Original Research Article

Prevalence of smart phone addiction, sleep quality and associated behaviour problems in adolescents

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ABSTRACT

Background: World is ever changing due to advancement in realm of science and technology, one such advancement is in field of smart phones. The ubiquity of smart phone technology raises concern for its addiction among adolescents and its relationship with quality of sleep, mental and physical health problems. Objective of the study was to investigate magnitude of smart phone addiction and evaluate the impact of smart phone addiction on their mental health and sleep quality.

Methods: A cross-sectional study was conducted on sample comprising of 587 students of repudiated school. Students were assessed with a specially designed proforma and Smart phone addiction scale (SAS) which was self-administered by the students. Subjects were classified into smartphone non-user group, a low smartphone user group and a high smartphone user group. Subsequently depression anxiety and stress sub scores (DASS-21) scale were administered to asses associated behaviour problems, investigate sleep quality Pittsburgh sleep quality inventory was administered (PSQI).

Results: Out of 587 subjects who completed the questionnaires 12.9% (n=76) were not using smart phones, (n=315) 53.62% were low users and (n=196) 33.3% were high users of Smart phone as estimated by Smart Phone addiction scale. Those who used smart phone excessively had high Global PSQI scores and DASS-21scores in terms of depression, anxiety and stress.

Conclusions: With increasing popularity of smart phones, youths spend significant time on smart phone thereby developing addictive tendencies. This study concludes that youths are not only addicted but are also developing significant sleep and behaviour problems owing to excessive smart phone usage.

Keywords: Behaviour problems, Smart phone addiction, Sleep quality

INTRODUCTION

The world is rapidly changing due to the advancement in the domain of e-technology. In this advancing and competitive world it's impossible to escape the presence of technology and one such example is the use of smartphones. Smart phones are more likely to be the hand held computers for configuring the daily schedules, saving large documents, for watching videos, listening music, chatting with friends, social networking sites, video conferencing and much more than a human mind can think.

Addiction is considered by WHO as dependence, as the continuous use of something for the sake of relief or stimulation, which often causes cravings when it is absent.[1] The two major categories of addiction involve either substance addiction or "behavioural addiction such

as mobile phone addiction. Smartphone addiction is similar in many aspects to Internet addiction.[2] However, based on the definition of Internet addiction, smartphone addiction has been defined as the overuse of smartphones to the extent that it disturbs users' daily lives. Moreover, smartphone overuse may lead to mental or behavioural problems. It may cause maladaptive behavioural difficulties, interfere with performance in school or work, reduce real-life social interaction, neglect of personal life, mental preoccupation, mood modifying experiences and can also lead to relationship disorders.[3] Each of these may be indicative of potential addiction.

Understanding and addressing the mental health issues of adolescents is important to study the concept of electronic technology dependency pattern on adolescents and its relationship with prevalence of and their sleep quality.

METHODS

After obtaining the required Institutional Ethical committee approval, a cross-sectional descriptive study was conducted at repudiated school of Ajmer, Rajasthan, India from July to September 2015. The study sample consisted of 587 randomly selected students who were considered as candidates for this study. 340 males and 247 females were included in the study.

Instruments

Semi-structured proforma

Semi-structured proforma that contained details of demographics, educational status, purpose of using the smart phone, money spent per month, place of access, the time of day when accessed the most and the average duration of use per day. Data was collected from those using smart phone for at least last 3 months.

Smart phone addiction scale (SAS)

The SAS is a 33-item, six-point likert scale based on the internet addiction scale and the features of smartphones. The options on this scale range from 1 to 6. Higher scores indicate a higher risk of smartphone addiction. The total score on the scale can vary between 33 and 198. Original 33-item Turkish version of the SAS was used in the present study because it was validated in a young population. According to smartphone use and the median value of SAS scores a study, participants were divided into three different groups, smartphone non-user group, a low smartphone use group (SAS score <the median value of 72), and a high smartphone use group (SAS score > the median value of 72).[4,5]

Pittsburgh sleep quality index

It measures subjective sleep quality during the preceding 1-month period. It consists of 19 self-rated questions and 5 questions rated by the bed partner. The 19 items are grouped into scores with the seven following components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. These component scores were added to a global PSQI score with a range of 0 to 21, with higher scores indicating worse sleep quality. PSQI scores of above 5 were taken as abnormal.[6]

Depression anxiety stress score 21 [DASS 21]

21 item self-report questionnaires designed to assess the severity of core symptoms of Depression, Anxiety and Stress. It can be administered by the respondents themselves or by another person. It is crucial that each question is answered.

