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Impact of smartphone usage on quality of sleep among undergraduate students of a south Indian University

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***Abstract*---**Over usage of a Smartphone during sleeping time interferes with the quality of sleep which seriously impacted the overall mental health status of the students. This study aims to find the impact of Smartphone usage on the quality of sleep and identified the seven components of the Pittsburgh Sleep Quality Index (PSQI) among three groups of Smartphone users. The stratified random sampling technique was used to collect the data from the participants. A standardized Pittsburg Sleep Quality Index tool was given to the students. The result of the study showed the majority of the undergraduate students were having poor quality of sleep. The poor quality of sleep and daytime sleep dysfunction was due to inadequate

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hours of sleep at night which affects online class attendance and academic performance during the COVID-19 pandemic.

***Keywords*---**smartphone, undergraduate students, sleep quality, Pittsburg, index scale, sleep duration.

Introduction

From a very young child to an elderly person are become addicted to Smartphones not only to talk but also to get connected to the outer world by using social media and the internet. Currently, most students are addicted to Smartphones as they can be used to access information easily, other than that it consists of several applications and features like messaging multimedia, photoshops, games and social media like WhatsApp, Facebook, Instagram etc (Demirci k, et al.,2015). Smartphone addiction, also known as "nomophobia" (fear of being without a mobile phone), is often fueled by an Internet overuse problem or Internet addiction disorder. A lot of people globally are addicted to their mobile phones, after all, it's rarely the phone or tablets itself that creates the compulsion, but rather than games, apps, and online worlds it connects us. Heavy Smartphone usage will cause many problems in human life such as stress, anxiety, depression, or loneliness (Lawrence, et al., 2020 and Mohammadbeigi, et al., 2020)**.** It is also helpful to relieve feelings of anxiety, loneliness, or awkwardness in social situations. Staring at your phone will deny you the face-to-face interactions that can help to meaningful others, it alleviate anxiety and boost your mood. In other words, the remedy you're choosing for your anxiety (engaging with your Smartphone), is making your anxiety worse (Darko-Adjei, et al., 2021). Over usage of a Smartphone can disturb your sleep, which can have a serious impact on your overall mental health. It will highly affect your memory; ability to think productively and also reduces cognitive skills in academic skills. Smartphone addiction is highly affecting our sleeping patterns. Sleep is an important aspect of maintaining the body's circadian rhythm. Inadequate sleep contributes to heart disease, diabetes, depression, falls, accidents, impaired cognition, and a poor quality of life. According to some psychologists and sociologists' usage of a phone is identified as a behavioural problem that has ill effects on the quality of sleep (Bhattacharya, et al., 2016).

Most college students are highly prevalent to Smartphone users as they report daytime sleeping, irregular sleeping, and because of this it highly disturbs the activities of daily life and academic performances. Excessive use can have a bad effect on health like blurred vision, obesity, heart-related problems, pain in the wrist or neck, headache, hearing acuity etc (Saraswathi;2017 and Choi, Dongwon; 2017). The poor quality of sleep due to Smartphone overuse results in mental or behavioural disorders like it cause maladaptive behavioural difficulties, craving for phones, reduced interaction with families and society, disturb activities of daily living, interferes with school work/studies and also has bad impacts on relationships (Tim Robinson, et al., 2020 and Hejab M alfawareh et al., 2021).Sleep quality decrease as the duration of mobile phone use increases. Many studies show that problematic internet use may affect sleep quality due to reducing rapid eye movement sleep, slow-wave sleep, and sleep efficiency (Severin

Haug, et al., 2020). Moreover, long term use of mobile devices may lead to physical discomfort which can be adverse effects on sleep quality. The blue light emitted by your Smartphone screen restrains the production of melatonin, the hormone that controls your sleep-wake cycle (Jocelyne Boumosleh, et al., 2021). This makes it even more difficult to fall asleep and wake up the next day. It will affect the student's performance in their academic performance and daily life (Ruth C King 2017, et al., 2020).

Materials and Methods

The undergraduate students participated in the survey which consisted of demographic performance and standardized Pittsburgh Sleep Quality Index (PSQI. The study was explained and consent was obtained from the undergraduate students. The participants were ensured about the confidentiality of their responses. The Stratified random sampling technique was employed to select the sample. The data were computed in IBM SPSS software version 23.0. The study included the Undergraduate students who have used a Smartphone at night time while sleeping and were exposed to Smartphone at least for one month are eligible participants for this study. The quality of sleep measurement was carried out by Pittsburgh sleep quality index scale which measured the subjective nature of people's sleep habits of "poor" and "good" sleep quality by measuring seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. Each item is weighted on a 0-3 interval scale. The global PSQI score is then calculated by totalling the seven components scores, providing an overall score ranging from 0-21, where lower scores denote a healthier sleep quality and a total score of "5" or greater is indicative of poor sleep quality. For analysis of sleep quality of the Undergraduate students, we divided the participants into three groups based on the hours of Smartphone usage at night time which includes (1)group I<1 hour of Smartphone users (2)group II 1-2 hour Smartphone users (3)group III more than 2 hours of Smartphone users.

