



Original Research Article

TECHNOLOGY USE, DIGITAL LITERACY SKILLS, AND THEIR IMPACT ON SLEEP QUALITY IN FIRST-YEAR MEDICAL STUDENTS OF AN INSTITUTION IN NAGAON DISTRICT, ASSAM

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ABSTRACT

Background: In the dynamic landscape of medical education, the integration of technology has become ubiquitous, shaping the learning environment and daily lives of students. First-year medical students, in particular, navigate a transformative phase marked by adaptation to rigorous academic demands and new personal responsibilities. The potential influence of technology use and digital literacy on sleep quality is a critical area of concern. **Objectives:** 1. To assess digital literacy skills of the students. 2. To determine the relationship between technology use and sleep quality.

Materials and Methods: A cross-sectional study was conducted among 169 undergraduate medical students in Nagaon by purposive sampling using pre-designed structured questionnaire, validated digital literacy questionnaire, PSQI scale and Compulsive Internet Use scale. SPSS version 22.0 was used for data analysis. Fisher's exact test and Simple linear Regression analysis applied. P value <0.05 was considered significant.

Results: Male students had significantly good knowledge (36.1%) and higher proficiency (63.6%) of digital skills compared to females. Majority (83.4 %) of the students had poor sleep quality and only (35.5 %) of the students had problematic technology use. There was no statistically significant association between sleep quality and technology use.

Conclusion: High level of digital literacy skills was found among the students but insufficient sleep have been found among the students suggesting a potential negative impact of prolonged digital device use on sleep quality which is a worrisome matter.

Keywords: Technology use, Digital literacy skills, Sleep quality index.

INTRODUCTION

In this 21st century where technology is being used in every domain of life, there is need to stimulate digital literacy for education be it medical engineering or any sector of education. The exponential growth of technology use in every organization has compelled everyone to be digitally literate. Persons equipped with digital literacy tends to perform better and are more productive. At workplaces, individuals with digital skills tend to

perform better and are more productive than those who lack digital skills.^[1,2] Many institutions and organizations are aware of the gap between existing and needed digital competencies.^[3] Portable electronic touch screen devices such as the iPad and iPod are increasingly a part of technology tools in aspects of current childhood experiences including those of schooling.^[4,5,6] Those tools have changing literacy instruction and the way of students learning. Digital literacy can also be an effective tool for children with disability. The European Commission

has defined digital literacy as the ability to use information and communication technologies and the internet for creativity, innovation, and entrepreneurship and to acquire the knowledge and skills necessary to live in the 21st century.^[7] Digital literacy skills include using laptops, smartphones, tablets, networks, and software (e.g. video conferencing, typing skills, using Word processing application and presentation application, typing skills, keyboard shortcuts) and installing/deleting programs. However at the same time technology use can also have impact on the sleep quality of the users. Through various process including light exposure with delayed melatonin release,^[8] and cognitive process resulting in an increased desire for continued use rather than sleep initiation.^[8,9] Sleep loss in this age group appears to be exacerbated by the use of technology devices, TV viewing, internet use, video gaming.^[10,11,12] Mobile telephone use have been associated with reduced sleep duration, late sleep initiation, lassitude and/or worsened sleep disturbance.^[13,14] We are tackling a difficult quandary: the digital tools designed to educate, connect, and empower us are also being exploited to harm our most vulnerable population- the children and the adolescents.^[15] In this study we made an effort to assess digital literacy skills of the students and to determine the relationship between technology use and sleep quality.

MATERIALS AND METHODS

Study type: Institutional based Descriptive Cross-sectional study

Study Area: Nagaon Medical College & Hospital, Assam

Study Population: First phase Undergraduate Medical Students

Study period: Sample size & sampling method- A total of 169 students were included by purposive sampling method.

Inclusion Criteria: All first phase Undergraduate Medical Students who gave consent to participate in the study.

Exclusion Criteria

a) Incompletely filled questionnaire

Data Collection tool: A pre designed self-administered structured questionnaire consisting of socio-demographic profile, digital literacy questionnaire Language Learners (DLQ-LL),^[16] and validated scales namely Pittsburgh Sleep Quality Index (PSQI),^[17] Compulsive Internet use scale.^[18]

Knowledge about Digital literacy was assessed by 10 questions, correct answer was given a score of 1 and wrong answer was given a score of 0. So, out of total 10 marks individual knowledge scores were calculated and categorized as 8-10 good, 6-7 Average, 0-5 poor.

