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Effects of Mobile Use on Sleep Quality and Anxiety Levels: A Cross-Sectional Study Among Nursing Students Of Mandya City

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Key Words
Mobile use, Pittsburgh's sleep quality (PSQI), mobile-related sleep risk factors (MRSRF), generalized anxiety disorder score (GAD score)

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ABSTRACT

Sleep is a physiological state of unawareness which plays an important role in cognitive and physical functions. Mobile phone overuse contributes to hyper arousal in bedtime and poor sleep quality (PSQ). A major factor which can contribute to PSQ is the blue light emitted by screens of mobile phones, which can decrease the production of melatonin, the hormone which controls the circadian rhythm. Even though studies have demonstrated that the use of cell phones can have positive benefits in supporting physical and mental well being recent studies have argued that excessive mobile use is a type of addictive behavior and can affect the mental and physical well being. To quantify the impact of daily usage of smart phones in sleep quality. Self-administered questionnaire based cross-sectional study done in 250 Nursing students of age group 19- 21 years of different nursing colleges in Mandya city. Out of 250 students, 72 males and 178 female students, with mean age group of 20 years, 87 (34.4%) had normal quality of sleep, 163 (65.2%) had poor sleep 53 students (21.2 %) had normal phone usage, whereas 197 (78.8%) had heavy usage, 121 have nil to mild anxiety, 86 have moderate anxiety, 32 have moderately severe anxiety and 11 have severe anxiety. Our study showed a high prevalence and prolonged duration of mobile use in young adults. Average mobile screen usage time was 6-8 hours and 78.8% of the participants reported of using mobile for more than 8 hours. This study showed a positive association between mobile use, poor sleep quality and anxiety levels. This study concludes that using mobile screen ≥8 hours/24 hours, using the mobile for at least 30 minutes before sleeping are positively associated with poor sleep quality and higher anxiety levels.

INTRODUCTION

Sleep refers to the state of unconsciousness from which the individual can be aroused by sensory or other stimuli[1]. We almost spend one-third of our lives sleeping[2]. Sleep plays an important role in cognitive and physical functions, in removal of cellular toxins and prevention of various diseases[3]. A major decline in the sleep hours can cause obesity, diabetes and other chronic debilitating diseases which have been documented in the past 20-30 years[4-6]. Many factors can affect sleep hygiene but the role of mobile use in causing sleep problems has gained huge attention in the past few years[7]. Mobile use at bedtime even after the lights have been turned off, can cause poor sleep quality (PSQ) by various mechanisms[8]. Mobile phone usage is usually seen more among students as they use as a break. Due to the revolution of technology, 90% mobile phone users now have smart phones which enable them to access internet and social networks[9]. This can resultin mobile phone addiction thereby contributing to hyper arousal in pre bedtime period and further leading to poor sleep quality[10]. A major factor which can contribute to PSQ is the blue light emitted by screens of mobile phones[11]. This blue light can decrease the production of melatonin, the hormone which controls the sleep/wake cycle or circadian rhythm. Reduction in melatonin makes it difficult to fall and stay asleep[12]. Some studies have found that exposure to blue light increases brain alertness and can stimulate cognitive functions, which in turn can lead to PSQ[13,14]. Mobile phones receive and transmit the signals through radiofrequency electromagnetic fields (RF-EMFs)[15]. It is known that RF-EMFs can pass through the skull and even reach the brain[16]. There by causing dangers for human health[17,18]. Even though studies have demonstrated that the use of cell phones can have positive benefits in supporting physical and mental wellbeing recent studies have argued that excessive mobile use is a type of addictive behaviour and can affect the mental and physical wellbeing[19,20]. Increased use of cell phones can increase anxiety levels[21]. Furthermore, several studies conducted among excessive cell phone users have validated to be having digitalstress, low self-esteem, worries and angers loneliness,anxiety, mooddisorders, psychological distress and emotional dysregulation[22,23]. Excessive mobile users were also found to be associated with anxiety disorders and symptoms related to attention-deficit hyperactivity disorder (ADHD)[24]. Immense use of cell phones and an adverse attitude and feeling of anxiety can increase the risk of depression and anxiety[25,26]. Mobile phone addiction is rapidly gaining acceptance as a serious psycho social condition.

