Effect of Internet Addiction on Sleep Quality and Academic Performance in Undergraduate Dental Students

Avni Rana[1]   Anmol Mathur[2]   Ayush Kharia[3]   Aditi Mathur[4]

[1] Department of Prosthodontics, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India
[2] Department of Public Health Dentistry, Dr. D. Y. Patil Dental College and Hospital, Pune, Maharashtra, India
[3] Department of Oral and Maxillofacial Surgery, People's College of Dental Sciences and Research Center, Bhopal, Madhya Pradesh, India
[4] Dental Department, Post Graduate Institute of Child Health (PGICH), Noida, Uttar Pradesh, India

Address for correspondence Anmol Mathur, MDS, Department of Public Health Dentistry, Dr. D. Y. Patil Dental College and Hospital, Pune, Maharashtra 411018, India (e-mail: dranmolmathur@gmail.com).

Abstract

Aim This study aimed to evaluate the prevalence of Internet addiction and its effect on sleep patterns and university academic performance among dental undergraduates.

Methodology A total of 400 dental undergraduates were targeted in a cross-sectional setting. The students were invited to fill out a pretested questionnaire consisting of the Pittsburgh Sleep Quality Index (PSQI) and the Internet Addiction Test. Data was analyzed using the Statistical Package for Social Science (SPSS) software (version 20.0). Frequencies and percentages along with mean and standard deviation were calculated.

Results A total of 274 study subjects participated in the study out of which the majority of respondents were females ($N = 230$; 83.9%). Seventy-six percent of the population was using the Internet for 0 to 6 hours. Excellent academic performance scores have not been reported in any of the years except the second year. The mean global PSQI score and Internet addiction score both are seen to be reducing as the year of study increases. Internet addiction is positively associated with poor PSQI scores.

Conclusion The authors concluded that adequate sleep is undoubtedly the most important factor. Internet usage is a dynamic issue; the students need to manage it in a strict schedule to manage a decent total sleeping time.

Keywords
► internet
► undergraduate
► PSQI
► IAT
► academic

Introduction

In today's era of androids and tablets, the Internet has become one of the most important and basic commodities for human survival. Any kind of information from local restaurants to international news can be accessed with a single click. Internet usage has gone so high that it is competing with alcohol and tobacco addiction. It dominates the lifestyles of university students, particularly those enrolled in medical and other health care courses. Health care students avail the Internet to obtain scientific literature and other relevant information. According to Hattie Kauffman, Internet users are more susceptible to spending their leisure time online than socializing in real life.[1] Frequent bedtime Internet usage inversely affects sleep duration in adolescents.[2,3] It is suggested that adequate sleep improves

memory consolidation and learning while lack of sleep causes sleepiness and in some cases, impaired neurocognitive and psychomotor performance.[4,5] Considering the increasing number of Internet users in today's time, Internet usage among dental undergraduates should not be uncommon. The dental profession demands long hours of study and clinical practice. It also requires high levels of concentration and proficiency in their clinical work. Since they would be the doctors of tomorrow and a lot of peoples' lives would depend on their minor yet critical dental procedures, they are expected to perform efficiently and be well-versed in their knowledge of the subjects. Any kind of divergence in their performance would ultimately affect their career performances.

Thus, there was a felt need to find out the total Internet addiction and its effect on sleep patterns and university academic performance in a large sample of budding dental undergraduates.

Materials and Methods

Study Design and Population
A descriptive cross-sectional survey was conducted among undergraduate health care students enrolled in a dental college affiliated with a deemed university. The dental college was selected by the convenience sampling method. The total undergraduate capacity of the selected college is 500, with 100 students enrolled in each batch. A total target group of 400 was selected. The study population consisted of second, third, and final year undergraduates and interns. The first-year students were excluded from the sample since they had not appeared for any university exams before the study and could not be assessed for academic performance. The pro forma had a few mandatory questions about the overall systemic health of the students, that is, any history of chronic illness, presence of clinical depression, and history of any sleep-inducing medication. Students who had any known chronic illnesses, any known cases of clinical depression, or were on any drugs causing sleep were excluded from the sample.

