Journal of Ayurveda & Holistic Medicine

https://jahm.co.in

eISSN-2321-1563

Cross Sectional Study

PREVALENCE OF SMARTPHONE ADDICTION AND ITS IMPACT ON SLEEP QUALITY AMONG SCHOOL-GOING STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT:

Background Smartphones are small portable devices with touch screens that can be operated with either a finger or a stylus. Smartphones are widely utilized and indispensable in the daily lives of young people. Sleep is one of the most important necessities for human survival. It is vital for returning to a normal life and revitalizing weary bodies and minds. **Objective**: smartphone addiction is and how it affects school-age children's sleep in both urban and rural areas. **Materials and Methods**: 140 enrolled students were chosen by simple random sampling to participate in a cross-sectional in-person study. The study was conducted from March 2023 to May 2023 in two urban and two rural areas of Belagavi. The Pittsburgh Sleep Quality Index (PSQI) and the Smartphone Addiction Scale Short Version (SAS-SV) were used to assess the students' smartphone addiction and sleep quality, distinguishing between good and poor sleep. Pearson's Chi-square test of independence was used to assess the relationship between smartphone and sleep quality. **Results**: Out of 140 students who have completed the questionnaires, 88 (62.9%) were addicted to Smartphone, 52(37.1%) were not addicted to Smartphone, 15(10.7%) and 125(89.3%) had good and poor sleep quality respectively. **Conclusion**: Pearson's Chi-square test of independence showed the relationship between smartphone and sleep quality. High school-going students were more affected by smart phone addiction. The males were more addicted to smart phone than females. The study revealed that in High school-going students males had majority of the poor quality of sleep than females. The present findings of the study can be used for framing health policy for adolescents in relation to the usage of smartphones.

KEYWORDS: Smartphone addiction, Sleep quality, Smartphone addiction Scale short Version (SASSV), Pittsburgh sleep quality index (PSQI).

RECEIVED ON: 26-04-2025

REVISED ON: 13-05-2025

ACCEPTED ON: 17-05-2025

Access This Article Online:

Quick Response Code:

Website Link: https://jahm.co.in

DOI Link: https://doi.org/10.70066/jahm.v13i4.1835

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CITE THIS ARTICLE AS

Kadambari Solankure, Sandeep Sagare, Bhoomika J. Prevalence of smartphone addiction and its impact on sleep quality among school-going students: A cross-sectional study. *J of Ayurveda and Hol Med (JAHM).* 2025;13(4):3-11.

1. INTRODUCTION

Smartphone are the mobile phone which most people use for functions such as internet browsing etc. Smartphone has become the inseparable part of humans that too mostly in adolescent, which has an impact on sleep quality.[1] Sleep is a fundamental need for human health and quality of life at every stage of life. It plays a crucial role in physical growth and improving academic performance.[2] The quality of sleep can be influenced by various factors, including environmental conditions, social life, work, financial situation, stress, and overall health.[3] One such environmental factor is smartphone addiction. Screen time has negative effects on sleep as smartphones are portable devices with greater potential to disrupt both the amount and quality of sleep; excessive use has been linked to shorter sleep duration, prolonged sleep durations, prolonged sleep latency, and fatigue during the day. Past studies have shown that mobile addiction has led to much psychological impairment. As smartphone usage among teenagers continues to raise, its effects on sleep quality are growing. It's important to understand this connection in order to encourage healthy digital behaviors and prevent sleep-related health problems in students. Hence with this objective the study was undertaken to evaluate the impact of Smartphone addiction on sleep quality for School-going students**.** we are doing this to note any changes in sleep quality.

OBJECTIVE: To find the association between smartphone addiction and sleep quality of school-going students.

2. MATERIALS AND METHODS:

Study design: Over the course of three months, a cross-sectional survey study was carried out in two rural and two urban high schools in Belagavi.

