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A Study of Mobile Phone Usage on Sleep Quality and Day Time Sleepiness.

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ABSTRACT

Mobile phones have become an essential part of the modern life, especially for young adults. Some of the studies have shown that excessive use of mobile phone has adverse effect on sleep. Thus, aim of the study is to know the effect of mobile usage on sleep quality and daytime sleepiness. The study was designed in medical college students (n=100) who were divided into two groups based on duration of mobile phone usage and their sleep quality was assessed by using Pittsburg Sleep Quality Index (PSQI) and day time sleepiness by Epworth Sleepiness Scale. Statistical analysis was done by paired t test to compare the sleep quality and sleepiness in between two groups. Study showed that 57% of the subjects were using mobile phones more than 2hrs and about 43% subjects were using mobile phones for less than 2hrs. The mean PSQI among group 2 (6.70±2.65) was significantly increased with p value < 0.001 when compared to group 1 (4.58±1.89) and the mean Epworth sleepiness scale among group 1 and group 2 (8.54±3.07) was more with p value < 0.001001 when compared to group 1 (6.12±1.72). Thus, students using mobile phone more than 2hrs/day may suffer poor sleep quality and daytime dysfunction affecting cognitive and learning abilities of the students.

Keywords: Mobile phones, Sleep, Electromagnetic field, Melatonin

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INTRODUCTION

Mobile phone usage has increased drastically over recent years that are fuelled by new technology such as smart phones [1]. These smart phones have become an indispensable communication tool that interacts in the sphere of work and private life. Besides communication, the additional features such as SMS, MP3 player, games, internet and videos have attracted people across all walks of life including the young students [2]. The use of mobile phones among adolescents and the youths, especially college-goers has dramatically increased over the past few years and because of their varied usability, humans are extremely exposed to the radio frequency electromagnetic field both during receiving and transmitting the signals thereby increasing possible biological effects from exposure to EMF [3].

These EMF radiations from mobile phones cause adverse health problems such as earache, headache, fatigue, development of brain tumours, sleep disturbances, impairment in short term memory, frustration and increased blood pressure among mobile phone users. Young people with excessive use of cell phones have increased restlessness with more careless lifestyles, consumption of stimulating beverages, disrupted sleep, and more susceptibility to stress and fatigue. Also exposure to EMF has reduced sleep quality and decreased melatonin production [4]. There are studies showing that exposure to EMF before night time affect sleep EEG [5]. Sleep deprivation can disrupt circadian rhythms resulting in deregulated metabolic, endocrine and immune responses like weight gain, insulin resistance, increased cortisol levels, systemic inflammation and hypertension [6].

Psychologically, inadequate sleep can affect cognitive functioning and has been linked to reduced short-term memory, decreased learning ability, poor productivity, and decreased motor performance. Studies have shown that Students suffering from excessive daytime sleepiness lose interest in lectures and thereby lag behind in their academics [7].

It is thus adamant/necessary to increase the awareness among youngsters about the negative effects of excessive mobile phone usage on their sleep-wake patterns, with serious health risks as well as attention and cognitive problems.

The students especially medicos are exposed tremendously to stress during the years of their professional career are more prone for sleep deprivation. They are subjected to mental and physical stress, which is closely associated with the extent of mobile phone use and their life style habits. Thus this study is undertaken to study the effect of mobile phone usage on sleep quality and day time dysfunction.

MATERIALS AND METHODS

This is a descriptive questionnaire based study carried out in volunteers of second year MBBS students in Sri Siddhartha medical college (SSMC), Tumkur. The study population consists of total 100 subjects including both males and females in the age group of 18-25 years. Institutional ethical clearance was obtained.

Students who were willing to participate were given a brief description about the study and its objectives. Students who had sleep disorders or any acute or chronic illness were excluded from the study. After taking their verbal consent, demographic profile of the subject like age, gender, education and life style habits like smoking and alcohol consumption was obtained. The volunteers were screened randomly on questionnaire basis that comprised of questions related to mobile usage which includes number of years of mobile phone usage, time of maximum usage, number of hours spent for calling / texting messages ,number of hours of mobile phone usage/day, number of hours spent in mobile phone after lights out and so on.

Pittsburg sleep quality index (PSQI) questionnaires was distributed among the study volunteers in order to assess their sleep quality and day time dysfunction. The score above 5 indicates poor sleep quality.

Epworth daytime sleepiness (EPS) questionnaire was distributed among the study volunteers to measure daytime sleepiness. The questionnaire asks the subjects to rate his /her probability of falling asleep on a scale from 0-3 for different eight situations. These scores of eight questions are added together to obtain a single number. A number in the 0-9 range is considered to be normal while the numbers between 10 and 11 are border and 12- 14 range indicate that expert medical advice should be sought.

Descriptive statistics is given in mean and SD. Comparison of variables between groups was done using Student t test $p < 0.05$ is considered as level of significance. All the statistics were carried out by using SPSS version 15.

RESULTS

This is an observational study designed to assess the effect of mobile usage on sleep quality index and daytime sleepiness. The study group is divided into two groups based on hours of mobile usage (group 1 <2hrs and group 2 >2hrs).