Results and Discussions

Table 1 shows the majority of undergraduate students belonging to the age group between 19-20years (35.2%), most of them were females (73.9%), Unmarried (93.2%), living in a nuclear family(78.9%), family income falls below 1,20,000(70.4%), not using Smartphone in between sleep (64.1%), using a Smartphone for more than 2hours (62.0%) in 24hours, living in a hostel(96.5%), hostel living room was bunker system (73.2%), Frequency of using Smartphone at night time for two or less than two times (48.6%). A hypothesis test is computed to identify a significant association between the Global PSQI Score and demographic variables. We found there is an association between type of residence (p0.051), frequency of Smartphone usage (p0.047) and reason for Smartphone usage (p0.014). The sleep quality of Undergraduate students as per the final score of PSQI which found (42.3%) were having good quality sleep and poor quality of sleep as (57.7%). Table 2 depicts seven components of the PSQI scale among the three groups (Group I< 1-hour of Smartphone user, Group II 1-2hours Smartphone user and Group III more than 2hours of Smartphone users). Among more than 2hours of Smartphone users (Group III), 27.14% was found

“fairly good” sleep quality of usage of the Smartphone. 27.4% of the student's sleep latency period was 15-30minutes.36.6% of the students slept within the 6-7hours duration. Habitual sleep efficiency 30.9% of the student’s habitual sleep efficiency was 85%.42.25% were had mild sleep disturbances, 16.90% were shown daytime dysfunction in sleep. 5.63% of 1-2hours Smartphone users taking less than once a week sleep medication. The Global PSQI score of the participants among the 2hours of Smartphone users was (61.97%) were had poor sleep quality. College students are highly prevalent to Smartphone usage as they report daytime sleeping, irregular sleeping, and because of this it highly disturbs the activities of daily life and academic performances. Excessive use can have bad effects on health like blurred vision, obesity, heart-related problems, pain in the wrist or neck, headache, hearing acuity etc. The poor quality of sleep due to Smartphone overuse results in mental or behavioural disorders like it causes maladaptive behavioural difficulties, craving for phones, reduced interaction with families and society, disturbs activities of daily living, interferes with school work/studies and also has bad impacts on relationships(Dongwon Choi, et al., 2020). In this study, we investigated the sleep quality of undergraduate students by use of the PSQI Scale. The sleep quality of Undergraduate students found (42.3%) were having good quality sleep and poor quality of sleep as (57.7%). This study result was supported by a study conducted in the municipality town of West Bengal on Smartphone addiction and its effects on sleep quality among nursing students out of 91students, 46 students were found to be not addicted, while 45 were addicted to smart phone.17.58% of students were found to be good sleepers, while 82.42% came out to be poor sleepers as per PSQI. In the present study, investigators divided the Smartphone user into different groups such as <1 hour of Smartphone users,1-2 hour Smartphone users and more than 2 hours of Smartphone users to investigate sleep quality among the users. We found those who use Smartphone at night for more than 2hours sleep quality is deteriorating. There is a need for sensitization on healthy sleep awareness is essential for more than 2hours of Smartphone users during bedtime. Students taking sleep medication to fall asleep was found among more than 2hours of Smartphone users. Sleeping medication may lead to health-related issues among undergraduate students in future. The study was supported by a cross-sectional observational study conducted among 450 medical undergraduate students, whose aim was to assess (a) the extent to which Smartphones are used by medical undergraduate students during bedtime and to find their quality of sleep (b) the association of quality of sleep and cell phone variable. By dividing the subjects into three groups according to their usage (Group I <1 hour, Group II 1 to 2 hours, Group III >2 hours), Group III respondents had significantly prolonged sleep latency, reduced sleep duration, sleep inefficiency and daytime sleep disturbances ($P < 0.05$). Lack of awareness about night shift mode, lying posture use while using the phone during bedtime correlated with poor quality sleep ($P < 0.05$).A standardized Pittsburgh Sleep Quality Index restricted exploring other relevant information on the quality of sleep of the Undergraduate students. The study was conducted in a one setting and smaller sample size owing to constrained resources limits the generalizing the study findings

Table 1: Demographic characteristics of undergraduate students in terms of frequency and percentage

(n=142)