Settings: The study was conducted at 2 high schools of Rural and 2 from Urban area in Belagavi through the lottery method on 18th February. The selected High schools are Rural schools selected are SMT J.R Doddannanavar High school Halaga Belagavi and Sri Siddharood high school Muchandi Belagavi. The Urban Schools selected are Sardar High school, Belagavi. Chintamani Rao High school, Belagavi. The study period is 3 months from March 2023 to May 2023 in which 2 rural and 2 urban schools were visited.

A total number of 140 School-going students were randomly selected from 2 high schools of Rural and 2 from Urban in Belagavi district Karnataka. Students were assessed by means of the short version of the Smartphone Addiction Scale (SAS-SV)[4] measures smartphone addiction. The Pittsburgh sleep quality index (PSQI)[5] was then evaluated for the same pupils. Meticulously Three months of painstaking data collection were followed by statistical analysis using Chi square Test. The collected data was analyzed to establish prevalence and its impact.

Study participants:

The subjects enrolled in the study were chosen regardless of their socioeconomic background or caste. The study is carried out in high school-going students of the Rural and Urban areas of Belagavi using simple random sampling. 140 students who fulfilled inclusion criteria gave their informed consent were selected for

the study on the prevalence of smartphone addiction and its effects on sleep quality. Interaction is done with the participants and a brief overview of the study and asked for their informed consent.

Inclusion Criteria:

1. Students of either sex with age group between 15-16 years

2. Students studying in 9th and 10th standard schools of urban and rural areas of Karnataka.

Exclusion Criteria:

1. Students younger than 15 and older than 16

2. Students enrolled in courses outside of Urban and Rural areas.

Variables/outcomes:

The study participants provided all of the data required f or the investigation.

The Pittsburgh Sleep Quality Index (PSQI) and the valida ted Smartphone Addiction Scale Short Version (SASSV) were used to evaluate smartphone addiction and its effe cts on sleep quality.

Data sources/measurement:

Smartphone Addiction 6-point Likert Scale Short Version (SASSV) was used, which comprises 10 questions with 6-point Likert scale. In males if more than 31 points are found correct then it is considered as addiction to mobile and in females if more than 33 then it is considered as Mobile phone addiction. The Pittsburgh Sleep Quality Index (PSQI), a measure us ed to evaluate sleep quality, evaluates several factors, including duration, latency, sle ep efficiency, and daytime dysfunction. Each component measured from 1 to 4 grading. Individuals were given the questionnaire and instructed to complete it within 30 minutes. The researcher then reviewed the completed forms to assess sleep quality and smartphone addiction.

Bias: It was cross sectional study and assessment parameters well known to the participants, so participants and investigators were not biased.

Study size:

99% confidence intervals, 20% tolerance error, 10% attrition with a formula n = [(z2 pq) / (20% of p)2] *1.1. n was calculated as 140 Where Z1-α/2 =1.96 p= 43% Prevalence of mobile phone addiction, q= 100-p.

Statistical methods:

For statistical analysis, SPSS software, version 27, was uti lized.While means and standard deviation were used for categorical data, descriptive statistics like frequencies a nd percentages were used for categorical data.For conti nuous variables, s were calculated.Continuous data distr ibutions were evaluated for normality using the Shapiro Wilk test.Using Pearson's Chisquare test of independenc e, relationships between smartphone addiction, sleep q uality, and a few demographic factors were investigated. Statistical significance was defined as a two-tailed p-value of less than 0.05.

3. RESULTS:

Table 1.: Demographics data of the participants

Variables		Number (N)	Percentage (%)
gender Distribution	Female	68	48.6%
	Male	72	51.4%
Age	14 years	44	31.4%
	15 years	75	53.6%
	16 years	21	15%
Religion	Hindu	128	91.4%

	Muslim	12	8.6%
Class	VIII class	43	30.7%
	IX class	97	69.3%
Locality	Rural	70	50%
	Urban	70	50%
Socio-economic status	BPL	130	92.9%
	APL	10	7.1%
Total		140	100