The subjects of either group were age matched with mean age of group 1 (19.30±0.99 yrs and group 2 19.23±2.28 yrs). Mean hours of usage of mobile among group 1 and group 2 is 1.95± 0.21 and 4.19±1.17hrs respectively.

In our study, it was observed about 57% of the subjects were using using mobile phones more than 2hrs and about 43% subjects were using mobile phones for less than 2hrs. among these subjects about 54.4% of males and 45.6% of females were using mobile phones more than 2hrs and 37.2% males and 62.8% females were using mobile phones less than 2hrs. The above details is depicted in table No 1.

Table 1: Distribution of study population according to duration of mobile phone usage.

Group	No. of subjects	Percentage (%)
Mobile usage less than 2 hours	43	43.0
Mobile usage more than 2 hours	57	57.0
Total	100	100.0

PSQI index was done to determine the quality of sleep among the two groups. The PSQI < 5 is normal whereas in this study about 82.5% of the individuals who use mobile for more than 2hrs have PSQI more than 5 when compared to individuals who use mobile less than 2hrs (58.1%). The mean PSQI among group 1 (4.58±1.89) and group 2 (6.70±2.65) with p value < 0.001, thus the individuals using mobile phones more than 2hrs have poor sleep quality index when compared to individuals who use mobile phones less than 2hrs.

Epworth sleepiness score was done among two groups to determine day time sleepiness due to excessive mobile usage before bed time which decreases the sleep quality. In this study about 63.2% of the individuals who use mobile more than 2hrs have EPS of more than 8 whereas individuals using mobile phone less than 2hrs have EPS less than 8 (16.3%). The mean Epworth sleepiness scale among group 1 (6.12±1.72) and group 2 (8.54±3.07) with p value < 0.001. Therefore, day time dysfunction is more among the individuals who use mobile phone more than 2hrs when compared its counterpart.

Comparison of PSQI and Epworth sleepiness scale among two groups is depicted in table No 2.

Table 2: Comparison of Age, Sleep quality and Daytime sleepiness among two groups.

Variables	Mobile usage less than 2 hours	Mobile usage more than 2 hours	Total	P value
Age in years	19.30±0.99	19.23±2.28	19.26±1.83	0.842
PSQI	4.58±1.89	6.70±2.65	5.79±2.57	<0.001**
EP	6.12±1.72	8.54±3.07	7.50±2.83	<0.001**
HRS Mobile	1.95±0.21	4.19±1.17	3.23±1.43	<0.001**

In summary of our results individuals using mobile more than 2hrs have poor sleep quality and day time sleepiness when compared to group with less than 2hrs of mobile usage.

DISCUSSION

In this study, subjects with mobile usage more than 2hrs showed poor sleep quality index and increased sleepiness during day time when compared to subjects with mobile usage less than 2hrs.

Sleep is a physiological process essential for life. Its quality is strongly related to psychological and physical well-being of a subject [8]. In this study more than 50% of the students using mobile phones for more than 2hrs per day of which 54.4% were boys of which about 60% of them using mobile during evening hours. Studies have shown that mobile usage during evening hours either for calling, playing games, browsing etc leads poor sleep quality [4]. In our study about 73.7% of the students using mobile phone more than 2hrs had poor sleep quality and 61.4% had daytime sleepiness. Mobile phones signals are pulse-modulated microwaves and EEG studies suggest that the extremely low-frequency (ELF) pulse modulation has side effects on sleep [9]. Mobile Phone usage leads to exposure to EMF and short wave length light which are associated in sleep disturbances such as short sleep duration, poor sleep quality, excessive daytime sleepiness and insomnia like symptoms [1]. A study showed that exposure to EMF prior to sleep decreased the rapid eye movement (REM) sleep latency and increased the electroencephalogram spectral power in the 11.5- to 12.25-Hz frequency range during the initial part of sleep following exposure [10]. One study has shown that exposure to 60 hertz magnetic field EEG measures decreased total sleep time, reduced sleep efficiency and increased time in stage 2 and decreased REM sleep [11]. Similar study has demonstrated that a relationship exists between rapid eye movement (REM) stage sleep and learning. The REM stage of sleep occurs during the last half of a full night's sleep, therefore if this stage of sleep is reduced, learning will also be affected [3]. Exposure to Pulse modulated EMF affects regional cerebral blood in dorsolateral prefrontal cortex which is considered with working memory. The possible mechanism give by this study for change in EEG on exposure to EMF may directly or indirectly modulate brain oscillations. The post exposure changes in the regional cerebral blood flow suggest altered cortico-thalmo cortical loops known to be involve in generating sleep spindles [12]. The other possible mechanism may be due to the light produced by the mobile which may disrupt circadian rhythms by suppressing melatonin, resulting in the inability to fall asleep [13]. Poor sleep quality causes daytime sleepiness which also causes lack of interest and concentration in the class.

Since mobile usage has become a life style habit among young adults they should be educated on sleep hygiene which cautions against the use of mobile phones after lights out like limited use of mobile will alleviate some degree of daytime sleepiness

Limitations of the Study

Study group is small. We could not estimate melatonin levels and measure EEG due to lack of facilities in the lab.

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