



Prevalence of Internet Addiction and Associated Psychological Co-morbidities among College Students in Bhutan

Karma Tenzin,¹ Thinley Dorji,² Mongal S Gurung,³ Pelzom Dorji,³ Sandip Tamang,⁴ Umesh Pradhan,⁵ Gampo Dorji⁶

¹Faculty of Postgraduate Medicine, Khesar Gyalpo University of Medical Sciences of Bhutan, ²Kidu Medical Unit, Gyalpoi Zimpon's office, Thimphu, Bhutan, ³Policy and Planning Division, Ministry of Health, Thimphu, Bhutan, ⁴Tshimalakha Hospital, Chhukha, Bhutan, ⁵Central Regional Referral Hospital, Gelephu, ⁶South East Asia Regional Office, World Health Organization, Delhi, India.

ABSTRACT

Introduction: Globally 3.5 billion people have access to internet and most of them are young adults and adolescents. In South Asia, Bhutan has the highest proportion of population with internet access at 37% in 2016. Many studies in Asia have reported significantly high level of internet addiction among college going students. In this light, this study was designed to estimate the prevalence of internet addiction and other co-morbidities.

Methods: This cross sectional study included 823 first year and final year students aged 18-24 from six colleges in Bhutan. A self-administered questionnaire consisting of three parts was utilized for data collection. The data was entered and validated in Epidata and analyzed using STATA/IC 14.

Results: The prevalence of moderate and severe internet addiction was 282 (34.3%) and 10 (1%) respectively. Positive correlations between internet addiction and psychological well-being ($r=0.331$ 95% CI: 0.269, 0.390), between Internet Addiction score and years of internet usage ($r=0.104$ 95% CI: 0.036, 0.171), age and years of using internet ($r=0.8$ 95% CI: 0.012, 0.148) were observed. The commonest mode of internet use was martphone 714 (86.8%). The use of computer laboratory (aPR 0.80, 95%CI: 0.66, 0.96) and internet use for news and educational purposes (aPR 0.76, 95%CI: 0.64, 0.9) showed protective effects.

Conclusions: The prevalence of internet addiction is high among the college going students in Bhutan. This warrants timely interventions to address the problems of internet addiction.

Keywords: internet addiction; protective; smartphone.

INTRODUCTION

Globally, 3.5 Billion people have access to internet which is seven fold increase from 738 million internet users in 2000. In Bhutan too, internet access has grown exponentially from 0.4% in 2000 to 36.9% in 2016, highest in the region. While internet use has increased substantially, research has found that the majority of the users are among adolescents and young adults.¹

Internet has become an important tool for education,

entertainment, communication, and information-sharing. However, internet users are also prone to develop addictive behavior mainly due to easy access and social networking.² Internet addiction in adolescent and young adults may result in poor personal behavior

Correspondence: Dr. Karma Tenzin, Faculty of Postgraduate Medicine, Khesar Gyalpo University of Medical Sciences of Bhutan, Email: karmatenzin9@gmail.com, Phone: +975-17969450.

and habits, lead to poor academic accomplishment, engagement in risky activities and instill poor dietary and sleeping habits.²⁻⁴

College going students are susceptible to developing internet addiction compared to other sections of the society as this is the stage of character formation phase, easy access to internet; limited or no parental supervision; and a way of escape from stresses.²

The prevalence of internet addiction among college students in Bangladesh, India and Malaysia, ranges from 8.1 -36.6%.^{2,5-7} Similarly, findings has been reported by studies in Hongkong and Malaysia.⁷⁻⁸

In Bhutan, the penetration of internet use has grown exponentially to 75% in 2017 which is the highest in the region; penetration of mobile subscription stands at 92%.¹ However, there are no previous epidemiological studies on prevalence of internet addiction in Bhutan. Therefore, this paper attempts to understand the patterns, prevalence, and the associated factors for internet addiction among college students in Bhutan. This paper would be very useful as Bhutan attempts to regulate the internet use.

