



III Effects of Using Smart Phones and/Or Laptops 1-2 Hrs Before Sleep, Among Students A Medical College in Central India: An Educational Interventional Study

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ABSTRACT

INTRODUCTION: Mobile phones have become an indispensable communication tools and have transformed from a status symbol to a necessity. The extensive use of mobile phones in recent years had led to exposure of humans to radio frequency electromagnetic field (RF-EMF) which adversely effects on sleep .**OBJECTIVES :** 1.To carry out pre and post-interventional survey on students using smart phones and/or laptops before sleep and evaluating the improvement in sleep .2.To identify sleep disturbances and to educate them about the ill effects of using smart phones and/or laptops using Pittsburgh Sleep Quality Index(PSQI).**MATERIALS AND METHODS** Design of the study-Educational and interventional study. Subjects-83 medical students of 2013 batch GMC, Bhopal. Inclusion criteria -Students consenting and using smart phones and/or laptops. Exclusion criteria –Students those were absent on that day or had any recent stress, depression or trauma. Ethical consideration -Verbal consent was obtained from the students. **RESULTS:** Out of 83 students 46 were male and 37 were female of which mostly belongs to the age group of 18-23 years with mean 21.33years and SD 3.08years. 97.6% were higher secondary passed .Students showing increase in subjective sleep quality was significant (p=0.00185), and significant improve in the number of students (35 to 54) showing no Problem to keep up enough enthusiasm to get things done (p=0.0146).Mean PSQI score decrease from (6.22 to 4.03) which means improvement in the sleep quality . (p value <0.0001). **CONCLUSION:** We should restrict the use of mobiles and laptops before sleep for sound mind and good health.

KEYWORDS

INTRODUCTION: Mobile is an essential part of our daily life. Human being cannot imagine life without mobile. If we remember the era before mobiles, human life was very different. (1)

Mobile phones have become an indispensable communication tools and have transformed from a status symbol to a necessity because of the countless perks that a mobile phone provides. The extensive use of mobile phones in recent years had led to exposure of humans to radio frequency electromagnetic field (RF-EMF) of 30 KHz-300GHz both during receiving and transmitting the signals. Studies on humans have reported the adverse effects of EMF emitted by mobile phones on sleep electroencephalograms (2) and reduced melatonin production (3, 4). A biological explanation for an association between exposure to RF-EMF and impaired sleep quality has been hypothesized which relates to the suppressed nightly melatonin excretion by electromagnetic field exposure. Mobile phone use is a very activating behavior. our brain is engaged, our fingers are engaged. (5). Smart phones are capable of processing more information than other phones as they include many features like games, access to the Internet and social networking, messaging, videos, multimedia, and navigation, in addition to their use for communication. Internet facility is increasingly easy because of improvements in mobile technology and the prevalence of smart phones. (6)

If you're typing, that's not part of a normal sleep preparation routine, said Doctor Jeffrey Bluhm with the [Providence Sleep Disorder Center](#). "Cell phones are so convenient that they're an inconvenience." [Haruki Murakami](#) .(7)

OBJECTIVES: To carry out pre-interventional survey on students using Smart phones and/or laptops before sleep.

- To identify students having sleep disturbances using Pittsburgh Sleep Quality Index (PSQI) scale before sleep.
- Intervention-To educate the students about the ill effects of using smart phones and/or laptops before sleep.
- To carry out a post interventional survey for evaluating the improvement in sleeps using PSQI scale.
- **MATERIALS AND METHODS:** This was educational and interventional study conducted on 83 MBBS students of 2nd proof senior batch of Gandhi Medical College Bhopal carried during the period of 4 month September 2015 to December 2015. Structured questionnaire was prepared using the Pittsburgh Sleep Quality Index (PSQI) .Expert from Psychiatry and Medicine department were also consulted for advice.
- Pilot testing was performed to test the wording of questions, to identify common response categories based on which the structured questionnaire was modified and standardized.
- The study population consisted of all the MBBS students of 2nd proof senior batch present on the day who gave verbal informed consent after assuring full confidentiality.
- Students who were absent or had any recent stress, depression or trauma excluded from the study.
- At the 1st point of questionnaire was given to be filled followed by 2nd point in which PowerPoint presentation on importance of sleep for health body and sound mind , and harmful effects of mobile phones and laptops on sleep were taught and follow up lecture and counseling in every fifteen days was taken for next 45 days . After the last follow up of same questionnaire were distributed for evaluation in improvement of sleep.

OUTCOME: Decrement in the no. of hrs of gadget use and simultaneous improvement in sleep quality is expected as outcome .The outcome of the study has been assessed on the ba-

sis of 7 components of Pittsburgh sleep quality Index.

