Research Article

DOES MOBILE PHONE REALLY HAVE AN IMPACT ON SLEEP PATTERN AMONG MEDICAL STUDENTS, TAMIL NADU?

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ABSTRACT

Introduction: Mobile phone* has become one of the essential gadgets in day-to-day life. In recent years excessive usage had resulted in dependency*, sleep disturbance and psychological problems. Frequent use of mobile phone has also become common among the medical students.

Objective: The primary objective was to assess the level of mobile phone addiction among medical students. The secondary objectives were to determine the association between demographic factors and smart phone addiction, and to study the impact of smart phone* addiction on sleep pattern.

Methodology: The Cross-sectional study was conducted among the medical students studying in a medical college, Tamil Nadu. A self-administered questionnaire containing demographic profiles, mobile phone usage pattern, Smart phone Addiction Scale(SAS) and Pittsburgh Sleep Quality Index(PSQI) scale. The comparison was carried out between smart-phone addiction* and sleep pattern* to evaluate the impact.

Results: A total of 252(43.2%) males and 331(56.8%) females participated in the study. 65.2% of students were using the mobile phone for more than 2 years;54.7% were using in the night;53% were using for 3-6 hours per day. The SAS score results obtained through the Exploratory Factor Analysis with the Principal Component Method were Kaiser- Mayer-Olkin index= 0.860; Barlett's test; chi square (528) = 4464.426; p= 0.0005. About 52.48% were found to be poor sleepers.

Conclusion: There was a significant relationship between smart phone addiction and sleep pattern among the medical students. This study had helped to understand the clinical consequence of excessive mobile phone usage and educating the students about the ill-effects.

INTRODUCTION

Mobile phone has become the most essential thing in our daily life. [1]Initially, mobile phones were used only as a communication tool. But now, mobile phone functions like a computer as it is used for different kind of entertainments like music player, games, internet, video-camera, calculator, alarm clock and other perceived benefits like increased accessibility, social connectivity, reducing loneliness and security in emergency situations.[1][2]

World wide mobile phone subscription has reached six billion. [3]According to the Telecom Regulatory Authority of India [4], 929.37 million mobile phone subscribers in India, making it the world's second-largest cell phone using developing country. [4]

Addiction not only refers to drug or substance abuse, but it also refers to gambling, internet, games, or even smart phones or mobile phone. [5] Nowadays usage of internet centers by youngsters and people has reduced because of facilities that are available in their mobile phone. Constant mobile phone use among youngsters has resulted in fear of being out of mobile phone contact, which is termed as the Nomophobia. [6]

Mobile phone usage has both positive and negative impacts in both male and female. [7] Its usage relieves stress in some circumstances but results in dependency, sleep disturbance and psychological problem in many circumstances.[2]

Good Sleep is the most important thing to lead a stress free life. Excessive smart phone usage affects health and sleep patterns. [7] Normally medical college students are sleep deprived, have poor sleep habits, and experience poor sleep quality. [3]Frequent use of mobile phone has also become common among medical students even in their busy schedule.

Hence, this study is focused to assess the prevalence of mobile or smart phone addiction and its impact on sleep pattern among medical college students by using Smart phone Addiction Scale (SAS)[8]and Pittsburgh Sleep Quality Index (PSQI).[9]

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REVIEW OF LITERATURE

In the study "Pattern of mobile phone usage and its effects on psychological health, sleep and academic performance in students of a medical university" by Naveenta Gupta et al [1] and published in the journal *National Journal of Physiology, Pharmacy and Pharmacology* depicts that the overuse of mobile phone have negative impact on psychological health, sleep, and academic performance of students and also resulting that night time usage of mobile phone is associated with difficulty in waking up, waking time tiredness, decline in study habits, difficulty in concentration, increase in missed classes, and going late for classes. Its p-value is $p < 0.0001$, which is highly significant [1]

The association between the mobile phone addiction and sleep disturbance have been explained by using PSQI scale by Sung-Yun Ahn et al [7] carried out a study on "The influence of smart phone use and stress on quality of sleep among nursing students" and published in journal *Indian Journal of Science and Technology* states that Smart phone use score was 2.53 (0.63), dependence was 2.94 (0.78), obsession was 1.86 (0.65), disability living was 2.54 (0.80), and compulsion was 2.81 (0.79) for subjects. Perceived stress score was 2.87 (0.54) for subjects. PSQI score was 6.47 (2.67), component 1(subjective sleep quality) was 1.19 (0.65), component 2(sleep latency) was 1.23 (1.00), component 3 (sleep duration) was 1.42 (0.85), component 4(habitual sleep efficiency) was 0.39 (0.78), component 5(sleep disturbance) was 0.95 (0.55), component 6 (use of sleeping medication) was 0.35 (0.26), and component 7 (daytime dysfunction) was 1.25 (0.77) for subjects. It signifies that higher the smart phone use, the lower was the quality of sleep with values $r = .30$, $p = .0001$. [7]