METHODS

This cross-sectional analytical study was conducted in six out of ten colleges of Bhutan. Due to the financial and time constraints the study covered all six colleges in Western Bhutan; the remaining four located in central and eastern region of the country were excluded. The study included 823 college students aged 18-24 years. Study participants were first and final year students from four colleges under the Royal University of Bhutan (Paro College of Education-PCE, College of Science and Technology-CST, Samtse College of Education_SCE, Gaeddu College of Business Studies-GCBS), Royal Thimphu College-RTC, and Faculty of Nursing and Public Health-FNPH located in four Dzongkhags in Western Bhutan. The study was conducted between 1st May and 31st January 2017. The ethical approval was sort from Research ethics Board of health on 28th March 2016 (REBH/Approval/2016/017). Assuming the prevalence of internet addiction among adolescents to be 30%⁷, absolute precision of 5%, a non-response of 10% and design effect of 2.0, a sample size of 650 was estimated. A multi-stage cluster sampling strategy was adopted to achieve the required sample size. The first stage sampling unit included colleges while the second stage sampling unit included students selected from each Colleges. A list of all eligible Colleges was prepared. A total of six colleges located in Western Bhutan were selected. From each College, a list of students studying in first year and final year was obtained and a total

of around 55 students were selected by systematic random sampling after calculating the sampling interval (total number of students in a batch/55). The selected students filled a self-administered questionnaire. The questionnaire had three parts, Part I: socio-demographic characteristics and pattern of internet use; Part II: Validated Internet Addiction Test (IAT) questionnaire,¹⁰ and Part III: Validated 12-item General Health Questionnaire.¹¹

Young's IAT, developed for screening and measuring levels of internet addiction, and has been the most widely used and well-tested for its psychometric properties. Young's 20-item scale for Internet addiction (YIAT 20) was applied to qualify for the prevalence of Internet addiction. It is a 20-item questionnaire measured on the five-point Likert Scale. The score range as normal to mild addiction range: 0-49 points, moderate: 50-79 points, and severe: 80-100 points.¹² The rationale for choosing Young's diagnostic questionnaire for the study was that it has been extensively and frequently used across many studies globally, is self-completed, has been validated on adult and adolescent populations, and has good internal consistency reliability as well as concurrent validity. In a recent meta-analysis study, overall value for the reliability IAT 20, the mean differences showed that it is reliable in college students.²

It consists of 12 questions and each one assesses the severity of mental problems over past few weeks using a likert-type scale (0-3). Higher score indicates severe mental issues.

Data were double entered in EpiData Entry (version 3.1, EpiData Association, Odense, Denmark), validated and imported into STATA version 14.0 for analysis. The STATA/IC 14.0 (Serial No. XXXXXXXX, StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: Stata Corp LP.) was used for statistical analysis. Socio-demographic variables and pattern of internet use has been represented by frequency tables.

Correlation between the degree of addiction (continuous variable) vs mental disorders, mean age of starting internet use and age were calculated. Chi-square for binary outcome variable (internet addicted or not) and, t-test for continuous outcome variable (score for internet addiction) were used to assess association with different categorical variables. To determine the association between the socio-demographic characteristics and the internet addiction, a weighted log-binomial regression was fitted to get the adjusted and unadjusted prevalence ratios. In all calculations, P values under 0.05 were considered significant.

RESULTS

The response rate was 100% as all 823 randomly selected students, approached for the study, participated in the study. The ratio of the female versus male was nearly equal (Table 1). The mean age of the participants was 21.7 years and they have been using internet for about five years on an average. Out of six colleges in western Bhutan, (105) 12.8% of the participants were from Faculty of Nursing and Public Health; about (131) 16% each were from Paro College of Education and Royal Thimphu College and about (148) 18% each were from GCBS, SCE and CST. Smart phone was the most common mode of internet use 714 (86.7%). Nearly 114 (14%) used internet at odd hours from 11 pm till morning of the following day. While 609 (75%) uses it for news and educational purposes, 722 (87.7%) uses it for social media and 205 (25.5%) uses for games.

Table 1. Demographic information of the participants (n= 823) of the internet addiction study among college students of western Bhutan, 2016.