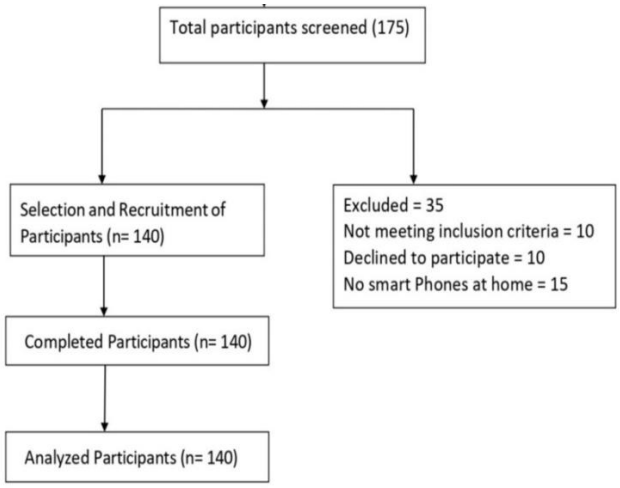

Figure No: 1 Showing Flow of Participants

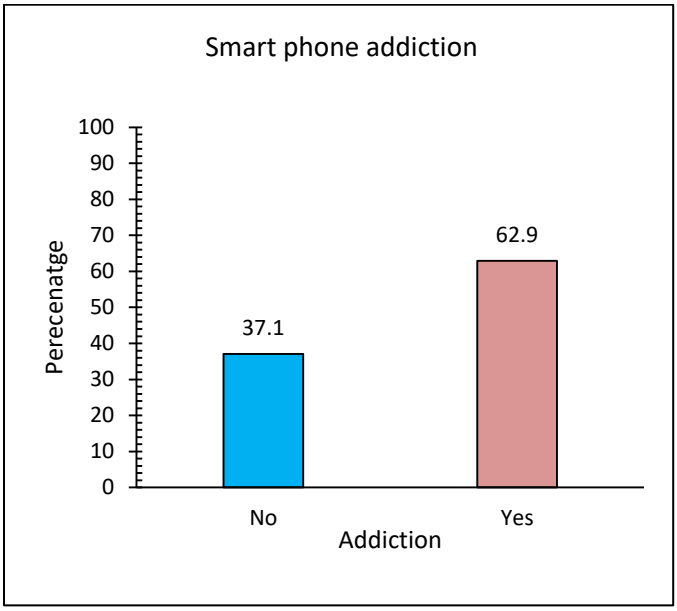

Figure No: 2 Smart phone addictions of the participants

Table 2: sleep quality of the participants

Sleep Quality	Number(N)	Percentage (%)
Poor	125	89.3
Good	15	10.7
Total	140	100

Table 3: Association between smart phone addiction and selected demographic variables

Variables		Smartphone addiction status		Chi-square value	p-value
		Not addicted	Addicted		
		n (%)	n (%)		
Gender	Female	33 (48.5)	35 (51.5)	7.343	0.007*
	Male	19 (26.4)	53 (73.6)		
Age	14 years	17 (38.6)	27 (61.4)	0.777	0.678
	15 years	29 (38.7)	46 (61.3)		
	16 years	6 (28.6)	15 (71.4)		
Religion	Hindu	45 (35.2)	83 (64.8)	2.524	0.112
	Muslim	7 (58.3)	5 (41.7)		
Class	VIII class	21 (48.8)	22 (51.2)	3.635	0.057
	IX class	31 (32)	66 (68)		
Locality	Rural	16 (22.9)	54 (77.1)	12.238	0.000*
	Urban	36 (51.4)	34 (48.6)		
Socio-economic status	BPL	47 (36.2)	83 (63.8)	0.763	0.383

	APL	5 (50)	5 (50)		