The article "Smartphone addiction among university undergraduates: A literature review" by Hafidha Suleiman Al Barashdi *et al* [2] and published in *Journal of Scientific Research & Reports* concludes that there is a lot of negative effects of smart phone addiction among university students.[2]

Sevil Sahin et al [6] in his study "Evaluation of mobile phone addiction level and sleep quality in university students" explains the sleep quality worsens with increasing addiction level with significant value of $p < 0.05$ and the addiction level was determined to be higher in the second year students, those with poor family income, those with type A personality, those whose age for first mobile phone is 13 and those whose duration of daily mobile phone use in above 5 hours with significant value of $p < 0.05$.[6]

"The smart phone addiction scale: Development and validation of a short version for adolescents" by Min Kwon et al [8] and published in *Plus One* states that the SAS-SV scores of gender with significant value of $p = 0.001$ and self-evaluation of smart phone addiction of significance $p = 0.001$ showed significant difference. The ROC analysis results showed an area under a curve (AUC) value of 0.963(0.888–1.000), a cut-off value of 31, sensitivity value of 0.867 and specificity value of 0.893 in boys while an AUC value of 0.947(0.887–1.000), a cut-off value of 33, sensitivity value of 0.875, and a specificity value of 0.886 in girls. [8]

There was a strong association between the mobile phone usage and health problems. It has been significantly proved in the study "Patterns of use of 'smart phones' among female medical students and self-reported effects" by Arwa Jamal *et al*[11] and published in *Journal of Taibah University Medical Sciences* says that a substantial number of female medical students who currently use a smart phone reported possible health hazards like long-term memory impairment (45.8%), prolonged sleep (31.7%), insomnia (30%), chronic headache (22.5%), and concentration problems (22.5%). [11]

Sleep quality and its association between problematic mobile phone use is described in "Effects of sleep quality on the association between problematic mobile phone use and mental health symptoms in Chinese college students" by Shuman Tao et al[12]and published in the journal *International Journal of Environmental Research and Public Health* predicts that 28.2% and 9.8% are with problematic mobile phone use and poor sleep quality respectively. The study also highlights that poor sleep quality may play a more significant role in increasing the risk of mental health problems in student with problematic mobile phone usage than in those without problematic mobile phone usage. [12]

The relationship between the mobile phone addiction and sleep disturbance is well explained in the study of "Relationship of smart phone use severity with sleep quality, depression and anxiety in the university students" by Kadir Demirci et al[15] and published in the *Journal of behavioral addictions* infers that the average SAS scores was 75.78 ± 22.46 among smart phone users. We found that SAS scores were significantly higher in females than males (SAS scores were 80.50 and 66.59, respectively, with the significance of $p < 0.001$). The median value of the SAS scores was found to be 72. Depression, anxiety, and the daytime dysfunction component of the PSQI scores were higher in the high smart phone use group than in the lower smart phone use group and its significance values are $p = 0.001$, $p < .0001$, $p = 0.0011$ respectively. [15]

The study "Mobile phone use and sleep quality and length in college students" by Abbey G. White et al [13] and published in the journal *International Journal of Humanities and Social Science* indicates that various aspects of mobile phone use such as problem mobile phone use, addictive text messaging, problematic texting, and pathological texting are related to sleep quality, but not sleep length. [13]

The impact of mobile phone usage on health problems like headache, earache, tinnitus, painful fingers and restlessness has been justified by P Stalin et al[14] on study "Mobile phone usage and its health effects among adults in a semi-urban area of southern India" and published in *Journal of Clinical and Diagnostic Research* depicts that the prevalence of mobile phone usage was high (70%) and also predicts that the health problems like headache, earache, tinnitus, painful fingers and restlessness etc, were found to be positively associated with mobile phone usage. [14]

The change in the day to day activities of a person after continuous mobile phone usage is dealt in the study "Effects of mobile phone use on the social and academic performance of students of a public sector medical college in Khyber pakhtunkhwa Pakistan" by Tauseef Aman *et al*[16] and published in the *journal KJMS*. It depicts that 97% had cell phones in which 81% students reported a change in their routine after getting a cell phone, 56% stated that their sleeping routine and other activities like games, exercise and other hobbies were affected, academic performance of 53% students was affected, 69% believed that they were distracted from the surroundings and 58% use phones even in company

of others due to which their social relations were compromised. 84% repeatedly check their mobile phones to see whether they have received any calls or not.[16]

AIMS AND OBJECTIVES

1. To assess the level of mobile phone addiction among medical students.
2. To study the association between certain demographic factors and mobile phone addiction.
3. To study the impact of mobile phone addiction on sleep pattern.

MATERIAL AND METHODS

Selection Criteria

Inclusion Criteria

1. The students who had used mobile phone or smart phones for more than 6 months was included in the study.
2. Medical students studying from the first year to final year were included.