Variable	Number of participants (n)	Mean (SD)
Age (in completed years)	719	21.7(1.66)
Years of internet usage	823	4.6(2.04)
Variable	Number of participants n (%)	
Sex		
Male	427 (51.9)	
Female	396 (48.1)	
Field of Study		
Science	254 (30.9)	
Business / Commerce	206 (25.0)	
Arts	74 (9.0)	
Others	289 (35.1)	
Year of college		
1st Year	425 (51.6)	
Final Year	398 (48.4)	
Current Residence		
Hostel	687 (83.5)	
Rented Apartment	70 (8.5)	
Home	64 (7.8)	
Others	2 (0.2)	
Mode of Internet Use*		
Smart Phones	714 (86.8)	
Laptop	545 (66.2)	
College computer lab	464 (56.4)	
Internet Café	67 (8.1)	

Tablets/ipad	41 (5.0)
Time of Maximum internet use*	
5PM to 11 PM	653 (79.3)
Noon to 5 PM	175 (21.3)
6AM to Noon	161 (19.6)
11PM to Morning	114 (13.9)
Internet usage for:*	
Social Media	722 (87.7)
News and Educational purpose	609 (74.0)
Games	210 (25.5)
Others	79 (9.6)
College name	
PCE	132 (16.0)
CST	148 (18.0)
SCE	154 (18.7)
GCBS	148 (18.0)
RTC	136 (16.5)
FNPH	105 (12.8)

*Multiple choice questions

PCE - Paro College of Education; CST - College of Science and Technology; SCE - Samtse College of Education; GCBS - Geadu College of Business Studies; RTC - Royal Thimphu College; FNPH - Faculty of Nursing and Public Health.

The prevalence of internet addiction, according to Young's internet addiction test scores of ≥ 50 points, among the college students was 282 (34.3%) (Table 2). While one-third of the students were experiencing occasional or frequent problems because of the internet, the internet usage was causing significant problems in the lives of 10 (1.2%) of them. Table 3 shows that the average internet addiction test score was 42.47 (SD: 16.32) and the average mental wellbeing was 11.02 (SD: 5.49).

Table 2. Prevalence of Internet addiction among college students (n= 823) of western Bhutan; findings of the internet addiction study, 2016.

Internet addiction test score ²	Number (n)	Percentage ¹ (%)	95%CI ¹
Overall (≥ 50 points)	282	34.3	(30.0, 40.0)
80 – 100 points	10	1.2	(1.0, 2.0)
50 – 79 points	272	33.1	(30.0, 0.3)
<49 points	541	65.7	(0.6, 0.7)
¹ Weighted analysis			
² Young's internet addiction test score interpretation			

Table 3. Mean Internet Addiction Test (IAT) Score by demographic factors and the mean mental wellbeing of the participants; findings of the internet addiction study among college students (n = 823) of western Bhutan, 2016.

