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Short Communication

Mobile usage and sleep patterns among medical students

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Abstract

Exposure of humans to radio frequency electromagnetic field (EMF) both during receiving and transmitting the signals has amplified public and scientific debate about possible adverse effects on human health. The study was designed with the objective of assessing the extent of mobile phone use amongst medical students and finding correlation if any between the hours of usage of mobile to sleep pattern and quality. hundred medical students grouped as cases (n=57) (>2 hours/day of mobile usage) and control (n=43) (≤2 hours/day of mobile usage) were examined for their sleep quality & pattern by Pittsburg sleep Quality Index (PSQI). Differences between groups were examined with the Mann Whitney "U" test for proportions (Quantitative values) and with Student't' test for continuous variables. The association of variables was analyzed by Spearman Rank's correlation. Probability was set at <0.05 as significant. Sleep disturbance, latency and day dysfunction was more in cases especially females. A significant association of hours of usage and sleep indices were observed in both genders (males r=0.25; p=0.04, females r=0.31; p=0.009). Evening usage of mobile phone in cases showed a statistically significant negative association (–0.606; p=0.042) with Sleep quality (higher PSQI means sleep deprivation). Students using mobile for > 2 hours/day may cause sleep deprivation and day sleepiness affecting cognitive and learning abilities of medical students.

Introduction

Mobile phones have become an indispensable communication tools and have transformed from a status symbol to a necessity because of the countless perks that a mobile phone provides. The additional features such as SMS, MP3 player, games, internet, and videos have attracted people across all walks of life including the students (1). The extensive use of mobile phones in recent years had led to exposure of humans to radio frequency elctro magnatic field (RF-EMF) of 30 KHz-300GHz both during receiving and transmitting the signals which has amplified public and scientific debate about possible adverse effects on human health. There are two direct ways by which health could be affected as a result of exposure to radio frequency radiation. These are thermal (heating) effects caused mainly by holding mobile phones close to the body and also as a result of possible non-thermal effects.

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EMF radiations from Mobile phones may cause adverse health problems such as headache, sleep disturbance, impairment of short term memory, and lack of concentration, dizziness, and increases in the frequency of seizures in epileptic children, brain tumors and high blood pressure amongst users of mobile phones (2, 3, 4). Studies on humans have reported the adverse effects of EMF emitted by mobile phones on sleep electroencephalograms (5) and reduced melatonin production (6, 7). A biological explanation for an association between exposure to RF-EMF and impaired sleep quality has been hypothesized which relates to the suppressed nightly melatonin excretion by electromagnetic field exposure (8).The medical students undergo tremendous stress during years of their MBBS course and are prone to sleep deprivation. Sleep disturbances increase the risk of physical and mental problems and has been found to be is closely associated with lifestyle habits including use of mobiles (9). The present study was designed with the objective of assessing the extent of mobile phone use amongst medical students and finding association if any between the hours of usage of mobile to sleep pattern and quality of life.

Materials and Methods

After consent from the Institutional Ethical Committee the study was conducted in the department of Physiology, HIHT University, Dehradun. An informed & written consent was taken from the volunteers before the commencement of the study. Study Design: A descriptive study was conducted on volunteers among first year medical students of HIHT University. Both male and female (16 to 22 years) among the first year medical students of HIMS, were screened randomly during the month of march by the investigator administered questionnaire on the usage of the mobiles which comprises of 17 questions covering several aspects of mobile usage including years of mobile usage, time of maximum usage, type and proximity of mobile during sleep.

The volunteers fulfilling the inclusion criteria of more than one year of GSM mobile usage were included in the study. They were grouped into cases and control following the criteria of inclusion:

- Control group (n=43) : mobile usage less than equal to 2 hours/day
- Cases group (n=57) : mobile usage for more than 2 hours/day

Study volunteers were questioned about their sleep quality/pattern using a Pittsburgh sleep Quality index questionnaire (PSQI) (10).

Statistical analysis

Descriptive statistics was used to present values as frequencies or mean values and standard deviations (SD). Differences between groups were examined with the Mann Whitney “U” test for proportions and with Student t test for continuous variables. The association of hours of mobile usage and PSQI was analyzed by Spearman Rank’s correlation. Probability was set at <0.05 as significant.

Resuts

In this study we address the sleep index (PSQI) and quality of sleep among medical students who are using mobiles for ≥2 hours/day (controls) and >2 hours/day (cases). The response to the questions about mobile usage revealed that 57% of the medical students were using the mobiles for more than 2 hours per day of which 63.6% were females. 75.9% females maximally used mobile during evening hours where as boys used the mobile equally during the evening and night. Chi square analysis revealed evening usage of mobile was significantly associated with ≥2 hrs of usage only among girls (Chi (n=54)=4.09; p=0.04). Males using mobiles more than 2 hours /day used it maximally during night (66.6%) as compared to females (31.4%). 59.3% of females showed a poor quality of sleep (PSQI>5) which is predictable with long hours of usage of mobile by them.

In Table I, cases and controls among males and females were analyzed for the sleep parameters which showed not much difference between the two in both the genders except for the sleep disturbance. Higher values for sleep latency, sleep disturbance, day dysfunction and lower values for sleep duration was observed in both males and females using mobiles for >2 hours/day. Cases in females showed a higher levels of sleep disturbance than in controls (rank mean 25.80 vs. 20.3) and the difference was

TABLE I: Comparison and association of cases (>2 hrs mobile usage) and controls (≤2 hrs mobile usage) to sleep quality parameters and Sleep Index (PSQI) among males & females.