Pretesting of Questionnaire
The questionnaire for pretesting had to be administered to 15 students, twice on successive days, who were interviewed to get feedback on the overall acceptability of the questionnaire in terms of length, language clarity, time, and feasibility. Based on their feedback, the questionnaire did not require any corrections. Cronbach's coefficient was found to be 0.80, which showed the internal reliability of the questionnaire. The mean content validity ratio was calculated as 0.85 based on the opinions expressed by the panel of six academicians. Face validity was also assessed and it was observed that 91% of the participants found the questionnaire to be easy.

Ethical Approval
The study protocol was reviewed and approved by the Scientific Review Committee of the participating college and was granted ethical clearance by the University Ethics Committee Letter No. DYPV/EC/222/2019.

Research Tools and Techniques
Permission was taken from the Dean of the college to conduct the study. After finalizing the suitable dates with the college administration, a letter of invitation for the study was sent to all the classes a week before the tentative dates. The students who wished to participate were asked to bring along with them a copy of their mark sheet of the last university examination. This was to verify the percentage of marks claimed by the subjects in the pro forma.

After explaining the nature and purpose of the research, confidentiality was assured and students were informed about the anonymity of the pro forma. Written informed consent was taken on the day of data collection from each of the participants before the study.

A combined pro forma consisting of demographic details, academic performance details, Pittsburgh Sleep Quality Index (PSQI), and Internet Addiction Test (IAT) was prepared. College academic performance was assessed by the total marks scored in the last set of university exams attempted by the subject (in %) and was categorized into excellent ($\geq 80\%$), good (60–80%), fair (50–60%), and poor ($< 50\%$).[6]

To assess sleep quality, the PSQI was employed. The PSQI consists of 19 self-rated questions and 5 questions rated by a roommate. The latter five questions are used for clinical information only and are not tabulated in the scoring of the PSQI. The 19 self-rated questions assess a wide variety of factors relating to sleep quality, including estimates of sleep duration and latency and the frequency and severity of specific sleep-related problems. These 19 items are grouped into 7-component scores, each weighted equally on a 0 to 3 scale. The 7-component scores are then summed to yield a global PSQI score, which has a range of 0 to 21; the higher the scores, the worse is sleep quality. We categorized this score further into three brackets of 0 to 7, 8 to 14, and 15 to 21 indicating mild, moderate, and severe sleep disturbances.[7]

As described by Widyanto and McMurran in their study,[8] Dr. Kimberly Young developed the IAT in 1998 which is a reliable and valid measure of Internet addiction. It consists of 20 items that measure mild, moderate, and severe levels of Internet addiction. Scores for each item are summed up, the higher the score, the greater the level of addiction. According to the scoring, the subjects were classified into average online users (20–49), moderate addicts (50–79), and severe addicts (80–100).[8] For further statistical analysis, the subjects were divided into two groups, that is, Internet addicts and nonaddicts based on their total Internet scores as described in a previous study with a score of more than 30 being categorized as Internet addicts.[9]

Statistical Analysis
Data was analyzed using the Statistical Package for Social Science (SPSS) software (version 20.0). Frequencies and percentages were calculated for all the categorical variables. Mean and standard deviation were also calculated. A p-value of < 0.05 was considered significant.

Results

After fulfilling the eligibility criteria, a total of 274 study subjects participated in the study out of which the majority of respondents were females, $N = 230$ (83.9%). On average, 39.1% of the students (maximum) use the Internet for 4 to 6 hours a day. Note that 10.6% of the students reported an Internet use of more than 10 hours a day. A total of 76% of the total population was found to be using the Internet for up to 6 hours.

Academic performance has only been reported as excellent among second year students as depicted in ►**Table 1**. Score "good" has been reported maximum among the study population, second and third year students reported with 69.41 and 69.35% of the population. Note that 51.43% of the final-year students reported fair academic performance scores. A mean global PSQI score of 5.32 ± 2.72 has been reported among second year students which suddenly reduced to 4.60 among the third-year students. The global Internet score is found to be drastically reduced with increasing years of education from 44.19 ± 12.29 in the second year to 42.89 ± 17.19 among interns.