Exclusion Criteria

1. Students who used mobile phone for less than 6 months were excluded from the study.
2. Students having sleep-related disorders, psychological disorders already were excluded from the study
3. Students not using mobile phone were also excluded from the study.
4. Interns or CRRI were excluded.

Study Centre

Institute of Community Medicine, Madurai Medical College

Study Population

This study was conducted among all the medical students studying in a medical college, Tamil Nadu.

Sample Size

All the medical students studying from first year to final year were included and considered as whole population.

Study Design

Cross sectional study.

Study Duration

Two months.

Study Procedure

The study was done after obtaining the Ethical Clearance from the Institutional Ethical committee. After explaining about the study, informed consents were obtained and self administered questionnaire were given to the participating students. The confidentiality of the individual was maintained. The questionnaire has four parts – demographic profiles, mobile phone usage pattern, smart phone addiction scale questions and PSQI scale questions.

The questionnaire contained the questions regarding the demographic profiles (eg:-age, gender, year of studying, etc..,) and the mobile phone usage pattern (eg:- years of usage, duration of usage per day, etc.,).

The questionnaire also included the questions under Smart phone Addiction Scale. [8] Smart phone addiction scale [SAS] consists of 6 factors and 33 items with a Likert scale[10] to assess the smart phone addiction based on self-reporting. The

Likert scale had the options of strongly disagree, disagree, neutral, agree and strongly agree. [10]The six factors in SAS include daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse and tolerance.

The questions under Pittsburgh Sleep Quality Index scale[9]was used to evaluate the sleep quality pattern. Pittsburgh Sleep Quality Index[PQSI] consists of 7 components related to sleep quality. The seven components of PQSI include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication and daytime dysfunction. Each component has the scoring ranges from point 0 to 3. Hence, in overall PSQI scale had the scoring ranges from point 0 to 21. In the study done by Sung-Yun Ahn *et al*[7], the person who got less than 5 points were considered to be "good sleepers" and the persons who got 5 points and more than 5 points were considered to be "poor sleepers".

CATEGORY		PSQI SCORING
Good Sleepers	-	Less than 5 Points
Poor Sleepers	-	5 and more Points

Statistical Analysis

The data was be compiled. SPSS software was used for data analysis. Smartphone addiction was computed as mean scores. Sleep pattern was be depicted as mean scores. The validity was assessed using Exploratory Factor analysis (EFA) through the Principal component Method (PC) in each sample, with Kaiser- Mayer-Olkin index(KMO) and Bartlett's test of shericity, respectively. According to Kaiser's criterion, one factor was retained (with Eigen values above 1, factor loadings above 0.4 that explained part of the variance). The comparison was carried out between smart-phone addiction and sleep pattern to evaluate the impact. Bar graphs, charts and tables will be obtained and explained.

OBSERVATIONS AND RESULTS

A total of 620 Medical students studying first year to final year, including the main and supplementary batches, were taken part in the study. Out of which, 583 students had shown the interest to participate in the study. The questionnaire was filled by the participants after obtaining the informed consent.

Table 1 Overall age, sex, year of studying and place of living of the study population

S.No	Demographic values	Frequency	Percentage
1	**Age**		
	<20 years	325	55.7%
	21-23 years	253	43.4%
	>23 years	5	0.9%
2	**Sex**		
	Male	252	43.2%
	Female	331	56.8%
3	**Year of studying**		
	1st year	129	22.1%
	2nd year	159	27.3%
	3rd year	164	28.1%
	4th year	131	22.5%
4	**Place of living**		
	Home	88	15.1%
	Hostel	494	84.7%
	Others	1	0.2%

A total of 252(43.2%) male and 331(56.8%) female were participated in the study. Out of which, 129(22.1%) were first year students, 159(27.3%) were second year students, 164(28.1%) were third year students and 131(22.5%) were

fourth year students. The age distribution was found to be 325(55.7%) were <20 years, 253(43.4%) were between 21-23 years of age and 5(0.9%) were >23 years of age. Out of 583 students, 88(15.1%) were living in home and 494(84.7%) were living in hostel. The overall age, sex, year of studying and place of living of the study population were summarized in the table-1.

Out of 583 participating students, all the students were found to use the mobile phone with smart application.

65.2% of the study population was using the mobile phone for more than two years, 19% for two years and 15.8% for one year. The comparison of sex with the duration of mobile phone usage was depicted in figure-1.
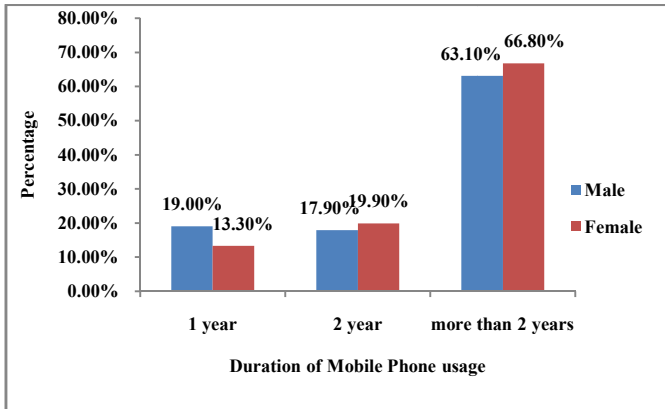

Figure 1 Comparison of sex with duration of mobile phone usage

Nearly, 87.7% of the students were using the mobile phone maximum at home, 2.6% of the students were using at street, 9.4% at class and 0.3% at other places.