Table 4: Association between specific demographic factors and sleep quality

Variables		Sleep Quality Status		Chi-square value	p-value
		Poor - n (%)	Good - n (%)		
Gender	Female	62 (91.2)	6 (8.8)	0.494	0.482
	Male	63 (87.5)	9 (12.5)		
Age	14 years	37 (84.1)	7 (15.9)	2.806	0.246
	15 years	70 (93.3)	5 (6.7)		
	16 years	18 (85.7)	3 (14.3)		
Religion	Hindu	113 (88.3)	15 (11.7)	1.575	0.209
	Muslim	12 (100)	0 (0)		
Class	VIII class	37 (86)	6 (14)	0.681	0.409
	IX class	88 (90.7)	9 (9.3)		
Locality	Rural	63 (90)	7 (10)	0.075	0.785
	Urban	62 (88.6)	8 (11.4)		
Socio-economic status	BPL	115 (88.5)	15 (11.5)	1.292	0.256

Table 5: Descriptive statistics of PSQI components

Component	Mean	SD
Component 1	0.77	0.8
Component 2	1.54	1.08
Component 3	1.31	1.19
Component 4	0.2	0.42
Component 5	2.06	0.39
Component 6	0.56	0.92
Component 7	1.66	0.56
PSQI Score	8.11	2.29

The table shows the descriptive data for the Pittsburgh Sleep Quality Index (PSQI) components among 140 students from Belagavi rural and urban districts. The participants' varied degrees of sleep difficulties are reflected in the mean scores for each PSQI component with a mean score of 0.77 and a standard deviation of 0.8, Component 1, which evaluates subjective sleep quality, shows a moderate degree of perceived sleep quality. The higher mean of 1.54 with a standard deviation of 1.08 for Component 2, which measures sleep latency, indicates that many students have trouble falling asleep with a mean of 1.31 and a standard deviation of 1.19 for Component 3, which gauges sleep duration, the students appear to be getting insufficient sleep. Component 4, which evaluates sleep patterns efficiency, which is characterized by considerable variability but generally good efficiency, has a low mean score of 0.2 and a standard deviation of 0.42. The component with the highest mean score (2.06) is Component 5, which assesses sleep disruptions with a standard deviation of 0.39, indicating regular sleep disturbances. The results of Component 6, which

measures participants' use of sleep aids, indicate modest but diverse use, with a mean of 0.56 and a standard deviation of 0.92. With a mean score of 1.66 and a standard deviation of 0.56 for Component 7, which gauges daytime dysfunction, sleep issues have a substantial impact on day-to-day functioning. With a mean of 8.11 and a standard deviation of 2.29, the total PSQI score points to generally poor sleep quality, as a score greater than 5 usually suggests poor sleep.

Table 6: Association between sleep quality and smart phone addiction

Attributes		Sleep Quality Status		Chi-square value	p-value
		Poor	Good		
		n (%)	n (%)		
Smart phone addiction	Not addicted	48 (38.4)	4 (26.7)	0.79	0.374
	Addicted	77 (61.6)	11 (73.3)		
	Total	125 (100)	15 (100)		

This table examines the connection between sleep quality and smartphone addiction among 140 school-going students in both urban and rural areas of Belagavi**.** According to Table 4, of the 125 students reporting poor sleep quality, 48 (38.4%) are not addicted to smartphones, while 77 (61.6%) are addicted. Among the 15 students with good sleep quality, 4 (26.7%) are not addicted, and 11 (73.3%) are addicted. The chi-square value for this association is 0.79, with a p-value of 0.374. Since the p-value is greater than the commonly accepted threshold of 0.05, it indicates that the relationship between sleep quality and smartphone addiction is not statistically significant. This suggests that, according to the data from this study, there is no strong evidence to support a direct association between smartphone addictions and sleep quality among the surveyed students. While a higher proportion of students with poor sleep quality appear to be addicted to smartphones (61.6%), it is possible that other factors are also affecting sleep outcomes.

4. DISCUSSION:

This section presents a comparison between the current study and other comparable studies, focusing on demographic variables such as age, gender, sleep quality, smartphone addiction, and religion to know the differences in the results. In the present study majority were males 51.4% and females were 48.6% (Table 1). Similar studies conducted in KIMS Hubballi [6] majority of them were males 59.2% and females were 40.8%. In Saudi study 66% were males and 34% were females.[7]

This study was conducted on 140 students belong to 8th 30.7% and 9th were 69.3%, 91.4% were Hindus and 8.3 %were Muslims (Table 1). Similar studies conducted in KIMS Hubballi majority of them were Hindus 88.3% and Muslims were 6.3%. Other study in Nepal showed 82.8% were Hindus and 17.2% were belonging to other religion. No similar studies are conducted for comparison.