It is rated on a four-point Likert scale, each item is scored from 0 to 3. The sum of the relevant 7 items multiplied by 2 for each scale constitutes the participants' scores for each of Depression, Anxiety and Stress. Each of the scales is then broken down into subscales comprising two to five items each. The reliability scores of the scales in terms of Cranach's alpha scores rate the Depression scale at 0.91, the Anxiety scale at 0.84 and the Stress scale at 0.90 in the normative sample.[7]

General health questionnaire (GHQ)

12 item versions were used to screen for possible presence of psychological distress among subjects. It has good internal consistency in terms of Cranach's alpha scores of 0.82 to 0.86.[8]

RESULTS

Total of 587 students were included in this study. Of all participants, 87% (n=511) were smartphone users and 12.9% (n=76) were not smartphone users. The average SAS score was 85.66±23.46 among smartphone users. We found that SAS scores were significantly higher in males than females (SAS scores were 80.50 and 66.59, respectively, p<0.001).

The median value of the SAS scores was found to be 72. Of the participants enrolled in the present study, 76 (12.9%) were in the smartphone non-user group, 315 (53.6%) were in the low smartphone use group, and 196 (33.3%) were in the high smartphone use group. The three groups were similar in terms of age (p=0.14). The general characteristics of the groups are shown in Table 1.

On analysing the mean of DASS-21 sub scores it was found that mean DASS (D) scores were significantly higher in male subjects (p=0.0004), mean DASS (A) score of male subjects is significant higher than female subjects (P=0.01) and mean DASS(S) score of male subjects is significantly higher (p=0.02), indicating significant amount of distress in male participants (Table 2).

Mean global PSQI score was 10.75 (3.49). Global PSQI scores in subjects were found to be 4.32 (2.09) in non-users, 8.33 (3.43) in low users and 11.85 (3.69) in high user group indicating poor quality of sleep among smart phone user group (Table 3).

Table 1: General characteristics of the groups.

	Smartphone non-user group (n = 76)	Low smartphone use group (n = 315)	High smartphone use group (n = 196)	p value
Sex, male n(%)	42 (55.2)	186 (59)	112 (57.1)	
Sex, female n(%)	34 (44.7)	129 (40.9)	84 (42.8)	
Age (years) Mean ± SD	16.8±2.11	16.7±2.74	16.2±2.31	
SAS Mean ± SD	–	67.1±9.8	98.4±15.8	

Table 2: Comparison of male and female subjects on DASS -21 sub scores.

Dass-21-	Sex	N (%)	Mean	Standard deviation	T value	P value
Dass (D) subscores	M	340 (57.9%)	15.33	5.24	T= 6.36	P= 0.0001
	F	247 (42%)	12.76	4.19		
Dass (A) subscores	M	340 (57.9%)	17.98	4.16	T=4.49	P= 0.0001
	F	247 (42%)	16.47	3.82		
Dass (S) subscores	M	340 (57.9%)	12.91	4.50	T=3.91	P=0.0001
	F	247 (42%)	11.47	4.25		

N (%)-percentage of total, M-male, F=female; *Mean DASS (D) scores were significantly higher in male subjects (p=0.0004); * Mean DASS (A) score of male subjects is significant higher than female subjects (P=0.01); *Mean DASS (S) score of male subjects is significantly higher (p=0.02).

Table 3: Global PSQI score in smart phone user and non-users.

Variables		Global		PSQI scores	
	Mean	Standard deviation		F	p
Non users	4.32	2.09		148.59	0.01
Low users	8.33	3.43			
High users	11.85	3.69			

To find out any correlation between SAS scores and DASS sub scores, SAS scores and Global PSQI scores Pearson's correlation coefficient was applied. Strong correlation was found between mean SAS scores and Global PSQI scores (P=0.56) and between SAS scores and DASS depression sub score (P=0.51) while very strong correlation was found between SAS scores and DASS anxiety and stress sub scores (P=0.69, P=0.74 respectively).