Out of 583 students, 10 (1.7%) were using the mobile phone most in the morning, 24 (4.1%) in the afternoon, 230 (39.5%) in the evening and 318 (54.7%) in the night. The diurnal variation of the mobile phone usage was given in figure-2.
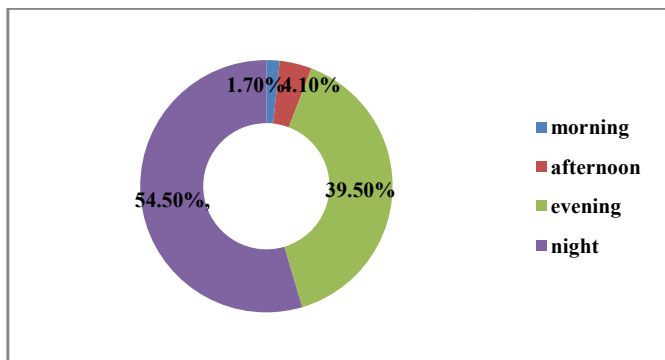

Figure 2 Diurnal variation of mobile phone usage

Out of 583 students, 186(31.9%) were using mobile phone for less than three hours per day, 309(53%) using for 3-6 hours per day and 15.1% for more than 6 hours per day. The duration of mobile phone usage were given in figure-3
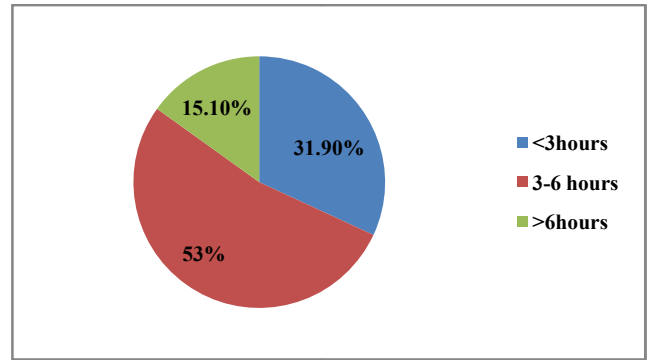

Figure 3 Duration of mobile phone usage (per day)

52.1% of the students were keeping mobile phone at the bed while sleeping, while 1.9% was keeping at their hands and 45.6% were keeping mobile phone at the table near the bed.

4.8% of the students have no social media in their phone, 79.4% of the students have 1-4 social media and the rest of the 15.8% have more than four social media in their mobile. The graphical representation was shown below in figure-4
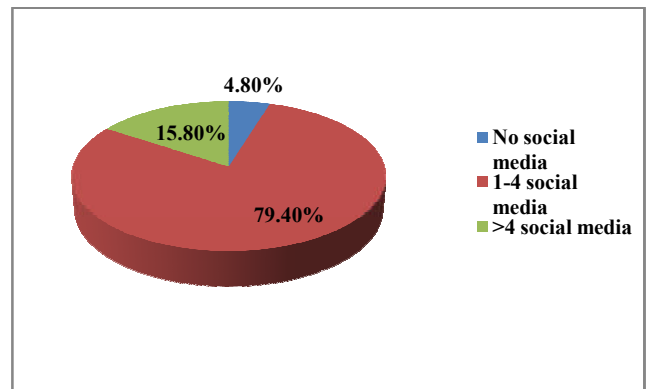

Figure 4 Number of social media in mobile phone

About 63.1% of the students have not switch off the mobile while sleeping/at work, 8.6% often switch off the mobile whereas the rest of the 27.4% never switch off their mobile phone.

Regarding the maximum purpose of usage of the mobile phone, 24.7% of the students were using it for contacting others, 13.9% were using it for taking photos, videos, 9.6% were using it for playing games, and 51.8% were using it for viewing social media. The graphical representation was shown in figure-5.
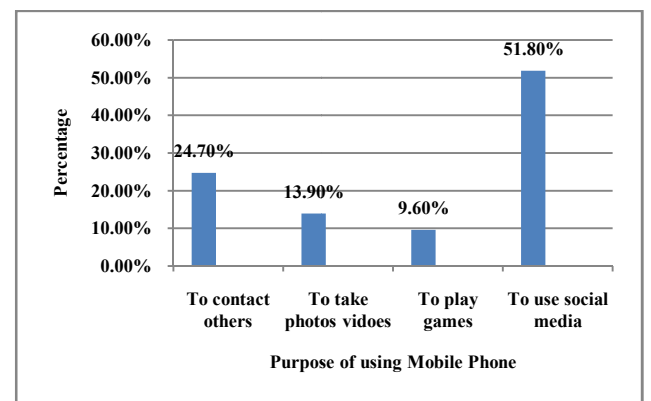