Significant results were seen associating the academic year with global PSQI score, sleep quality, and sleep duration as depicted in ►**Table 2**. The students with mild PSQI score had prevented good academic performance. Severe PSQI score students could not score excellent marks in annual examinations. Sleep deprivation is found to be directly associated with academic performance. Only students with less than 5 hours of sleep could secure good academic scores. As the sleep hours increased to more than 7 hours for 114 students, good scores were observed in the last university examinations.

Internet addiction is positively associated with poor PSQI scores (►**Table 3**). Only 42 nonaddicts reported any kind of PSQI score. Moderate and severe scores are reported only among Internet addicts. Maximum of the Internet nonaddicts fall under fairly good sleep quality. Seven of the addicts were reported to have poor sleep quality.

Only one Internet nonaddict was sleeping for 5 hours. Internet addiction is found to be reduced as the year of education is increasing. Maximum Internet addicts are reported from second year courses and then reduced to 42 among interns. A maximum of Internet addicts scored good ranks in the last academic university examinations.

Table 2 Academic performance in relation to Pittsburgh Sleep Quality Index (PSQI) scores, sleep quality, and sleep duration among the study population

Pittsburgh Sleep Quality Index (PSQI)	Academic performance		
	Excellent	Good	Fair
Mild	2	191	36
Moderate	11	31	0
Severe	0	1	2
	Chi-square = 57.39, *p*-value < 0.01		
Sleep quality			
Very good	0	59	14
Fairly good	2	142	27
Fairly bad	0	20	3
Poor	0	4	3
	Chi-square 67.39, *p*-value < 0.01		
Sleep duration			
> 7 h	1	114	22
6–7 h	1	82	14
5–6 h	0	22	9
< 5 h	0	7	2
	Chi-square = 74.66, *p*-value < 0.01		

Table 1 Academic performance, global PSQI score, and global Internet score in relation to academic year among the study population

Variables	2nd year		3rd year		4th year		Intern	
	N	%	*N*	%	*N*	%	*N*	%
Academic performance								
Excellent	1	1.18	0	0	0	0	0	0
Good	59	69.41	43	69.35	34	48.57	42	73.68
Fair	25	29.41	19	30.65	36	51.43	15	26.32
p-Value = 0.22								
Global Pittsburgh Sleep Quality Index (PSQI)	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	5.32	2.72	4.60	2.65	5.23	2.85	5.26	3.46
ANOVA test = 0.88, *p*-value = 0.45								
Global Internet score	44.19	12.29	42.53	13.65	42.53	11.40	42.89	17.19
ANOVA test = 0.27, *p*-value = 0.85								

Abbreviations: ANOVA, analysis of variance; PSQI, Pittsburgh Sleep Quality Index; SD, standard deviation.

Table 3 Internet addiction and its association with global PSQI score, sleep quality, sleep duration, and academic year

	Non-Internet addicts (global Internet score < 30)	Internet addicts (global Internet score ≥ 30, ≤ 100)	Total
PSQI (Pittsburgh Sleep Quality Index)			
Mild	42	187	229
Moderate	6	36	42
Severe	0	3	3
	Chi-square = 1.05, p-value = 0.59		
Sleep quality			
Very good	19	54	73
Fairly good	28	143	171
Fairly bad	1	22	23
Poor	0	7	7
	Chi-square = 8.06, p-value = 0.05		
Sleep duration			
> 7 h	25	112	137
6–7 h	17	80	97
5–6 h	12	26	31
< 5 h	1	8	9
Academic year			
2nd year	11	74	85
3rd year	12	50	62
4th year	10	60	70
Intern	15	42	57
Academic performance			
Excellent	0	2	2
Good	44	181	225
Fair	4	43	47

Discussion

College students in a developing nation like India represent the country's future investment and hence, they must remain in a healthy state. Internet addiction might lead to sleep deprivation which could hurt the overall academic performance of a dental student who has been enrolled for a four-plus-one-year dental program as per the Dental Council of India.[10] Keeping in mind this extensive education program, the present study was conducted among dental undergraduate students.