Sleep parameters	*Hrs of use*	*Males (n=45)*				*Females (n=55)*			
		Mean rank	*Mann whitney value*	*P value*	*Spearman*	*Mean Rank*	*Mann whitney value*	*P value*	*Spearman*
Sleep efficiency	≤=2 hrs >2 hrs	21.85 24.20	226.5	0.51	0.09 (0.26)	26.98 28.59	329.5	0.70	0.05 (0.35)
Sleep duration	≤=2 hrs >2 hrs	23.37 22.61	244.5	0.83	–0.03 (0.41)	31.35 26.09	283	0.19	–0.17 (0.1)
Sleep disturbance	≤=2 hrs >2 hrs	20.33 25.80	191.5	0.09	0.25 (0.04)	22.30 31.06	236	0.02	0.31 (0.009)
Sleep latency	≤=2 hrs >2 hrs	20.96 25.14	206	0.15	0.21 (0.07)	28.15 27.91	347	0.9	–0.009 (0.47)
Day dysfunction	≤=2 hrs >2 hrs	21.26 24.82	213	0.33	0.14 (0.17)	24.08 30.24	217.5	0.14	0.19 (0.07)

Significant if P<0.05.

TABLE II: Gender-wise Distribution of sleep quality index (PSQI) and its association with hours of mobile usage.

Gender		*N*	*Sleep quality PSQI (%)*		*Chi square*	*P value*	*Spearman*
			≤5 (normal)	*>5 (poor)*			
Male	Control (≤2 hours) Cases (>2 hours)	23 22	8 (34.8) 6 (27.3)	15 (65.2) 16 (72.7)	0.296	0.5	–0.21 (0.22)
Females	Control (≤2 hours) Cases (>2 hours)	20 35	7 (35) 15 (42.9)	13 (65) 20 (57.1)	0.327	0.5	–0.08 (0.38)

Significant if P<0.05.

statistically significant (p=0.02). A statistically significant positive association was observed between the sleep disturbance and usage of mobile per day both in male (Spearman rho: 0.25 (p=0.04) and females (Spearman rho: 0.31 (p=0.009).

In Table II, not much difference was observed in the (PSQI) sleep index among cases and controls, however higher percentage of male cases had poor quality of sleep. Negative association was seen between the PSQI and hours of mobile usage among both the genders. Cases observed a poor to moderately poor sleep efficiency of 31.5%, Sleep duration of <5 hours in 10.5%, a moderate to severe sleep disturbance in 17.5%, a moderate to severe sleep latency in 17.5% and a moderate to severe Day dysfunction in 49.1% of randomly selected volunteers.

Discussion

The consequences of electromagnetic exposure on human health are receiving scientific attention and have become the subject of vigorous public debate. In this study we addressed the sleep pattern, and quality of sleep and their relationship to increased hours of mobile usage among medical students. More than half of the students (57%) were using the mobile for more than 2 hours in a day of which 63.6% were girls with 2/3rd of them using mobiles in evening hours. A study on Japanese adolescents also reported a higher number of adolescent girls (89.7%) were using mobile daily for calling even after light out leading to insomnia (9). Condensed medical curriculum makes it difficult for the students to take time out for discussing their thoughts with near and dear ones and in touch with their parents. It is in consensus to study on university students in India (11). Poor quality of sleep was therefore reported in 59.3% of girls who were using mobile for more than 2 hours in a day as they are socially & emotionally more attached than boys. Late hours & extended use of mobile for communication may causes emotionally and cognitive arousal in pre sleep period that leads to poor quality of sleep and insomnia.

Excessive use of mobile for > 2 hours/day was associated with higher sleep latency sleep disturbance and day dysfunction. Lowden et al in their study on humans have also reported that exposure to EMF from mobile handsets prior to sleep decreased the REM (rapid eye movement) sleep latency and increased EEG spectral power in 11.5-12.5 Hz during initial part of sleep following exposure(12). Graham & Cook found a reduced REM sleep and increased time in stage 2 sleep on exposure to low frequency of 60 Hz EMF but in males (13). Even low frequency 50Hz magnetic field exposure reduced total sleep time in exposed group as compared to sham exposed group (14).

PSQI was negatively associated with the hours of usage of mobile in both the genders in our study. Poor sleep efficiency, sleep duration < 5 hours/day with moderate today dysfunction & sleep latency was observed in users using mobile for > 2 hours/day. Poor sleep quality causes symptoms of sleep deprivation including sleepiness and loss of interest and concentration during the lectures and tutorials. Increased day time sleepiness was observed in 49.1% of the chronic mobile users (> 2 hrs/day). Study by Graham and Cook also found a reduction of total sleep time and sleeps efficiency with intermittent exposure to 60 Hz of magnetic field (13). The study result suggests that EMF exposure (mobile usage) in evening influence the physiological factors as sleep quality and the melatonin rhythm probably by influencing the brain activity especially the activity of pineal gland and also may be due to altered cerebral blood flow and brain electrical activity as suggested by Huber et al (15).

Limitations of the study

Due to operational and financial constraints, Quantification & staging of EMF and melatonin levels could not be studied in all 100 participants. Mobile using GSM mode of communication was studied, but Authors do feel that the use of Bluetooth technology can affect the sleep pattern and duration & is limitation of study.

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