Figure 5 Maximum purpose of using mobile phone

7.9% of students were using mobile phone every 5 minutes, 26.1% were using mobiles every half an hour, whereas 28.8%

were using every one hour and the rest of the 37.2% were using mobile phone more than one hour once. The pictorial representation was given in figure-6.
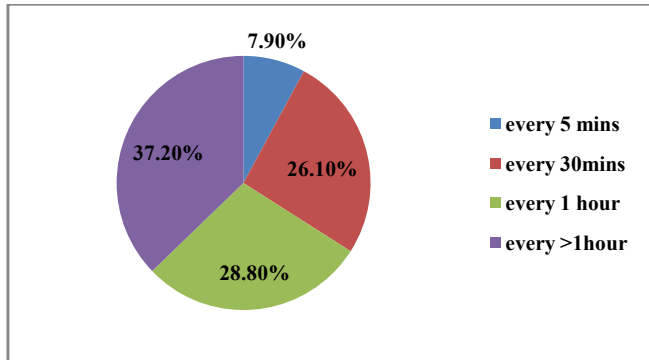

Figure 6 Freqency of mobile phone usaage

While collecting the data, 22% of the students were keeping the mobile phone in their hand, 14.8% in their bag, 24.5% in their pockets and 38.8% in some other places like table, etc..,

The overall comparison of sex with pattern of mobile usage was summarized in table-2

Table 2 Overall comparison of sex with pattern of mobile usage

S.No	Mobile Phone usage	Male(%)	Female(%)	p value
1	**Smart application**			-
	With smart application	252(100)	331(100)	
	Without smart application	0(0)	0(0)	
2	**How long are you using mobile phone?**			0.163
	1st year	48(19)	44(13.3)	
	2nd year	45(17.9)	66(19.9)	
	Morethan 2 years	159(63.1)	221(66.8)	
3	**Where do you use the mobile phone at most?**			0.801
	Home	217(86.1)	294(88.8)	
	Street	7(2.8)	8(2.4)	
	Class	27(10.7)	28(8.5)	
4	**When will you use the mobile at most?**			0.810
	Morning	5(2)	5(1.5)	
	Afternoon	12(4.8)	12(4.0)	
	Evening	101(40.1)	129(39)	
	Night	134(53.2)	184(55.6)	
5	**How many hours will you use the mobile per day?**			0.137
	< 3 hours	87(34.5)	99(29.9)	
	3-6 hours	135(53.6)	174(52.6)	
	>6 hours	30(11.9)	58(17.5)	
6	**Where will you keep the mobile phone while sleeping?**			0.351
	At your hand	6(2.4)	5(1.5)	
	At the bed	129(51.2)	175(52.9)	
	At the table near the bed	115(45.6)	151(45.6)	
	Other	2(0.8)	0(0)	
7	**How many social medias(whatsapp, FB, etc.,)do you have in your mobile?**			0.726
	0	14(5.6)	14(4.2)	
	1-4	198(7.6)	265(80.1)	
	>4	40(15.9)	52(15.7)	
8	**Will you switch off your mobile while sleeping/at work?**			0.142
	Never	158(62.7)	210(63.4)	
	Often	29(11.5)	21(6.3)	
	Rare	63(25)	97(29.3)	
	Others	2(0.8)	3(0.9)	
9	**What is your maximum purpose of using the mobile?**			0.034
	To contact others	77(30.6)	67(20.2)	
	To take photos videos, etc.,	34(13.5)	47(14.2)	
	To play games	24(9.5)	32(9.7)	
	To use social media	117(46.4)	185(55.9)	
10	**How often will you use the mobile?**			0.422
	Every 5 mins	18(7.1)	28(8.5)	
	Every half an hour	65(25.8)	87(26.3)	
	Every one hour	73(29)	95(2.7)	
	One hour	96(3.1)	121(36.6)	
11	**Where is your phone right now?**			0.366
	In your hand	47(18.7)	81(24.5)	
	In your bag	37(14.7)	49(14.8)	
	In your pockets	67(26.6)	76(23)	
	Somewhere else	101(40.1)	125(37.8)	

The results obtained through the EFA with the PC were KMO = 0.860; (KMO measure between 0.8 -0.9 indicates a meritorious) Barlett's test: chi square (528) = 4464.426; p= 0.0005. The higher variability and Eigen values >1 indicated that there may be chance of bias or similar answers were found among students for these questions. Eigen value<1 indicates that students were fairly responded to questionnaire. And an elbow shape curve graph helps you to know the responses for all questions and Eigen values < 1. The results of SAS scores was summarized in the table-3