Variable	Mean ¹	SD	95%CI
Total IAT Score	42.50	16.32	(,)
Sex			
Male	43.30	8.27	(4 2 . 5 , 44.1)
Female	41.60	7.96	(4 0 . 7 , 42.5)
Field of Study			
Arts	42.50	15.30	(4 0 . 6 , 44.3)
Science	43.60	11.16	(4 2 . 3 , 44.9)
Business/Commerce	44.30	7.18	(4 3 . 3 , 45.3)
Others	39.50	4.30	(3 8 . 5 , 40.5)
Year of college			
1st Year	43.20	8.25	(4 2 . 4 , 44.0)
Final Year	41.60	7.98	(4 0 . 7 , 42.4)
Current Residence			
Home	40.40	28.83	(3 8 . 2 , 42.6)
Hostel	42.70	2.51	(4 2 . 1 , 43.4)
Rented Apartment	42.00	8.00	(4 0 . 1 , 44.0)
Mode of Internet Use			
Smart Phones	No	38.50	9.40 (3 6 . 8 , 40.2)
	Yes	43.10	8.02 (4 2 . 4 , 43.7)
Tablets/ipad	No	42.20	5.00 (4 1 . 6 , 42.8)
	Yes	47.10	32.68 (4 4 . 4 , 49.8)
Laptop	No	42.10	9.47 (4 1 . 0 , 43.1)
	Yes	42.70	8.62 (4 2 . 0 , 43.4)
College computer lab	No	44.50	13.75 (4 3 . 6 , 45.4)
	Yes	40.70	3.27 (3 9 . 9 , 41.5)
Internet Café			
	No	42.20	8.39 (4 1 . 6 , 42.8)
	Yes	45.80	7.68 (4 3 . 4 , 48.2)
Time of Maximum internet use			
6AM to Noon	No	41.80	3.91 (4 1 . 2 , 42.5)
	Yes	45.30	20.44 (4 3 . 8 , 46.9)
Noon to 5 PM	No	42.60	7.64 (4 2 . 0 , 43.3)
	Yes	41.80	9.26 (4 0 . 4 , 43.2)
5PM to 11 PM	No	43.40	18.01 (4 2 . 1 , 44.7)
	Yes	42.20	3.81 (4 1 . 5 , 42.9)
11 PM to morning	No	41.50	7.99 (4 0 . 9 , 42.1)
	Yes	48.90	8.54 (4 7 . 4 , 50.5)
Internet usage for:			
Social Media	No	39.10	9.04 (3 7 . 4 , 40.8)
	Yes	43.00	8.06 (4 2 . 3 , 43.6)
Games	No	41.00	5.85 (4 0 . 3 , 41.7)
	Yes	46.40	14.81 (4 5 . 3 , 47.5)
News and Educational purpose	No	47.00	14.86 (4 5 . 9 , 48.1)
	Yes	40.70	5.80 (4 0 . 0 , 41.4)
Others	No	42.60	8.18 (4 1 . 9 , 43.2)
	Yes	41.70	9.78 (3 9 . 5 , 43.9)
College name			
PCE		40.80	8.04 (3 9 . 4 , 42.1)
CST		45.80	9.73 (4 4 . 2 , 47.4)
SCE		38.40	11.17 (3 6 . 5 , 40.2)
GCBS		44.50	7.30 (4 3 . 4 , 45.6)
RTC		42.60	8.16 (4 1 . 2 , 44.0)
FNPB		39.60	10.25 (3 7 . 6 , 41.5)
Mental Wellbeing Score		11.02	5.49
¹ Weighted analysis			

PCE - Paro College of Education; CST - College of Science and Technology; SCE - Samtse College of Education; GCBS - Geadu College of Business Studies; RTC - Royal Thimphu College; FNPH - Faculty of Nursing and Public Health; IAT -Internet Addiction Test.

Degree of association between addiction and mental disorders

There is positive correlation between Internet Addiction score and age of the participants ($r = 0.8$, 95% CI: 0.012, 0.148); between Internet Addiction score and years of internet usage ($r = 0.104$, 95%CI: 0.036,

0.171); and between Internet Addiction score and mental wellbeing scores ($r = 0.331$, 95%CI: 0.269, 0.390).

There is statistically significant association between internet addiction and mental wellbeing, tablet/ipad as mode of internet use, college computer lab as mode of internet use, the maximum internet use time is from 11pm till morning of the following day, using internet mainly for social media. However, using internet mainly for news and educational purposes (Table 4). Two of the factors, viz., college computer laboratory as mode of internet use and using internet mainly for news and educational purposes showed protective association.

Table 5. Factors associated with internet addiction among the college students of western Bhutan (n= 823); findings of the internet addiction study, 2016.

