Problematic Internet Use and Sleep Quality in Medical Undergraduates: A Cross Sectional Study

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Abstract

Background

With the increased use of internet, concerns are also being raised about the negative effects of internet particularly in the young population. Students are particularly susceptible to the negative physical and psychological effects of internet. With this background we aimed to study the problematic internet use and its association with sleep quality in undergraduate students of BP Koirala Institute of Health Sciences (BPKIHS).

Methodology

A descriptive cross sectional study was conducted among the undergraduate students of BPKIHS. An online form consisting of sociodemographic profile, Young's Internet Addiction Test (IAT) and Pittsburgh Sleep Quality Index (PSQI) was distributed among the students.

Results

A total of 235 responses were obtained. The mean age of participants was 22.52 years ± 1.851. Majority of the participants were males (61.3%) and from third year of study program (32.3%). Problem internet use was found to be present in 211 (89.8%) of the participants with 163 (69.4%) and 48 (20.4%) having mild and moderate addiction respectively. 83(35.3%) students reported to have a disturbed sleep pattern. A significant association was found between problematic internet use and sleep problems (p value <0.01). A moderately positive co-relation was found between IAT and PSQI scores (r value=0.4, p value <0.01).

Conclusion

Problematic internet use is a highly prevalent phenomenon among medical undergraduates and is significantly associated with poor sleep quality. Effective measures need to be taken to educate students about internet use and sleep hygiene.

Keywords

Internet, problematic, addiction, sleep, medical, students

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INTRODUCTION

The world was first introduced to internet in the 80s and the number of people using internet has been on a steady rise since. Nepal is no exception to this and has an internet penetration rate of 49.6%.[1] There is no doubt that internet has made our lives easier in many ways. However with increasing use concerns are also being raised about the adverse effects associated with it. This increased use of internet has been referred to by various terms such as internet addiction (IA), Problematic Internet Use (PIU), Compulsive Internet Use, Pathological Internet Use among others.[2] PIU has been defined as use of the Internet that creates psychological, social, school, and/or work difficulties in a person's life.[3] We have preferred the term PIU as it has the advantage of not making assumptions about the nosology or underpinning causative mechanisms of the various subcategories.[4] The prevalence of PIU has been found to be around 14.22% globally[5] and 20% in South-East Asia[6] and has been found to be associated with a number of adverse psychological effects such as depression, anxiety, low self-esteem, sleep problems, etc.[7] Though the prevalence of PIU has been shown to be five times more in medical undergraduates than in the general population,[8] most of the studies about PIU and associated psychological issues have been conducted among the

general adolescent population. Studies from Nepal have also mostly focused on adolescents with reported ranges of PIU between 31.9% to 51.2%.[9-11] Few studies have looked into PIU in medical undergraduates and reported a wide range of PIU.[12-14] The variations in these studies could be due to the different tools and different cut-offs used. Only one study has looked into the association between PIU and medical students and found a significant association between the two.[14] Medical studies is generally considered a stressful one and has often been shown to be associated with poor sleep. Hence it is important to identify the factors that could be associated with poor sleep so that appropriate interventions can be designed. In this study we have made an attempt to understand the relationship between PIU and sleep quality among medical undergraduates from our institute.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted after obtaining ethical clearance from the Departmental Research Unit (DRU) following presentation and feedback incorporation. Conducted over one month, a Google form with four sections was distributed to MBBS and BDS students at BPKIHS. Section one outlined objectives, confidentiality, and voluntary participation; section two recorded demographics; section three included Young's 20-item Internet Addiction Test developed by Kimberly Young[15] (IAT; 0–5 scale; Cronbach's α = 0.89–0.9316), where scores of 20–49, 50–79, and ≥80 indicate mild, moderate, and severe addiction, respectively.[19] We have used the Young IAT without reproducing or translating the scale and has been used in this way previously with proper citation.[10] Section four included the 19-item Pittsburgh Sleep Quality Index (PSQI), where global scores >5 denote poor sleep quality.17 Convenience sampling was used via batch representatives who circulated the form through WhatsApp. Data were analyzed in SPSS 11.5 using descriptive statistics, Chi-square for associations, Spearman's correlation for score relationships, Kruskal–Wallis for group comparisons, and logistic regression for predictors of poor sleep. Statistical significance was set at p<0.05.

RESULTS

A total of 235 students participated in the study. The mean age of participants was 22.52 ± 1.85 years. Majority of participants were male (61.3%) and from third year of study (32.3%). 6.4% and 8.1% respectively had a past and family history of mental illness. Majority of the participants had access to multiple devices with internet and spent more than 2 hours per day on internet (Table 1).

The IAT scores showed that 89.8% of the participants had PIU. Among the participants 69.4% and 20.4% of the students had mild and moderate problematic use respectively (Table 2). Table 3 shows that 123 (52.3%) of the students had good sleep while 112 (47.7%) had poor sleep. 50.7% of the participants had both poor sleep and internet addiction. While 79.2% of the participants without internet addiction had good sleep, only 49.3% of those with internet addiction were found to have good sleep quality. There was a highly significant association between sleep quality and internet addiction (p value <0.01) (Table 4). The mean IAT and total PSQI score were 37.04 ± 14.91 and 5.15 ± 3.5 respectively. There was a statistically significant positive correlation between the two scores. (r value = 0.4, p value - <0.01).