Tabel3 Results of Smart Phone Addiction Scale (SAS) scores

S.No	Smart Phone Addiction Scale Questionnaire	Total	% of Variance
		Initial Eigenvalues	
1.	Missing planned work due to smart phone use?	6.149	18.633
2.	Having a hard time concentrating in class/while doing assignments/while working due to smart phone use?	2.747	8.325
3.	Experiencing light headedness/blurred vision due to excessive smart phone use?	1.971	5.972
4.	Feeling pain in the wrists or at the back of the neck while using a smart phone?	1.597	4.840
5.	Feeling tired and lacking adequate sleep due to excessive smart phone use?	1.432	4.339
6.	Feeling calm or cozy while using a smart phone?	1.232	3.735
7.	Feeling pleasant or excited while using a smart phone?	1.119	3.392
8.	Feeling confident while using a smart phone?	1.015	3.076
9.	Being able to get rid of stress with a smart phone?	0.959	2.905
10.	There is nothing more fun to do than using my smart phone?	0.895	2.713
11.	My life would be empty without my smart phone?	0.863	2.614
12.	Feeling most liberal while using a smart phone?	0.820	2.485
13.	Using a smart phone is the most fun thing to do?	0.809	2.451
14.	Won't be able to stand not having a smart phone	0.767	2.324
15.	Feeling impatient and fretful when I am not holding my smart phone?	0.762	2.310
16.	Having my smart phone in my mind even when I am not using it?	0.737	2.233
17.	I never give up using my phone even when my daily life is already greatly affected by it?	0.712	2.156
18.	Getting irritated when bothered while using my smart phone?	0.688	2.085
19.	Bringing my smart phone to the toilet even when I am in a hurry to get there?	0.672	2.035
20.	Feeling great meeting more people via smart phone use?	0.642	1.945
21.	Feeling that my relationships with my smart phone buddies are more intimate than my relationships with my real-life friends?	0.629	1.905
22.	Not being able to use my smart phone would be as painful as losing a friend?	0.610	1.848
23.	Feeling that my smart phone buddies understand me better than my real-life friends?	0.580	1.759
21.	Constantly checking my smart phone so as not to miss conversations between other people on Twitter/fb?	0.548	1.660
22.	Checking SNS(Social Networking Service) sites like Twitter/fb right after waking up?	0.523	1.586
23.	Preferring talking with my smart phone buddies to hanging out with my real-life friends or with the other members of my family?	0.509	1.543
24.	Preferring searching from my smart phone to asking other people?	0.497	1.505
25.	My fully charged battery does not last for one whole day?	0.486	1.473
26.	Using my smart phone longer than I had intended?	0.469	1.420
27.	Feeling the urge to use my smart phone again right after I stopped using it?	0.435	1.317
28.	Having tried time and again to shorten my smart phone use time, but failing all the time?	0.427	1.295
29.	Always thinking that I should shorten my smart phone use time?	0.367	1.112
30.	The people around me tell me that I use my smart phone too much	0.333	1.010

The seven components of PQSI include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication and daytime dysfunction. Each component has the scoring ranges from point 0 to 3. Hence, the overall global PSQI score varies from 0 to 21. The persons who got less than 5 points are considered to be "good sleepers" and the persons who got 5 points and more than 5 points are considered to be "poor sleepers". Accordingly, 306 persons are found to be "poor sleepers". The impact of mobile phone usage on sleep pattern ofbad sleepers

with global PSQI score of 5 to 21 were compiled in the table-4.

Table 4 Impact of mobile phone usage on Sleep pattern of bad Sleepers with global PSQI score of 5 to 21

S.NO	Pattern of Mobile Usage (N= 306)	Mean ± S.D	Mean Rank	Significance
1.	What type of phone are you using?	-	292	1
2.	How long are you using mobile phone?	2.49 ± 0.76	291.87	0.982
3.	Where do you use the mobile phone at most?	1.24 ± 0.65	294.23	0.557
4.	When will you use the mobile at most?	3.54± 0.65	307.38	0.009
5.	How many hours will you use the mobile per day?	1.90 ± 0.65	307.76	0.009
6.	Where will you keep the mobile phone while sleeping?	2.41 ± 0.55	280.48	0.047
7.	How many social medias (whatsapp, facebook, etc.,) do you have in your mobile?	2.15 ± 0.43	301.22	0.049
8.	Will you switch off your mobile while sleeping/at work?	1.67 ± 0.90	294.80	0.620
9.	What is your maximum purpose of using the mobile?	3.11 ± 1.21	318.49	0.0005
10.	How often will you use the mobile?	2.87 ± 0.99	278.84	0.037
11.	Where is your phone right now?	2.77 ± 1.16	287.30	0.459

DISCUSSION

A total of 620 students were studying in the college, whereas 37 were not interested to participate in the study and hence they were excluded from the study and 583 were included in the study. The sex distribution of the usage of the mobile phone in this study is 43.2% among males and 56.8% among females, which coincides with the study done by Naveenta Gupta *et al* [1] which shows 57.2% of females are using the mobile phone and 42.8% of males are using the mobile phone. The other study made by Sung-Yun Ahn *et al*[7], also tells that 89.9% female and 10.1% male are using the mobile phone. This signifies that the mobile phone usage is quite more among females than males.