Variable	Crude PR (95%CI) ¹	P Value	aPR (95%CI) ¹	P Value
Age (in completed years)	0.98 (0.95, 1.02)	0.366	-	-
Years of internet usage	1.05 (1.03, 1.08)	<0.001	1 (0.97, 1.04)	0.857
Mental Wellbeing Score	1.06 (1.05, 1.06)	<0.001	1.05 (1.04, 1.07)	<0.001
Sex				
Male	Ref	Ref	-	-
Female	1.01 (0.91, 1.11)	0.915	-	-
Field of Study				
Arts	Ref	Ref	-	-
Science	0.98 (0.81, 1.19)	0.847	-	-
Business/Commerce	0.98 (0.82, 1.18)	0.861	-	-
Others	0.76 (0.63, 0.92)	0.005	-	-
Year of college				
1st Year	Ref	Ref	-	-
Final Year	0.92 (0.83, 1.02)	0.119	0.95 (0.79, 1.13)	0.542
Current Residence				
Home	Ref	Ref	-	-
Hostel	1.14 (0.94, 1.38)	0.193	-	-
Rented Apartment	1.01 (0.78, 1.31)	0.92	-	-
Mode of Internet Use ²				
Smart Phones	1.5 (1.25, 1.82)	<0.001	1.18 (0.87, 1.62)	0.289
Tablets/ipad	1.84 (1.6, 2.11)	<0.001	1.82 (1.4, 2.38)	<0.001
Laptop	1.03 (0.92, 1.15)	0.591	1.12 (0.92, 1.37)	0.268
College computer lab	0.78 (0.7, 0.86)	<0.001	0.8 (0.66, 0.96)	0.016
Internet Café	1.26 (1.07, 1.49)	0.006	1.31 (0.98, 1.75)	0.067
Time of Maximum internet use ²				
6AM to Noon	1.1 (0.97, 1.24)	0.149	1.14 (0.93, 1.4)	0.197
Noon to 5 PM	1 (0.88, 1.14)	0.991	1.05 (0.85, 1.3)	0.663
5PM to 11 PM	0.93 (0.82, 1.05)	0.232	0.95 (0.77, 1.16)	0.597
11 PM to morning	1.57 (1.4, 1.77)	<0.001	1.3 (1.06, 1.6)	0.013
Internet usage mainly for: ²				
Social Media	1.59 (1.31, 1.93)	<0.001	1.48 (1.02, 2.14)	0.04
Games	1.34 (1.2, 1.48)	<0.001	1.14 (0.94, 1.38)	0.173

News and Education	0.66 (0.59, 0.73)	<0.001	0.76 (0.64, 0.9)	0.002
Others	0.82 (0.67, 1)	0.051	0.82 (0.59, 1.12)	0.214
¹ Weighted analysis				
² Binary variables: Reference "No"				
PR - Prevalence Ratio; aPR - Adjusted Prevalence Ratio				

DISCUSSION

This first ever cross sectional study conducted in Bhutan on problem of internet addiction among college going students in western Bhutan. The main findings of this study are a) over 30% of the college students are internet addict b) Internet addiction and mental wellbeing had association c) Internet addiction was associated with purpose of use of internet, smartphone use, age, number years of internet use d) Internet use for news and education purpose had protective effect.

Majority of students accessed internet using smartphone and over 70% of them access internet after college times and visits to social website and networking was prevalent in over 80% of the study participants. The prevalence moderate and severe internet addiction was 33.1% and 1.2% respectively. This prevalence reported in comparative in the region actually reported varying rates ranging from 8.1% to 25.5%.^{6,7,13,14} This possible reasons for such variation could be attributed to different setting, cultural context and environment and of course when the study was conducted. Further, this study found that inverse correlation between internet addiction score and mental wellbeing which is similar to the other studies.

The patterns of internet use was multifarious with the majority of students having been using computers for more than five years, the smart phones being the most preferred mode for internet use.^{15,16}

A significant gender difference in the prevalence of internet addiction was observed (more in males more than females), which is similar to findings reported in other studies in the region.¹⁴ The prevalence also significantly varied across socioeconomic status, field of study, internet usage timing, mode of use of internet and year in college.

This study found following potential risk factors to be associated with internet addiction: age of the participants, years of internet use; mental wellbeing status; tablet/ipad as mode of internet use ; the

maximum internet use time is from 11pm till morning of the following day.¹⁷

using internet mainly for social media.¹⁶ Use of college computer lab as mode of internet use and using internet mainly for news and educational purposes are protective.

This is the first study in the country exploring the prevalence of internet addiction among the college going students. However, this study has its limitations that four colleges in eastern and central Bhutan were excluded from the study, and only 1st and final year students, aged 18 through 24 years, were included in the study therefore the generalizability of the findings might not be possible.

CONCLUSIONS

It may be concluded that the prevalence of internet addiction among Bhutanese college students is quite high and also internet addiction has an association with mental disorders. Therefore this problem merits more attention and it is timely. Amongst others interventions such as discouraging unhealthy use of internet through education and awareness creation activities; professional support to the students or person with internet addiction; and further studies on the level of IA among high school students and general public needs to be prioritized. There is also an urgent need to create awareness about internet addiction for the policy makers, teachers, students, parents and general public.