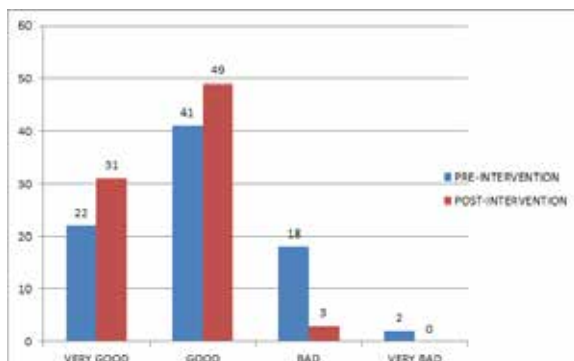
Table: 1 Demographic characteristics of the study sample

CHARACTER	SAMPLE n=83(%)
SEX : Male	46(55.42)
Female	37(44.58)
AGE (years) : 18-23	75(90.36)
24-30	6(7.22)
>30	2(2.4)
Mean Age , SD	21.33 yrs , 3.08yrs
RELIGION : Hindu	66 (79.51)
Muslim	13(15.66)
Sikh	1(1.20)
Christian	3(3.61)
EDUCATION: Higher Secondary	81(97.6)
Graduation	2(2.4)

Table.2 Showing changes in sleep after intervention

S No.		Pre intervention	Post intervention	P value
1.	Mean habitual sleep efficiency	80.06%	91.04	>0.05
2.	Number of students using gadget In a day <1hr	3	18	>0.05
	1-2hr	30	40	
	2-4hr	40	21	
	>4hr	8	5	
3.	Number of students sleep during day <1 hr	29	43	>0.05
	1-2hr	31	26	
	2-4hr	12	7	
	>4hr	11	7	
4.	Time taken to fall asleep <15 min	32	48	>0.05
	16-30 min	33	27	
	31-60min	14	6	
	>60min	4	2	
5.	No. of students taken Medicine to fall asleep			>0.05
	Not during last month	63	72	
	<1 in a week	12	8	
	1-2 times in a week	7	3	
	>times in a week	1	0	
6.	Trouble staying awake while driving , eating meals , or engaging in social activity			>0.05
	Not during last month	57	63	
	<1 in a week	20	17	
	1-2 times in a week	4	2	
	>times in a week	2	1	

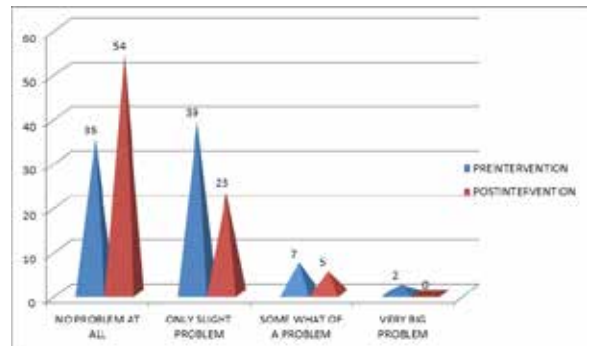
1. Diagram showing subjective sleep quality



SUBJECTIVE SLEEP QUALITY

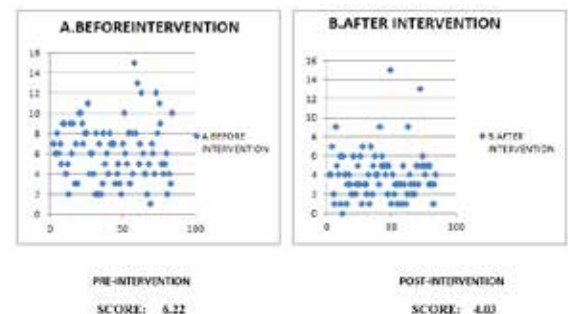
The p-value is .001857. The result is significant at $p < .05$.

2. How much of a Problem has been for you to keep up enough enthusiasm to get things done.



$P = 0.0146 (<0.05)$ test result are significant

3. Scatter diagram showing PSQI score before and after intervention



The two-tailed P value is less than 0.0001

The difference is considered to be extremely statistically significant.

RESULTS: Out of 83 students 46 were male and 37 were female of which 75 belongs to the age group of 18-23 years 6 between 24-30 years and 2 were more than 30 years with mean age 21.33years and SD 3.08years. Majority of them were Hindu (79.51%), some were Muslims (15.66) and rest others. 97.6% were higher secondary passed and rest 2.4% had already done graduation.

Parameters increase after intervention of same group of students such as Mean habitual sleep efficiency from 80.06 to 91.04 , number of students using gadget <1 hr from 3 to 18 , number of students sleep during day <1hr from 29 to 43 ,time taken to fall asleep < 15min from 32 to 48 , no. of students not taken Medicine to fall asleep from 63 to 72 , trouble staying awake while driving , eating meals , or engaging in social activity not during last month 57 to 63 were found but these were found to be statistically insignificant . Number of students showing increase in subjective sleep quality as shown in diagram 1 was significant ($p=0.00185$), and significant improve in the number of students (35 to 54) showing no Problem to keep up enough enthusiasm to get things done ($p=0.0146$).

Mean PSQI score which shows quality of sleep was 6.22 before intervention decrease to 4.03 after intervention in same group which means improvement in the sleep quality . (p value <0.0001).