In this study, 55.7 % of the students using mobile phone are less than 20 years of age, 43.4% using mobile phone are between 21-23 years of age and 0.9% are >23 years of age. It coincides with the study made by Sung-Yun Ahn *et al*[7], which implies that nearly 60.8% of those using the mobile phone are between 18-20 years of age, 22.1 % using the mobile are between 21-22 age group and 17.1% using mobile phone are more than 23 age. Hence, it is clear that the mobile phone usage is more among the age group of 18-20 years.

The study done by Naveenta Gupta *et al*[1] tells that the mobile phone usage is more among those who residing in the hostel(83%) than those who residing in the home (17%), which correlates with this study which finds that the mobile phone usage is more among hostel students (84.7%) than home residing students (15.1%). Therefore, it is obvious now that the mobile phone usage is higher among the hostel students than other students.

In this study, all the students (100%) were using the mobile phone with smart application. This strongly tells the view that the smart phone were become the essential component of the student's life.

In this study, it had been observed that the maximum number of students was found to be using the mobile phone for more than 2 years (65.2%) and only 15.8% of the students were found to be using the mobile phone for less than 1 year, with the significant value of p = 0.163. This strongly tells that the

mobile phone addiction was common among the chronic mobile phone users.

Regarding the place of maximum usage, 87.7% of students were using the mobiles maximum at home/hostels. This correlates with the study done by Naveenta Gupta *et al*[1], where the maximum mobile phone usage was seen in home (96%). Hence the mobile phone usage was more common at home/hostels.

The question asked in this study regarding the time of usage of mobile phone symbolizes that the mobile phone usage, was found in the following order:-
Night (54.5%) >Evening (39.5%) > Afternoon (4.1%) > Morning (1.7%)

In the study by Tauseef Aman *et al*[16], the values were found to be morning (9%), afternoon (21%), evening (47%) and night (23%). Comparing the study by Naveenta Gupta *et al*[1] where the usage at night (27%) and evening (62.4%) together account for 89.4% coincides with this study which shows night (54.5%) and evening (39.5%) together have a value of 94%. Hence, we can understand that the mobile phone usage was more during evening and night. The maximum usage of mobile phone during night indirectly tells the disturbance of the sleep during night.

In this study, 31.9% were using mobile for less than 3 hours a day, 53% were using for 3-6 hours a day and 15.1% for more than six hours a day. This can be compared with the study by Selvin Sahin *et al* [6] which some mild deviation where the usage pattern was found to be – out of n=576, 151 using for <1 hour, 261 using for 1-2 hours, 84 for 3-4 hours and 80 using for > 5 hours. The p value here was p = 0.137.

The questions asked in this study for the place of mobile phone during sleeping gives the results of 52.1% at the bed and 45.6% at the table near the bed and 1.9% at the hand, which were compared with Naveenta Gupta *et al*[1] study where 90.6% are at the bed and 9.4% are at the table near the bed. The positive results with phones at the bed tell the usage of the mobile phone at night which also affects the sleep of the individual.

About 79.2% of the students are having 1-4 social media apps in their mobile phone and 15.8% having more than four apps, which tell the student's view of contacting the people through mass media. It also tells the purpose of using mobile phone can also be using of social media.

In this study, it has been observed that only 8.6 % students would switch off the mobile phone while doing works/while sleeping, which coincides with the Naveenta Gupta *et al* [1] study which has a value of 6.2%.

About 51.8% of the students are using mobile phones for using the social media, which can be strengthened by the view of 79.2% using 1-4 social media apps and 15.8% using >4 apps (p = 0.034).

In Tauseef Aman *et al* study[16], the frequency of using mobile are found to be 58% whereas in this study it was observed to be 7.9% for every 5mins, 26.1% for every half an hour, 28.8% for every one hour and 37.2% for every one hour.

The persons who got less than 5 points are considered to be "good sleepers" and the persons who got 5 points and more than 5 points are considered to be "poor sleepers". Accordingly, 306 (52.48%) persons are found to be "poor

sleepers", which can be compared with the study Sung-Yun Ahn eta al. [7]

CONCLUSION

It has been found that the mobile phone usage is common among both male and female, but comparatively mobile phone usage is more common among the female students of 18-20 years, particularly those who residing in the hostel. Most of the mobile phone users are found to be the chronic users of using mobile for more than 2 years. Night time is observed to be the most reliable time that the students are using the mobile phone. Most of the students have 1-4 social media apps, hence the maximum purpose of using the mobile phone is found to be for using the social media. The smart phone addiction scale results are found to be significant p= 0.0005. Impact of mobile phone usage on sleep pattern of bad sleepers with global PSQI score of 5 to 21 is found to be significant. The evaluation of mobile phone addiction will help us to educate the students about the ill-effects of excessive mobile phone usage. We conclude our study by saying that the detection of its impact on sleep pattern will be useful in correlating the clinical consequence of excessive mobile phone usage.