In the present study 62.9% had smart phone addiction and 37.1% had no smart phone addiction (figure 2).

Similar studies were conducted among medical students in Maharashtra and KIMS Hubballi where it showed that 46.15% and 51.2% of the students had smart phone addiction and 48.75% were using smart phone excessively. Among Indian medical students, almost half 46.15% were screened positive for smart phone addiction. Study conducted in Gyeonggi-do, Korea[8] revealed that 95.57% of participants were normal smart phone users, and 2.73% of participants had risky smart phone usage. The study conducted in Suez Canal, Egypt among medical students had similar results of smart phone addiction that's 74.7% and 23% students were not addicted to smartphone. The smart phone addiction of the present study is less when compared to similar studies as the sample size of the current study is less.[9]

This study showed 125 students reporting poor sleep quality, 48 (38.4%) are not addicted to smartphones, while 77 (61.6%) are addicted (Table 6). Similar studies were conducted among medical students at KIMS Hubballi where 48.75% had poor sleep and 51.2% had good sleep. Dworak et al, a survey of UK showed that 61.6% had poor sleep quality. Another study of Gyeonggi-do, Korea and India where 29.51% and 22.45 had good sleep, whereas 51.73 and 77.6% of them had poor sleep quality. Kumar et al study reported that poor sleep quality among medical students with smart phone addiction.

Gender Comparison for Sleep Quality and Smartphone Addiction: According to the current study, smartphone addiction was more common in men (73.6%) than in women (51.5%) (Table 3). Similar studies have shown significant gender differences in addiction, with females reporting higher levels of smartphone addiction, particularly in regions like Korea and the Middle East [29-31]. A similar trend was observed in the study by Hegazy et al. However, in the present study, females reported poorer sleep quality (91.2%) compared to males (12.5%) (Table 4). This contrasts with a study by Ghoreishi et al. conducted on university medical students, where 44.8% of poor sleepers were male and 38% were female. The results of the current study differ from other studies, as it includes a higher proportion of female participants.[10] In present study we found that smart phone addiction was higher in Rural area students 77.1% than urban area students 48.6%(Table 3).To educate rural communities and drive positive change about the relationship between excessive phone use and disrupted sleep patterns.

Limitations: For data collection only 2 Rural and 2 urban areas were considered. A few more areas could be considered for better understanding and data generation. As it was a cross-sectional study and data was collected only once, so studies with follow-ups and other assessment parameters can fetch more evidences and long-term effect of smartphone addiction.

Strength: It is cross sectional study with a good number of sample sizes. Standard assessment parameters were used with proper statistical analysis.

Generalizability: The present data provides insight for comparing the sleep quality and smartphone addiction which has impact on mental development of school-going children. The data results can be used for the development of protocol, incidence calculation and to create awareness in school-going students.

Implications: The present data can be used for health policy making for adolescents in relation to the usage of smartphones. Prevention guidelines can be framed highlighting the consequence of overuse, future research can be taken to analyze the effect of smartphone addiction**.**

5. CONCLUSION:

The present study found that sleep quality was affected by smart phone addiction among the high school-going students. Males were more addicted to smart phone than females, and poor sleep quality was also found in females. This type of research provides insights for framing school health policy and to develop guidelines for future research works. Studying with larger populations and different age groups can yield better scientific results which helps in generating evidence-based results.

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Approval of final manuscript: All authors

Conflict of Interest: None

Source of Support: We gratefully acknowledge the CCRAS for providing financial support for this work. We also extend our sincere thanks to Dr. Suhaskumar Shetty, Principal, KLE Shri B.M.K. Ayurved Mahavidyalaya, Shahapur, Belagavi, for his guidance and support throughout the study.

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