There was a statistically significant difference in the scores of all the PSQI domains among those with normal, mild and moderate IAT scores. Those with moderate addiction scored significantly higher than those with mild or no addiction in all domains of PSQI. However, the difference between mildly addicted and normal users was not significant in all domains (Table 5). Using logistic regression, table 6 examines the relationship between internet addiction factors and sleep quality. A positive and significant association of sleep was found with the total IAT score and the IAT factors excessive use and anticipation. Additionally females with PIU were found to have shorter sleep duration (p value <0.01) and those who spent more than 2 hours per day on internet had poor sleep quality (p <0.01), shorter sleep duration (p 0.04), took more time to fall asleep (p 0.03) and had more sleep disturbances (p <0.01). No other significant association was found between sleep quality and demo-

graphic profile among those with PIU.

Table 1: Sociodemographic profile of the respondents and other variables (N = 235)

Category		
Age (Mean ±SD)		22.52 ± 1.85
Gender No. (%)	Male	144 (61.3)
	Female	91 (38.7)
Year of study No. (%)	First	50 (21.3)
	Second	45 (19.1)
	Third	76 (32.3)
	Fourth	26 (11.1)
	Final	1 (0.4)
	Interns	37 (15.7)
Past history of mental illness No. (%)	Yes	15 (6.4)
	No	220 (93.6)
Family history of mental illness No. (%)	Yes	19 (8.1)
	No	216 (91.9)
History of substance use No. (%)	Yes	10 (4.3)
	No	225 (95.7)
Time spent on internet per day No. (%)	<30 minutes	2 (0.9)
	30-60 minutes	8 (3.4)
	60-120 minutes	43 (18.3)
	>120 minutes	182 (76.2)
Number of devices with access to internet No. (%)	Single	47 (20)
	Multiple	188 (80)

Table 2: Distribution of participants according to IAT scores

IAT score range	Interpretation	Number (Percentage)
<20	Absent	24 (10.2)
20-49	Mild	163 (69.4)
50-79	Moderate	48 (20.4)

Table 3: Distribution of participants according to sleep quality

Sleep quality	Number (Percentage)
Good	123 (52.3)
Poor	112 (47.7)

Table 4: Association between sleep quality and internet addiction

Categories		Sleep quality		df	Chi2	p value	Remarks
		Good Number %	Poor Number %				
Problematic Internet Use	Absent Number %	19 (79.2)	5 (20.8)	1	60.86	<0.01	Highly significant
	Present Number %	104 (49.3)	107 (50.7)				

Table 5: PSQI components among participants

	PIU severity	N	Mean (SD)	Kruskal Wallis H	df	P value	Significant difference
PSQI global score	Normal (A)	24	3.29 (3.42)	41.77	2	<0.01	A-B
	Mild (B)	163	4.56 (2.80)				B-C
	Moderate (C)	48	8.08 (4.13)				A-C
Subjective sleep quality	Normal (A)	24	0.46 (0.72)	36.05	2	<0.01	A-B
	Mild (B)	163	0.77 (0.60)				B-C
	Moderate (C)	48	1.44 (0.84)				A-C
Sleep latency	Normal (A)	24	0.71 (0.75)	9.53	2	<0.01	A-C
	Mild (B)	163	0.94 (0.90)				B-C
	Moderate (C)	48	1.33 (0.95)				
Sleep duration	Normal (A)	24	0.63 (0.77)	10.79	2	<0.01	A-C
	Mild (B)	163	0.74 (0.78)				B-C
	Moderate (C)	48	1.25 (1.04)				
Habitual sleep efficiency	Normal (A)	24	0.13 (0.44)	37.27	2	<0.01	A-C
	Mild (B)	163	0.30 (0.67)				B-C
	Moderate (C)	48	0.94 (0.90)				
Sleep disturbances	Normal (A)	24	0.88 (0.53)	11.15	2	<0.01	A-C
	Mild (B)	163	1.00 (0.44)				B-C
	Moderate (C)	48	1.23 (0.55)				
Use of medications	Normal (A)	24	0.13 (0.61)	10.94	2	<0.01	A-C
	Mild (B)	163	0.06 (0.30)				B-C
	Moderate (C)	48	0.38 (0.87)				
Daytime dysfunction	Normal (A)	24	0.38 (0.57)	37.22	2	<0.01	A-C
	Mild (B)	163	0.74 (0.83)				B-C
	Moderate (C)	48	1.52 (0.85)				

Table 6: Association between sleep quality and PIU by logistics regression

Variables	β	Standard error	Exp (β)	95% confidence interval for β		p value
				Lower	Upper	
Salience	-0.023	0.045	0.977	0.894	1.067	0.60
Excessive use	0.147	0.060	1.158	1.029	1.304	0.01
Anticipation	0.146	0.073	1.157	1.004	1.334	0.04
Neglect of work	0.127	0.101	1.136	0.932	1.385	0.20
Lack of control	-0.034	0.068	0.966	0.846	1.104	0.61
Neglect social life	-0.076	0.093	0.927	0.772	1.113	0.41
Total IAT score	0.05	0.010	1.054	1.033	1.066	<0.01