Summary

A total of 252(43.2%) male and 331(56.8%) female were participated in the study.

129(22.1%) were first year students, 159(27.3%) were second year students, 164(28.1%) were third year students and 131(22.5%) were fourth year students. 55.7% were of<20 years age, 43.4% were between 21-23 years of age and 0.9% were >23 years of age. Out of 583 students, 15.1% were living in home and 84.7% were living in hostel.

All the students were found to use the mobile phone with smart application. 65.2% of students were using the mobile phone for more than two years, 19% for two years and 15.8% for one year. 87.7% of the students were using the mobile phone maximum at home. 39.5% of students were using the mobile phone in the evening and 54.7%were using in the night.

31.9% were using mobile phone for less than three hours per day, 53% were using for 3-6 hours per day. 79.4% of the students have 1-4 social media in their mobile phone. The maximum purpose of using the mobile phone was found to be for using the social media which accounts for about 51.8%.

The SAS score results obtained through the EFA with the PC were KMO = 0.860; (KMO measure between 0.8 -0.9 indicates a meritorious) Barlett's test: chi square (528) = 4464.426; p= 0.0005.

About 52.48% were found to be poor sleepers with the global PSQI score varying between 5 and 21, as given by Sung-Yun Ahn *et al*. [7] The impact of mobile phone usage on sleep pattern of bad sleepers with global PSQI score of 5 to 21were analyzed.

References

1. Naveenta Gupta *et al* | Pattern of mobile phone usage and its effects on psychological health, sleep, and academic performance in students of a medical university | *NationalJournal of Physiology, Pharmacy and Pharmacology* | 2016 | Volume 6 | Issue 2 | 132-139

2. Hafidha Suleiman Al-Barashdi *et al* | Smartphone Addiction among UniversityUndergraduates: A Literature Review | *Journal of Scientific Research & Reports* | 2015 |Volume 4 | Issue 3 | 210-225
3. World Bank. 2012 Information and Communications for Development : Maximizing Mobile [Internet]. Washington, DC: World Bank; 2012 Aug [cited 2022 Mar 1]. Available from: https://openknowledge.worldbank.org/handle/10986/11958
4. Telecom Regulatory Authority of India, 2012. Retrieved from http://www.trai.gov.in/WriteReadData/PressRealease/Document/Pr-TSD-May12.pdf. [cited 2022 Mar 1].
5. Min kwon *et al* | Development and Validation of a Smartphone Addiction Scale (SAS)| *Plos One* | 2013 | February | Volume 8 | Issue 2 | 1-7
6. Sevil Sahin *et al* | Evaluation of mobile phone addiction level and sleep quality in university students | *Pakistan Journal of Medical Science* | 2013 | Volume 29 | Issue 4 |913-918
7. Sung-Yun Ahn *et al* | The influence of Smart phone Use and Stress on Quality of Sleep among Nursing Students | *Indian Journal of Science and Technology* | 2015 | Volume 8 | Issue 35 | 1-6
8. Min kwon *et al* | The Smartphone Addiction Scale: Development and Validation of a Short Version for Adolescents | *Plus One* | December 2013 | Volume 8 | Issue 12 | 1-7
9. Daniel J. Buysee *et al* | The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research | *Psychiatry Research* | 1988 | 193-213
10. Mcleod S. [Likert Scale Definition, Examples and Analysis]. 2008 [cited 2022 Mar 1]; Available from: https://www.simplypsychology.org/likert-scale.html
11. Arwa Jamal *et al* | Patterns of use of 'smart phones' among female medical students and self-reported effects | *Journal of Taibah University Medical Sciences* | 2012 | 7(1), 45-49
12. Shuman Tao *et al* | Effects of Sleep quality on the association between problematic mobile phone use and mental health symptoms in chinese college students | *International Journal of Environmental Research and Public Health* | 2017, 14, 185
13. Abbey G. White *et al* | Mobile phone use and sleep quality and length in college students | *International Journal of Humanities and Social Science* | Vol.1 no.18
14. P. Stalin *et al* | Mobile phone usage and it health effects among adults in a semi-urban area of southern India | *Journal of Clinical and Diagnostic Research* | 2016 Jan, Vol-10(1) Lc14-LC16
15. Kadir Demirci *et al* | Relationship of smart phone use severity with sleep quality, depression, and anxiety in university students | *Journal of Behavioral Addictions* | 4(2) | pp. 85-92 (2015)
16. Tauseef Aman *et al* | Effects of mobile phone use on the social and academic performance of students of public sector medical college in Khyber Pakhtunkhwa Pakistan | *KJMS* | January-April | 2015 | Vol. 8 no.1

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