Proficiency was assessed whether a student possess skill for a certain task with 10 questions. A score of 1 was given if response was positive and score of 0 if

response was negative. Out of total score of 10, students who scored above 5 were categorized as highly skilled, students who scored less than 5 were categorized as less skilled.

PSQI is a validated scale (Cronbach's alpha 0.77) which measures sleep quality and disturbances over one month period and consists of 19 questions that are self-rated. The 19 items are divided into 7 components, each component ranging from a score of 0-3. Total global PSQI score range from 0-21 which is obtained by adding the scores of 7 components with score more than 5 indicating poor sleep quality with diagnostic sensitivity of 89.6 % and specificity of 86.5 % respectively.

Digital technology use-related impairments were assessed based on adolescents' perceptions of whether their digital technology use was problematic or impairing aspects of their daily life using an adapted version of the Compulsive Internet Use Scale. The term "internet use" was replaced by "use of technology" and defined as the use of "the internet, email, social networking sites and tools, mobile phones, and text messaging" to reflect the changing nature of online activities and communication in the decade since the original scale was developed.

Data Collection Method: Data was collected in a classroom according to prefixed day schedule. Students were briefed about the purpose of the study and details about the scales. After obtaining written informed consent from the students assuring them confidentiality and anonymous of data collection, questionnaires were distributed which was self-administered by the students.

Data Analysis: Descriptive statistics viz. frequency, percentage, mean and standard deviation were calculated to represent the data. Fisher's exact test was done to find association among variables and Simple linear regression analysis done to find the relationship between sleep quality and technology use of medical students. P value <0.05 was considered as statistically significant. Data was entered in MS Excel and analysed using SPSS 22.0 version.

Ethical Approval- Study was approved by Institutional Ethical Committee, Nagaon Medical College and Hospital, Assam.

RESULTS

Out of 169 students, 111 (65.7%) were male and 58 (24.3) were female. The mean age of the students was 21.3+1.6 years, mean CIU score was 1.36+0.47, mean Global PSQI score was 12.4+6.7, mean knowledge score was 6.5+2.6 (male 6.4+2.6, female 6.6+2.6) respectively.

Majority of the students had good knowledge about Video Conferencing devices (96.4%), storage of images in a digital camera (98.8%), AVI &MP4 (94.7%), Bluetooth (92.3%), Junk Files (98.2%),

term used for confirming username & password (80%) respectively. [Table 1]

There's a statistically significant difference (P=0.007) in knowledge levels between male and female students. A higher percentage of male students (36.1%) have good knowledge about digital literacy compared to female students (10.7%). [Table 2]

The difference in proficiency between male and female students is not statistically significant (P=0.332). Most of the male students (63.6%) were highly skilled than female students (36.4%). [Table 2]

There's a statistically significant difference (P=0.016) in sleep quality between male and female

students. Majority of male (78.4%) and female (93.1%) students have poor sleep quality. Less than one fourth (21.6%) of male students and only (6.9%) of female students had good sleep quality. (Table 3)

More than half (55%) of the male students were found to have problematic technology use compared to female students (45%) but it was statistically insignificant (P=0.42). [Table 4]

On regression analysis, no statistically significant association was found between use of technology by the students and sleep quality of the students. [Table 5]

Table 1: Gender wise distribution of knowledge assessment regarding digital literacy (N=169)

	Correct responses	Correct responses	Correct responses
Items	Male	Female	Total
Device needed for video conference	108 (66.3)	55 (33.7)	163(96.4)
Where does a digital camera store pictures	110(65.9)	57(34.1)	167(98.8)
AVI and MP4 are examples of	108(67.5)	52(32.5)	160(94.7)
Technology for converting speech to text	63(67.7)	30(32.3)	93(55)
What is Bluetooth	106(67.9)	50(32.1)	156(92.3)
What is not needed for evaluating website information	30(71.4)	12(28.6)	42(24.9)
Term used for junk files	110(66.3)	56(33.7)	166(98.2)
Confirming username and password is known as	94(69.1)	42(30.9)	136(80.5)
Fraudulent attempt to acquire sensitive information	71(68.9)	32(31.1)	103(61)
Unsafe password practice	85(68)	40(32)	125(74)