The mean global Internet score recorded in the present study reported that the Internet consumption was maximum for second year students with 44.19 (12.29), which is reduced to a constant value of mean score of 42.53 among third and final year students and a slight increase for the interns with a mean score of 42.89. This difference reported by the present study could be due to the shift of clinical and theory time table, second year students only have a theory and preclinical posting which shifts to theory, clinical, and preclinical postings. In the internship, the postings create vigorous clinical exposure for the students. This slight shift in Internet usage among interns could be correlated to the easy availability of an increasing need for videos regarding clinical work. Internet consumption for the postgraduate application process and decision-making regarding their career could also be a possible reason for this shift. Although contrary to the results of the present study, certain studies have not reported any change in Internet addiction concerning age/year of education such as a study done by Sharma et al.[11] Al-hantoushi and Al-abdullateef also reported no significant difference in Internet addiction between different ages.[12] Other studies have found that Internet addiction usually manifests itself in the late 20s or early 30s.[13,14]

The present study demonstrates that among the total population, the maximum number of students belonged to the Internet addict category. There is a huge population categorized as addicts which is a lot more compared with other studies.[15–18] This huge variance may be due to difficulty in intellectualizing Internet addiction, heterogeneity of the population studied, lack of availability of standard diagnostic criteria, studies failing to discriminate between essential and nonessential Internet use, and nonconsideration of psychiatric comorbidity in some of the studies.[19–23]

The maximum number of students ($n = 187$) from the Internet addict group belong to the mild PSQI group among addicts and none of the nonaddict students showed severe PSQI scores. Such finding from the present study verifies the association between Internet addiction and PSQI scores. The present study is in complete accordance with the findings of prior works demonstrating the relationship between sleep deprivation and prolonged use of the Internet or other media.[24–27] These studies presumed that excessive Internet use time caused sleep deprivation by disturbing total sleep time.[27] Sleep deprivation actually can cause daytime sleepiness and a reduced level of attention affecting overall performance. Poor sleep also affects performance by increasing depression, decreasing motivation, and compromising health.[28,29] The students are required to be made aware of the ill effects of sleep deprivation and its effect on academic performance by the academicians through different approaches such as flipped class, blended learning, and content-based learning resources in early professional years of education.

In research done on medical students at Jahrom University of Medical Sciences by Eslami in 2012, the results showed that 43.9% of the subjects were affected by sleep disorders including daytime tiredness and loss of vitality (48.8%), excess sleepiness during lectures (45.5%), postponing lectures/work (23%), and frequent absence in classes (20.6%).[30]

Authors concluded that sleep deprivation affects academic performance, the most unfortunate part of it is that students who are sleep-deprived and experience academic difficulties are mostly not even aware of the extent to which

their sleep loss can impair their memory, decision-making power, and ability to complete cognitive tasks. The students enrolled in health care-related courses are required to have good cognitive control, but according to a study by Pilcher and Walters[31,] it was found that among the total of 44 students, the sleep-deprived students performed significantly worse on cognitive tasks compared with students who had normal sleep. Some previous studies conducted by Hershner and Chervin in 2014,[32] Lund et al in 2010,[33] and Rosen et al in 2006[34] reported sleep disturbance as a major contributing factor to poor academic performance. Qanash et al[35] in their cross-sectional study investigated the effect of addiction to electronic devices on quality of sleep and performance of health care professionals in their academics and concluded that poor sleep quality risk was higher with electronic device addiction but was not associated with the risk of a lower Grade Point Average. Rathakrishnan et al[36] in their study concluded that an increased screen time affects the quality of sleep. The highlight finding of the present study was two students among addicts belonging to an excellent academic performance group. This makes the authors feel that Internet usage among the students could even be a good outcome and not just for leisure activity.

Despite the most efficient and widely acceptable latest scales being used in the current study for Internet usage and sleep scores being calculated, there are limitations to the present study such as its cross-sectional approach. Nevertheless, there are further studies required for the longitudinal design to accurately record the data worth comparing. Another shortcoming is the consideration of limited factors potentially related to sleep and Internet use included in the study and the exclusion of major confounding factors like physical performance and daily exercises.

Conclusion

The present survey concluded that adequate sleep is undoubtedly the most important factor contributing to a healthy and successful graduation. Internet usage is a dynamic issue; the students need to effectively manage their time, not compromise on their sleep, and maintain a strict schedule to be well-versed regarding the latest trends in the scientific field, and be in contact with mentors and eminent people in their field. The impact of sleep deprivation among dental undergraduates is unfortunately overlooked.

Conflict of Interest
None declared.

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