Table 4: Comparison of male and female subjects on Global PSQI scores.

Global PSQI scores	Sex	N (%)	Mean	Standard deviation	T value	P value
Non users	M	340 (57.9%)	4.31	2.16	1.22	0.220
	F	247 (42%)	4.09	2.12		
Low users	M	340 (57.9%)	8.12	3.33	0.144	0.88
	F	247 (42%)	8.16	3.27		
High users	M	340 (57.9%)	11.78	3.65	0.42	0.66
	F	247 (42%)	11.65	3.62		

There were no significant differences between mean Global PSQI scores of male and female.

DISCUSSION

Few studies have been conducted, especially among adolescents with respect to Smart phone addiction. This study is a preliminary step toward understanding the extent of Smart phone addiction among adolescents in India. Our study found that 33.3% out of total 87% who were smart phone users were having high smart phone usage. Those subjects who had high scores on SAS scale had higher scores on DASS 21 and PSQI scales, indicating high levels of depression, anxiety and stress as well as poor quality of sleep among high users.

SAS mean score was 85.66 in the present study which is similar to results of study conducted by Kwon M et al results are not consistent with previous research conducted by Demirci et al, SAS mean score of male students was significantly higher than that of female students in this study, difference may be related to usage pattern or purpose, such as increased use of social networks.[4,5] Present results showed that poor quality of sleep was higher in the high smart-phone use group than in the low smartphone use group. This result may be due to sleep deregulation. There were positive correlations between sleep quality global scores and SAS scores 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 or that the bright light of a computer screen may suppress melatonin secretion and delay the onset of sleep.[9-11]

Cain et al suggested some mechanisms concerning the relationship between electronic media use and poor sleep.[12] Moreover, Huber et al reported that electromagnetic field exposure in the evening influences physiological factors such as sleep quality and the melatonin rhythm, probably by influencing pineal gland; it may also result in altered cerebral blood flow and brain electrical activity.[13] Moreover, another study reported that prolonged use can cause physical discomfort and headaches, which can negatively affect sleep.[14]

Probably these mechanisms observed in technology users may be responsible for sleep problems in the case of smartphone over users. Present study found strong correlation between smart phone over usage and prevalence of depression, anxiety and stress, which is not consistent with results of previous study conducted by Lemola et al, did not find any relationship between smartphone ownership and symptoms of depression.[15] However, Hwang et al found that state anxiety, trait anxiety, and depression were higher in the smartphone overuse group than in the normal use group among college students which is similar to results of this study.[16] Present findings on depression and anxiety are highly consistent with those of previous studies.[17] Sleep is a significant biological mechanism related to mood regulation, students whose sleep is disrupted because of technology use may be more likely to experience markers of depression. In present study, smartphone use predicted the level of depression and anxiety. 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.[18] Moreover, Adams et al reported that depressed individuals might have sleep problems and use the technology to pass the time this could be plausible reason for our findings on depression, stress and anxiety.[19] Lemola et al found that electronic media use at night is related to sleep disturbances and depressive symptoms which is similar to findings of present study.[15]

The researchers reported that electronic media use at night was associated with depressive symptoms. They suggested that sleep disturbances in turn appear to be a partial mediator of the relationship between electronic media use at night and depressive symptoms. Our findings indicated that depression and/or anxiety acted as a mediator between smartphone overuse and sleep quality. We think that smartphone overuse may lead to depression and/or anxiety, which in turn leads to sleep problems.

Limitations

Smart phone addiction is a widely prevalent problem so a sample of 587 cannot be generalized to whole of adolescent's population. Moreover, all of the participants were school students, and may not represent the total population. All subjects were well-educated. Longitudinal studies and samples with different educational and age backgrounds are needed. Cross-sectional design, which is not the best way to evaluate causal relations, also limited the results. Strenuous school training, curriculum and competitive examinations psychological distress is expected to be more among adolescents so it cannot be solely attributed to excessive use of Smart phones.

CONCLUSION

With increasing popularity of Smart phones, one can always appreciate the advantages offered by this technology however adolescents need to be cautious about its addictive potential that is adversely affecting their mental health.

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