Sl. No	Demographic variables	Frequency (f)	Percentage	X^2	df	P value
1	Age in years					
	• 18years	46	32.4			
	• 19-20years	50	35.2	2.697	3	0.441 [NS]
	• 21-22years	37	26.1			
	• 23 years	9	6.3			
2	Gender					
	• Male	37	26.1			0.887
	• Female	105	73.9	0.020	1	[NS]
3	Marital status					0.446
	• Single	131	92.3	1.614		[NS]
	• Engaged	9	6.3			
	• Married	2	1.4		2	
4	Family structure			0.935		0.333
	• Joint family	30	21.1		1	[NS]
	• Nuclear family	112	78.9			
5	Family income					0.892
	• Below Rs 1,20,000	100	70.4	0.229	2	[NS]
	• Between Rs 1,20,000-Rs2,00,000	31	21.8			
	• Above Rs 2,00,000	11	7.7			
6	Using Smartphone in between sleep					0.209
	• Yes	51	35.9	1.580		[NS]
	• No	91	64.1		1	
7	Period of Smartphone usage in 24hrs					
	• Less than 1 hr	10	7.0			
	• 1-2 hr	44	31.0	2.994	2	0.229
	• More than 2 hrs	88	62.0			[NS]
8	Type of residence			3.792		*0.051
	• Hosteller	137	96.5		1	
	• Day scholar	5	3.5			
	• Paying guest	0	0			
9	Type of room			1.276		0.528
	• Single room	24	16.9		2	[NS]
	• Double room	14	9.9			
	• Bunker room	104	73.2			
10	Frequency of smart phone usage at night time	69	48.6			*0.047
	• 2 or less than 2 times	34	23.9	6.127	1	
	• 2-4 times	39	27.5			

- Very often

df: degree of freedom, NS: Not significant, *Significant

Table 2: Components of PSQI scale among the three groups of smart phone users

(n=142)

Variable	Group I < 1-hour f (%)	Group II 1-2hours f (%)	Group III f (%)	P value
Subjective sleep quality				
• very good	2(1.4)	11(7.85)	37(26.05)	
• fairly good	4(2.8)	25(17.85)	38(27.14)	0.105
• fairly bad	4(2.8)	8(5.63)	13(6.33)	
• very bad	-	-	-	
Sleep latency				
• <15 minutes	-	15(10.56)	31(21.8)	
• 15-30minutes	9(6.33)	21(14.7)	39(27.4)	0.027
• 31-60 minutes	-	5(17.60)	17(11.97)	
• >60 minutes	1(0.7)	3(2.11)	1(0.7)	
Sleep duration				
• >7	6(4.22)	15(10.56)	29(20.4)	
• 6-7	3(2.11)	27(19.01)	52(36.6)	0.452
• 5-6	1(0.7)	2(8.4)	4(2.8)	
• <5	-	-	3(2.11)	
Habitual sleep efficiency				
• >85%	4(2.8)	24(16.90)	44(30.9)	
• 75-84%	5(3.52)	13(9.15)	28(19.7)	0.887
• 65-74%	1(0.7)	5(3.52)	10(7.04)	
• <65%	-	2(8.4)	6(4.22)	
Sleep disturbance				
• No disturbance	-	1(0.7)	13(9.15)	
• Mild disturbances	6(4.22)	33(23.23)	60(42.25)	0.107
• Moderate disturbances	4(2.8)	11(7.7)	13(9.15)	
• Severe disturbances	-	2(8.4)	2(8.4)	
Use of sleep medications	8(5.63)	34(23.94)	79(55.63)	
• Not during the past month	1(0.7)	8(5.63)	6(4.22)	0.91
• Less than once a week	-	6(4.22)	1(0.7)	
• Once or twice a week	1(0.7)	4(2.81)	-	
• Three or more times a week	4(2.81)	19(13.38)	55(38.73)	
Day time dysfunction	1(0.7)	17(11.97)	24(16.90)	0.009
• No problem	3(2.11)	7(4.92)	5(3.52)	
• Mild	2(1.40)	1(0.7)	4(2.81)	
• Moderate	10(7.04)	44(30.98)	88(61.97)	0.229
• Severe				

Global PSQI

Group I :< 1 hour of smart phone users, Group II: 1-2 hour smart phone users, group III more than 2 hours of smart phone users.

Conclusion

The majority of the Undergraduate students had poor quality of sleep and daytime sleep dysfunction due to inadequate hours of sleep at night which affects online class attendance and academic performance during a covid-19 pandemic. Awareness of health-related issues due to lack of sleep for parents and undergraduate students of Smartphone users more than 2hours is important. Among consuming medication for falling asleep students' health status monitoring is essential to prevent any illness in future.

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