DISCUSSION

Our study shows that the prevalence of PIU among medical students is quite high with around one-fifth of the participants having moderate addiction. Meta-analyses have shown that around one-quarter of medical students have PIU with a higher prevalence in South-East Asia.[18] However, the comparison of prevalence of PIU across studies is a difficult thing to do because of the differences in sample included, screening instrument used and the cut-off scores used. For Young's IAT, different cutoffs such as 20, 30, 40 and 50 have been used in various studies.[19-23] IAT scores have also been shown to be influenced by factors such as age and cultural context with some researchers questioning its clinical utility.[24] Despite this IAT is the most widely used tool around the globe and is likely to be so until an agreement on an ideal screening tool or cutoff score is reached.

In our study 47.7% of the students had poor sleep quality. This finding is comparable to other studies.[25,26] Sleep quality of undergraduate students is a much talked about topic with most studies showing that medical students have poor sleep and calls being made to identify associated factors and development of targeted health promotion measures.[27]

Our study shows that PIU and poor sleep are significantly associated with each other. This association has been shown in other studies as well.[28-37] Those with PIU scored poorer in all the domains of sleep which is again a finding reflected in these studies. We compared the PSQI domain scores across three groups, i.e, normal users, mild PIU and moderate PIU and found that those with moderate PIU scored significantly higher in all domains of sleep compared to those with mild IA and normal users. However the difference in scores between those with mild PIU and normal users was not found to be significant in all domains. This finding highlights that those with mild PIU may not be much different from normal users and a revision of cut-off score of IAT is indeed needed.

Logistic regression revealed that the IAT factors excessive use and anticipation were positively and significantly associated with poor sleep. Studies that have used logistic regression have shown similar results for these two factors. There have been mixed results when we look into the association of sleep quality with other factors of IAT.[35-37] In our study the association with other factors was not found to be significant.

While the sample size in most of these studies was similar to ours, four studies[27,30,35] had a higher sample size than our study. The IAT cutoff used was similar to ours in three of the studies[30,31,37] while the rest used different cutoffs ranging from 15-80.

One study reported no significant association between IAT and PSQI scores.[38] This may relate to living arrangements, as only 18% of its participants stayed in hostels, whereas all students in our study resided in BPKIHS hostels. Hostel settings offer easy campus internet access, while home environments allow greater parental control and alternative recreation through family interactions.

The reason why PIU and sleep are associated with each other is not fully understood. First, use of internet acts as a direct substitute for activities related to good sleep hygiene.[39] Additionally it has been shown that children and adolescents with nighttime electronic media use have increased physiological arousal.[40] One study has shown that PIU causes disruption in circadian rhythm.[41] Another possible explanation is the effect of electromagnetic fields emitted by mobile phones, which are an important medium

of internet use. A study reviewed 14 different studies examining human brain electrical activity during or after such radiofrequency emissions and found that enhanced electroencephalogram alpha band power was found in several of the studies.[42] Another study has shown that mobile phone use 30 minutes before sleep is associated with decrease in rapid eye movement sleep latency and increased electroencephalogram spectral power in the 11.5-12.25 Hz frequency range during the initial part of sleep.[43] Finally electronic devices such as smartphones emit short wavelength blue light which have been to suppress melatonin causing sleep dysfunction. In view of this finding, many devices are now equipped with night mode to reduce blue light emission.[44]

Structural and functional brain studies in PIU have shown reduced grey and white matter volumes in prefrontal cortex[45], limbic system[46], a mix of increase/decrease activity in the default mode network and overall decreased activity in the executive control network.[47] It is possible that PIU disrupts sleep through these effects as these areas are known to have a role in sleep regulation.

There is another school of thought which says that internet addiction is a result of poor sleep quality. This is in accordance with the cognitive behavior model of PIU which says that individuals with pre-existing psychopathology when exposed to internet may go on to develop PIU if they receive positive reinforcement from internet use.[48] Based on this theory one study has shown that dyssomnias can predict development of internet addiction.[49] In another study the authors did not find any negative effects of media use on sleep but reported that media use was sought as a means of coping with sleep problems.[50] Despite these results, these are early times to say whether poor sleep is a cause or effect of excess internet use.

This study has several limitations. The response rate was low (34%), likely due to ongoing examinations among senior students. The instruments were not validated for this population, and responder bias may have occurred, with affected students more likely to participate. Finally, the cross-sectional design precludes causal inference between PIU and sleep quality, warranting further research.

CONCLUSION

Our study found that PIU was highly prevalent among medical students and significantly associated with poor quality. Sleep problem is a huge problem among medical students and is often associated with poor academic performance. Identifying the factors associated with poor sleep can help develop proper mitigating measures which will not only improve the sleep quality but may also improve the academic performance. Further establishing a cause effect relationship between PIU and sleep quality can help guide awareness programs and develop digital hygiene strategies in medical schools. Finally it can also help institutions develop proper policies on internet access and student mental well-being.

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