MATERIALS AND METHODS

This cross-sectional study ,was conducted from august 2023 to December 2023 on 250 subjects, including 128 females and 72 males of age group 19-21 years who are 1st and 2nd year nursing students from various colleges of Mandya city, who use mobile phones in day to day basis. The institutional Ethical committee approved study on September 1st 2023. The data was collected by using a semi-structured questionnaire which contains 4 parts after collecting informed.

Socio Demographic Characters:

- The first part shall collect details of socio demographic characteristics like name, age, sex, etc.

Pittsburgh Sleep Quality Index (PQSI):

- PSQI has been found to be most effective in terms of reliability and validity. It includes 19 self-rated items, which focus on seven main areas including: subjective sleep quality, sleep latency (time taken to fall asleep), sleep duration, habitual sleep efficiency (the ratio of total sleep time to time in bed), sleep disturbances, the use of sleep-inducing medicines and daytime dysfunction.

PSQI Scoring: The PSQI includes a scoring key for calculating a patient's

- seven sub scores, each of which ranges from 0-3.
- A score of 0 indicates no difficulty.
- A score of 3 indicates severe difficulty.
- The 7 component scores are then added to make a globalscore with a range of 0-21
- A score of 0 means no difficulty.
- A score of 5 or more indicates poor sleep quality.
- A score of 21 means severe difficulties in all areas.
- (The higher the score, the worse the quality).

Mobile-Related Health Risk Factors (MRHRF):

- Total duration of mobile use/day
- using mobile while in the bed when the lights have been turned off
- using blue light filters on mobile
- keeping the mobile under pillow
- keeping the mobile 2 meters away from the bed
- putting the mobile on airplane mode while sleeping.

Scoring:

- The scoring is from 0-8, greater than 4 is considered as mobile phone overuse.

Self-Test for Anxiety:

- It includes a questionnaire called GAD-7.
- GAD stands for generalized anxiety disorder and 7 for 7 questions in the tool which helps find out if a person has anxiety disorder.
- It rates the severity from mild to severe anxiety.

The Scoring is:

- 0-4=mild anxiety
- 5-9=moderate anxiety
- 10-14=moderately severe anxiety
- 15-21=severe anxiety
- If score is 10 or higher it shows that anxiety is affecting their daily life

Data Collection: Data were collected by convenience sampling technique, among 250 nursing students who volunteered from various colleges of mandya city. A five minutes briefing session was given in the class to explain the study and various terms which are used in the study, total time of 10-15 minutes was provided to the students to fill the questionnaire. The students were assured about the confidentiality of their personal information.

Inclusion Criteria:

- 1st and 2nd year nursing students from 4 different colleges in Mandya city willing to give informed consent to participate in the study.

Exclusion Criteria:

- Any diagnosed chronic respiratory problem.
- (including nasal congestion, chest infections, asthma, adenoids, allergic rhinitis).
- Any chronic physical or mental illness, affecting their sleep.
- Using any prescription medication for a minimum period of 3 months.
- Any diagnosed psychiatric illness.
- Nursing students of Mandya Institute of Medical Sciences.

Statistical Analysis: The data collected is entered in Microsoft Excel and analysed using SPSS 22 (Statistical Package for Social Sciences).

Descriptive Statistics:

- For categorized data (like sex, anxiety level scores, sleep quality scores etc.).
- For continuous data (like age, sleeping hours etc.).

Inferential Statistics:

- Chi2 test (to know the association of sleep quality and mobile usage / to know the impact of mobile usage on anxiety levels).
- T test (to know the differential means like sleep with mobile usage).