**Figures in parenthesis indicate percentage*

Table 2: Gender based comparison of digital literacy

Variables	Gender		Total	P Value
	Male	Female		
Knowledge				0.007
Good	61(36.1)	18(10.7)	79 (46.7)	
Average	44(26.0)	32(18.9)	76(45.0)	
Poor	06(3.6)	08(4.7)	14(8.3)	
Proficiency				0.332
Highly skilled	84(63.6%)	48(36.4%)	132 (78.1)	
Less skilled	27(73%)	10(27 %%)	37 (21.9)	
Total	111	58	169	

*Figures in parenthesis indicate percentage

Table 3: Gender based comparison of sleep quality

Variables	Gender		Total	P Value
	Male	Female		
Sleep Quality				0.016
Good	24 (21.6)	04 (6.9)	28 (16.6)	
Poor	87 (78.4)	54 (93.1)	141 (83.4)	
Total	111	58	169	

*Figures in parenthesis indicate percentage

Table 4: Association of sleep quality with technology use

MODEL	Sum of Squares	Degree of Freedom	Mean Square	F-Value	P Value
Regression	0.097	1	0.097	0.699	0.404*
Residual	23.264	167	0.139		
Total	23.361	168			

Dependent Variable Sleep Quality
*Predictors (Constant) Compulsive Internet use scale

DISCUSSION

The use of Technology, digital literacy skills, and their impact on sleep quality among first-year medical students of an institution in Nagaon district, Assam were explored in this study

The study showed satisfactory level of digital literacy knowledge among the participants, with most students having adequate awareness of commonly used digital tools such as video conferencing platforms, multimedia file formats, Bluetooth use, junk files, and password authentication. The exponential integration of digital technologies into academic learning and daily life, especially following the widespread adoption of online teaching modalities in medical education is inevitable.^[19] However, a statistically significant gender difference was seen in knowledge levels, with male students demonstrating greater digital literacy knowledge than female students. Similarly in a study conducted van Deursen AJ et.al, gender-based differences have been reported. This disparity can be attributed to greater informal exposure, interest, and confidence in technology use among males.^[20]

Though there were differences in knowledge levels, our study did not find a statistically significant gender difference in digital proficiency. Although a

higher proportion of male students were categorized as highly skilled, the overall proficiency levels were comparable across genders. This suggests that structured academic requirements and routine use of digital platforms in medical education may help bridge practical skill gaps, even when theoretical knowledge differs which was published in a narrative review by Gaur U et al.^[21]

While in our study sleep quality assessment revealed a high prevalence of poor sleep quality among both male and female students, with a significantly higher proportion of females reporting poor sleep. This finding is consistent with earlier study conducted by Ibrahim NK et.al indicating that medical students are particularly vulnerable to sleep disturbances due to academic stress, irregular schedules, examination pressure, and psychosocial factors.^[22] The higher prevalence of poor sleep quality among female students has also been reported in a study done by Zhang B et.al and may be influenced by greater stress perception, anxiety, and emotional responsiveness.^[23]

Among the male students, problematic technology use was observed more frequently, however, the difference was not statistically significant. These findings align with study conducted by Kuss DJ et al.^[24] This finding suggests that excessive or maladaptive use of technology is prevalent among

medical students irrespective of gender, likely due to increased dependence on digital devices like smartphones, laptop, tablet for academic, social, and recreational purposes.

Remarkably, regression analysis did not demonstrate a statistically significant association between technology use and sleep quality in the present study. This indicates that while technology use is common among medical students, sleep quality may be more strongly influenced by other factors such as academic burden, stress levels, physical activity, and lifestyle habits. These findings are same as reported in study by Lemola S et al where sleep disturbances persisted even after controlling for screen time and digital exposure.^[25]

CONCLUSION

In general the findings underscore the need for early interventions which includes sleep hygiene, stress management, and balanced technology use among medical students. Incorporating awareness programs and counseling services within the medical curriculum may help improve sleep quality and promote healthier academic and psychosocial functioning.

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