the important factors. A use of 40-80 hours weekly or up to 20 hours at one time can serve as an indication for hospitalization.²⁰ In our study, students who used the internet 4 or more hours daily, 30 hours/week scored high on IA, Anxiety symptoms and depressive symptoms ($p < 0.05$)

As rightly pointed by Young (2004) cases of problematic internet use should be screened for depressive symptoms. In our study, depression and internet addiction had significant positive correlation ($p < 0.05$). There were 44 (32.8%) who had depressive symptoms of all 134 internet addicts which is in accordance with Indian study by Subhashini J where 38.7% of internet addicts reported depression.²¹ Also various other recent studies have shown that Internet Addiction causes decrease in social interactions, depression and loneliness and lower self-esteem.²² In our study 27 (33.8%) students who scored high on Depressive symptoms had reported loneliness as frequent reason for use of internet which is in consistence with other studies done in the past which showed positive correlation between IA and Depression.

There is lack of research depicting relationship between IA and Anxiety symptoms. Excessive internet use is associated with loneliness, decreased self-esteem, lower satisfaction levels in life, anxiety symptoms and overall poor mental health. Consistent with this, anxiety and IA was seen positively correlated in our study. Out of total 134 internet addicts 79 (58.9%) students had anxiety symptoms.

We also noted that the students who kept their phone bed side while sleeping at night and first thing they did was to check their phone in the morning, scored high on IA, anxiety symptoms and depressive symptoms as they had

repeated urge to check their phones so as not to miss any of the notifications.

Conclusion

The present study revealed that of all 700 students 80.9% were normal internet users, 19.1% were IA among them 17.3% had moderate IA and 1.8% had severe addiction. IA is seen to be positively correlated with Depressive and anxiety symptoms. The cause-effect relationship between depression and IA is not clear, nevertheless it is beneficial to screen for depression in individuals with IA. Various factors like stressful educational process, uncertainty of living away from one's family, financial and emotional stress may lead to depression or internet addiction among students. Hence, treating the underlying depressive symptoms may help to decrease internet addiction. Appropriate preventive strategies like educating students about healthy use of internet, stress management techniques, coping strategies, maintaining good peer relationships, importance of offline world need to be taught in order to protect the physical and mental health of the users. Parents and teachers need to be sensitized regarding identification of problematic internet use and further referral to advanced centers for screening and management.

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Limitations of the study

The study design being cross-sectional could not conclude a cause-effect relationship between the causative factors and IA. As the study involved only medical students from a district of Karnataka with a small sample size; therefore findings cannot be generalized to the community. The tools used were self-reported questionnaires which could have led to errors in the study results. No control group was included in the study.

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Nil

Conflicts of interest

There is no conflict of interest.

References

1. Whang L, Lee S, & Chang G. Internet over-users psychological profiles: a behaviour sampling analysis of internet addiction. *Cyberpsychol Behav* 2003;6:143-50.
2. Shaw M, Black DW. Internet addiction: definition, assessment, epidemiology and clinical management. *CNS Drugs* 2008;22(5):353-65.

3. Diagnostic and Statistical Manual of Mental Disorders 5th edition, American Psychiatric Association, Page no. 795.
4. Latest beta version of ICD 11. Available at <http://id.who.int/icd/entity>
5. Block JJ. Issues for DSM-V: internet addiction. *Am J Psychiatry*, 2008;165(3):306-7.
6. Kratzer S, & Hegerl U. Is "Internet Addiction" a disorder of its own?-a study on subjects with excessive internet use. *Psychiatr Prax* 2008;35:80-3.
7. Yen J, Ko C, & Yen C. The comorbid psychiatric symptoms of internet addiction: attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. *J Adolesc Health* 2007;41:93-8.
8. Yang C, Choe B, Baity M, Lee J, & Cho J. SCL-90-R and 16PF profiles of senior high school students with excessive internet use. *Can J Psychiatry*, 2005;50:407-14.
9. Tsai C, Lin S J. Internet Addiction of adolescents in Taiwan. *Cyberpsychol Behav* 2003;6:649-52.
10. Egger & Rauterberg (1996). Internet Behaviour and addiction, Swiss Federal Institute of Technology, Zurich; Yu S.C. (2001). Internet using behaviours and related factors among university students, Taiwan.
11. Young KS, Internet Addiction. The emergence of a new clinical disorder. *Cyberpsychol Behav* 1998;1:237-44
12. Ghamari F, Mohammadbeigi A, Hashiani AA. Internet addiction and modelling its risk factors in medical students, Iran. *Indian J Psychol Med* 2011;33:158-62
13. http://www.med.navy.mil/sites/NMCP2/PatientServices/SleepClinicLab/Documents/Beck_Depression_Inventory.pdf
14. Beck A T, Steer R.A (1990). Manual for the Beck Anxiety Inventory. San Antonio, TX Psychological Corporation.
15. Lam LT, Peng ZW, Mai JC, Jing J. Factors Associated with Internet Addiction among Adolescents. *Cyberpsychol Behav* 2009;12:551-5
16. Deepak Goel. A study on prevalence of internet addiction and its association with psychopathology in Indian adolescents. *Indian J Psychiatry* 2013;55(2):140-3.
17. Krishnamuthy S. Internet Addiction: Prevalence and risk factors: A cross sectional study among college students in Bengaluru, the Silicon Valley of India. *Indian J Public Health* 2015;59(2):115-21.
18. Bhushan Chaudhari. Internet Addiction and its determinants among medical students. *Ind Psychiatry J* 2015;24(2):158-62
19. Yeh Y, Ko H, Wu J, & Cheng C. Gender differences in relationships of actual and virtual social support to internet addiction mediated through depressive symptoms among college students in Taiwan. *Cyberpsychol Behav* 2008;11:485-7.
20. Brenner V. Psychology of computer use: XLVII. Parameters of internet use, abuse and addiction: The first 90 days of the internet usage survey. *Psychol Rep*, 1997;80:879-82.
21. Subhashini K.J, Praveen G. An era of digital slavery: A study of internet addiction among professional college students of Hassan, Karnataka. *Int J Community Med Public Health*, 2018;5(7):2977-93.
22. Ko C.H, Yen, Chen C.C. Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *J Nerv Ment Dis* 2005;193:273-7.