Statistical significance will be considered if $P<0.05$

RESULTS AND DISCUSSIONS

The mean age (±SD) of participants was 20years. Out of 250 subjects' number of female participants was 178 (71.2%), male participants was 72 (28.8%) Among them, 98% of the participants owned smart phones and 87 (34.4%) had normal quality of sleep, 163 (65.2%) had poor sleep. 121 have nil to mild anxiety , 86 have moderate anxiety , 32 have moderately severe anxiety and 11 have severe anxiety. 53 have normal mobile usage 197 have heavy usage 53 students (21.2%) had normal phone usage, whereas 197 (78.8%) had heavy usage Average screen usage time was 6.8±4.59/24 hours and 69% of the participants reported of using mobile for more than 8/24 hours. Our study showed an increased prevalence and prolonged duration of mobile use in young adults. Average mobile screen usage time was 6.8±4.59/24 hours and 69% of the participants reported of using mobile for more than 8/24 hours. Using mobile for at least 30 minutes after the lights have been turned off (without a blue light filter in mobile) correlates with poor sleep quality, daytime sleepiness, sleep disturbances, increased sleep latency and using mobile screen $\geq$8 hours/24 hours are positively associated with higher anxiety levels. Sahajal Dhooria, Archana Sasi[25] conducted a study on the effect of mobile phone use on sleep in march 2022 in India in which out of the 566 participants, 128 (22.61%) had PSQI $\geq$5, reflecting poor sleep quality. A higher use of mobile phone was significantly associated with a poor sleep quality as a component of PSQI questionnaire. Shima Hashemi[26] conducted a Study in January 2021 in India to find Out the Correlation of Mobile Phone Addiction with Anxiety and Sleep Quality in the College Students of Surat City the statistical analysis indicates that 27% of students were addicted to the smart phone. Anxiety and sleep quality have a positive significant correlation with smart phone addiction. The results revealed there were high chances of anxiety and stress for cell phone addicts.

CONCLUSION

The study concludes that

- Using the mobile for at least 30 minutes after the lights have been turned off or more than 4 hours/24 hours "results in poor sleep quality, daytime sleepiness, sleep disturbances and increased sleep latency.
- Mobile-related sleep risk factors (MRSRF), i.e., "using mobile before sleeping after the lights have been turned off, not using blue light filter, not

Table 1: Distribution of the Study Population According to Phone Usage Pattern:

Mobile Usage	Frequency	Percent
Normal usage	53	21.2
Heavy usage	197	78.8
Total	250	100.0

Table 2: Distribution According to Quality of Sleep

Sleep	Frequency	Percent
Normal	87	34.8
Poor sleep	163	65.2
TOTAL	250	100.0

Table 3: Distribution of the Study Population According to the Level of Anxiety

Anxiety Levels	Frequency	Percent
Mild anxiety	121	48.4
Mod anxiety	86	34.4
Mod sever anxiety	32	12.8
Sever anxiety	11	4.4
Total	250	100.0

Table 4: Comparing the PSQI and MRSRF

		MRSRF			
		Norma Usage	Heavy Usage	Total	P value
PSQI	Normal Sleep	26	61	87	0.014
	Poor Sleep	49.1%	31.0%	34.8%	
		27	136	163	
		50.9%	69.0%	65.2%	
Total		53	197	250	
		100.0%	100.0%	100.0%	

Table 5: Comparing the Quality of Sleep and Level of Anxiety Among Heavy and Normal Phone Usage Study Population

		Group Statistics			
	MRSRF cat	N	Mean	Std. Deviation	P value
PSQI score	Low usage	53	3.57	2.398	0.000
	High usage	197	5.36	3.144	
GPA score	Low usage	53	2.81	3.632	0.000
	High usage	197	6.12	4.332	

Table 6: Comparing the GPA and MRSRF

MRSRF cat					
		Normal usage	Heavy usage	Total	P value
GPA	Mild anxiety	42	79	121	0.000
		79.2%	40.1%	48.4%	
	Mod anxiety	7	79	86	
		13.2%	40.1%	34.4%	
	Mod sever anxiety	2	30	32	
		3.8%	15.2%	12.8%	
	Sever anxiety	2	9	11	
		3.8%	4.6%	4.4%	
Total		53	197	250	
		100.0%	100.0%	100.0%	

using airplane mode, putting the mobile near the pillow while sleeping" were highly prevalent amongst the mobile users.

- using mobile screen ≥8 hours/24 hours are positively associated with higher anxiety level.

Key Message: Sleep plays an important role in cognitive and physical functions, in removal of cellular toxins and prevention of various diseases. Mobile phone overuse contributes to hyper arousal in bedtime and poor sleep quality (PSQ) and affect the circadian rhythm. Excessive mobile use is a type of addictive behavior and can affect the mental and physical well being. We are living in an era of technology, but forgetting the fact that all these will have its repercussion. Lesser the devices you have at your home higher will be the peace of your mind.

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