DISCUSSION: Now days, there is not much information about the relationship between use of Smartphone 1-2hr before sleep and sleep quality. Observations of the present study are based on a small group of students of Gandhi Medical College Bhopal M.P. (India), which may not necessarily reflect the problem of all over the world. The main findings of our study are as follows, subjective sleep quality and enthusiasm to get things done (component of PSQI scale) were significantly high-

er in medical student before intervention than after intervention.

The use of smart phones has increased rapidly in recent years. This may result in Smartphone addiction, which represents the convergence of existing mobile phone and Internet addiction problems into Smartphone addiction (Hwanget al., 2012). Overuse of a Smartphone may cause various physical and psychological health problems. Some studies have evaluated the relationship between smart phones/laptops and sleep disturbances. (9) Canan et al. (2013) found an association between Internet addiction and impaired sleep.

Hutter et al. investigated the influence of cell phones on health and sleep quality in Australia. They conducted a descriptive cross sectional study on 365 individuals for one year and demonstrated a significant relationship between using cell phones and somatic complaints, especially headache. However, unlike us they could not find a significant relationship between using cell phones and sleep quality. (8)

Lemo et al. (2014) evaluated adolescents' electronic media usage at night, along with sleep disturbances and depressive symptoms. Park (2014) found a negative association between the level of physical activity and risk of problematic Internet use via the mediation of sleep satisfaction and stress in adolescents.

An et al., (2014) found the associations between problematic Internet use and adolescents' physical and psychological symptoms showed that excessive Internet use had indirect negative effects through sleep deprivation.

Our results showed that daytime dysfunction, which is a component of sleep quality, was higher before the intervention in students than after intervention. This result may be due to sleep deregulation. There were positive correlations between subjective sleep quality, sleep disturbance, and daytime dysfunction, in our study. It has been reported that problematic Internet use may affect sleep construction, such as by reducing rapid eye movement (REM) sleep, slow-wave sleep, and sleep efficiency (10) or that the bright light of

a computer screen may suppress melatonin secretion and delay the onset of sleep (11) .

Moreover, Loughran et al. (2005) reported the adverse effect of electromagnetic fields emitted by mobile phones on sleep electroencephalograms. Similarly, Huber et al. (2002) reported that electromagnetic field exposure (mobile phone usage) in the evening influences physiological factors such as sleep quality and the melatonin rhythm, probably by influencing the brain activity – particularly that of the pineal gland; it may also result in altered cerebral blood flow and brain electrical activity.

Young adults tended to be unaware of just how much time they really spent on Smartphone, and the effect this might have on their academic performance and social interaction (Meena, Mittal & Solanki, 2012). Because sleep is a significant biological mechanism related to mood regulation (Thomée, et al., 2011), students whose sleep is disrupted because of technology use may be more likely to experience markers of depression such as loss of energy, concentration problems, and daytime sleepiness (Adams & Kisler, 2013; NSF, 2011).

Parameters increase after intervention of same group of students such as Mean habitual sleep efficiency, number of students using gadget, number of students sleep during daytime taken to fall asleep < 15min, no. of students not taken Medicine to fall asleep, trouble staying awake while driving, eating meals, or engaging in social activity not during last month although these were found to be statistically insignificant but increase may be because of overall improvement in sleep.

When used moderately, a Smartphone may contribute to improving emotional and psychological well-being. In addition, Smartphone communications can be used to relieve stressful situations (Park & Lee, 2012). Moreover,

We think that Smartphone overuse may lead to depression and/or anxiety, which in turn leads to sleep problems. Several limitations of the present study should be considered. The relatively small study population was one such issue. Moreover, all of the participants were medical students, and may not represent the total population. All subjects were well-educated adults. Longitudinal studies and samples with different educational and age backgrounds are needed.

The cross-sectional design, which is not the best way to evaluate causal relations, also limited the results. Furthermore, all of the scales were self-rated. Finally, the literature in this field is not yet rich enough. In conclusion, our study expanded the literature to include Smartphone overuse, and sleep quality in medical students. Although the effects of behavioral addictions, including Smartphone addiction, on our lives are rising, little research has been carried out on these issues. Thus, our study provides an important contribution to the disturb in sleep quality with Smartphone overuse.

CONCLUSION: After conducting this educational intervention on the ill effects of smart phones/ laptops on normal sleep for 12 weeks on 83 students of Batch- 2013 of GMC, Bhopal, we found that the quality of sleep improved on limiting gadget use 1- 2 hrs before sleep.

The quality of sleep was assessed by Pittsburgh Sleep Quality Index (PSQI) scores. Ideally, PSQI score should be less than 5. A decrease in mean PSQI score by 2.19 was seen after the interventional study which is suggestive of an improvement in sleep quality. And increase of 8.08% in mean habitual sleep efficiency has been seen after the study.

This study recommends that the amount of Smartphone/ laptop use should be curtailed 1-2 hrs before bedtime for a good quality sleep.

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