ACKNOWLEDGEMENTS

The researchers would like to thank and acknowledge the support of University management and other officials for their support during the entire period.

Conflict of Interest: None.

REFERENCES

- ICA. Annual Report. [Internet]. 2016 June [Cited 2018 Jan 4]. Available from: https://www.icagruppen.se/globalassets/rapporportal/arsredovisning-2016/01.-omslag/ica-gruppen_annual_report_2016.pdf. [Full Text]
- Krishnamurthy S, Chetlapalli 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. [PubMed | Full Text]
- Kim K, Ryu E, Chon M-Y, Yeun E-J, Choi S-Y, Seo J-S, et al. Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. *Int J Nurs Stud*. 2006;43(2):185-92. [PubMed | DOI]
- Weinstein A, Lejoyeux M. Internet Addiction or Excessive Internet Use. *Am J Drug Alcohol Abuse*. 2010;36(5):277-83. [PubMed | DOI]
- Goel D, Subramanyam A, Kamath R. A study on the prevalence of internet addiction and its association with psychopathology in Indian adolescents. *Indian J Psychiatry*. 2013 Apr;55(2):140-3. [PubMed | DOI]
- Islam MA, Hossain MZ. Prevalence and risk factors of problematic internet use and the associated psychological distress among graduate students of Bangladesh. *Asian J Gamb Issues Public Health*. 2016;6(1):11. [PubMed | DOI]
- Ching SM, Awang H, Ramachandran V, Mohd S, Lim S, Aliaa W, et al. Prevalence and factors associated with internet addiction among medical students - A cross-sectional study in Malaysia. 2017;72(1):7-11. [Full Text]
- Fu KW, Chan WSC, Wong PWC, Yip PSF. Internet addiction: Prevalence, discriminant validity and correlates among adolescents in Hong Kong. *Br J Psychiatry*. 2010;196(6):486-92. [PubMed | DOI]
- BHUTAN LIVING STANDARDS SURVEY REPORT 2017 [Internet]. Thimphu, Bhutan. 2017 [cited 2018 Jan 24]. Available from: <http://www.nsb.gov.bt/publication/files/pub2yo10667rb.pdf>. [Full Text]
- Ranganatha S C, Usha S. Prevalence and pattern of internet addiction among medical students, Bengaluru. *Int J Community Med Public Health*. 2017 Dec;4(12):4680-4. [Full Text]
- Jamali J, Ayatollahi S. Classification of Iranian Nurses According to their Mental Health Outcomes Using GHQ-12 Questionnaire: a Comparison Between Latent Class Analysis and K-means Clustering with Traditional Scoring Method. *Mater Socio Medica* [Internet]. 2015;27(5):337-41. [PubMed | DOI]
- Cash H, D. Rae C, H. Steel A, Winkler A. Internet Addiction: A Brief Summary of Research and Practice. *Curr Psychiatry Rev*. 2012;8(4):292-8. [PubMed | Full Text]
- Jhala J, Sharma R. Prevalence and Nature of Internet Use among Adolescents in Vadodara (Gujarat). *International Journal of Indian Journal of Indian Psychology*. 2017;4(2):2349-3429. [Full Text]
- Nath K, Naskar S, Victor R. A Cross-Sectional Study on the Prevalence, Risk Factors, and Ill Effects of Internet Addiction Among Medical Students in Northeastern India. *Prim Care Companion CNS Disord*. 2016;18(2):1-6. [PubMed]
- Long J, Liu T-Q, Liao Y-H, Qi C, He H-Y, Chen S-B, et al. Prevalence and correlates of problematic smartphone use in a large random sample of Chinese undergraduates. *BMC Psychiatry*. 2016 Nov 17;16(1):408. [PubMed | Full Text]
- Srijampana RGVV, Endreddy AR, Prabhath K, Rajana B. Prevalence and patterns of internet addiction among medical students. *Med J Dr DY Patil Univ*. 2014;7(6):709-13. [Full Text]
- Mutalik NR, Tejaswi TP, Moni S, Choudhari SB. A cross-sectional study on assessment of prevalence of Internet addiction and its correlates among professional college students. *Open J Psychiatry & Allied Sci*. 2017;9:20-5. [Full Text]