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## Sleep patterns among medical students in a metropolitan city

**Ayesha Javed Hasan, Srabani Bhattacharya and Sundaram Kartikeyan**

### Abstract

This cross-sectional comparative study was conducted among 322 medical students (females = 156; 48.44%; males = 166; 51.56%), aged 18+ years, of either gender, in Western India to determine their sleep patterns. After explaining about the study and obtaining written informed consent, the participants were administered a pre-tested questionnaire. There was significant ( $Z=2.123$ ;  $p=0.033$ ) gender difference in the age distribution of participants. The differences among those staying in hostels and those staying at their homes were not significant. 130 (40.37%) respondents reported sleep disturbances due to change of environment. 52.56% female students reported that they did not experience sleep disturbances during menses. Significant gender differences were also found in sleep duration of less than six hours ( $Z=2.049$ ;  $p=0.040$ ), sleeping before midnight ( $Z=2.561$ ,  $p=0.010$ ). Students of both used mobile phones at night. The findings of this study indicate that the students require counseling and support.

**Keywords:** Gender, medical students, sleep patterns

### 1. Introduction

Sleep, an actively regulated process modulated by homeostatic influences, is a state of reversible unconsciousness wherein there is no response to visual stimuli, a decreased threshold of response to auditory stimuli and the brain is less responsive to external stimuli. Sleep is necessary for all higher forms of life and its deficit is detrimental to health. There are two distinct types of sleep viz. non-rapid eye-movement (NREM) sleep and rapid eye-movement (REM) sleep that alternate cyclically. NREM sleep has four stages that have distinctive characteristics including variations in brain wave patterns, eye movements, and muscle tone<sup>[1]</sup>. Irregular cycling or absence of sleep stages is related to sleep disorders<sup>[2]</sup>.

The determinants of sleep patterns include age of the subjects, their occupation, their psychological traits and state of physical and mental health<sup>[3]</sup>. Sleep is essential for good memory, enhanced learning process and mood stability<sup>[4]</sup>. Compared with that in a state of wakefulness, the core temperature is somewhat reduced, the metabolic rate is lowered slightly and the subject is in a state of starvation but it is unconfirmed as to whether sleep is essential for tissue repair. Sleep is an important factor in storage of long-term memory. The recall of information learned during the day is better than that learned just before bed time<sup>[5]</sup>. Sleep and wake states are evaluated using the polysomnogram<sup>[6]</sup>. The quality and quantity of sleep along with its regularity and phase scheduling determine academic performance<sup>[7]</sup>.

The determinants of sleep include age, gender, habitat, body mass index (BMI), physical activity or sports and tobacco use<sup>[8]</sup>. Researchers have correlated sleep duration with performance and subjective alertness<sup>[9, 10]</sup>. Medical students seem to be susceptible to inadequate sleep possibly as a consequence of the academic requirements of their medical training<sup>[11]</sup>. The sleep-wake cycle of medical students is characterized by insufficient sleep duration, delayed sleep onset, and occurrence of day-time sleepiness,<sup>[12, 13]</sup> which, has been found to affect cognitive function in medical students<sup>[14]</sup>

About 70% of surveyed Hong Kong medical students self-reported sleep deficit with no significant gender and age differences<sup>[15]</sup>. In a Malaysian study, 35.5% of medical students reported daytime sleepiness<sup>[16]</sup>. A survey of Indian medical students revealed that 30.6% had daytime sleepiness and sleep quality in females was better than in males<sup>[17]</sup>. 40.6% of medical students in an Iranian study reported poor sleep quality, which was not related to gender<sup>[18]</sup>.

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The variations in frequency of sleep disturbances reported in various studies are due to differences in measurement tools used, age, gender and cultural differences. Studies affirm that globally, medical students frequently report symptoms of either insomnia or sleepiness, and that the effect of gender is inconsistent [19].

Research on sleep disturbances in undergraduate medical students is of particular interest because sleep is associated with mental health [20]. The objective of this study was to determine the pattern of sleep among medical students.

## 2. Materials and methods

This cross-sectional comparative study was conducted among medical students in Western India. Medical students, aged 18+ years, of either gender, were explained about the study and written informed consent was obtained. The participants were administered a pre-tested questionnaire. The data were entered in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and were statistically analyzed using EpiInfo

Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Categorical data were presented as percentages while continuous data were presented as mean and standard deviation (SD). The 95% confidence interval (CI) was presented as: [Mean-(1.96)\* Standard Error] to [Mean+(1.96)\*Standard Error]. The standard error of difference between two means and standard error of difference between two proportions were computed. Statistical significance was determined at  $p < 0.05$ .

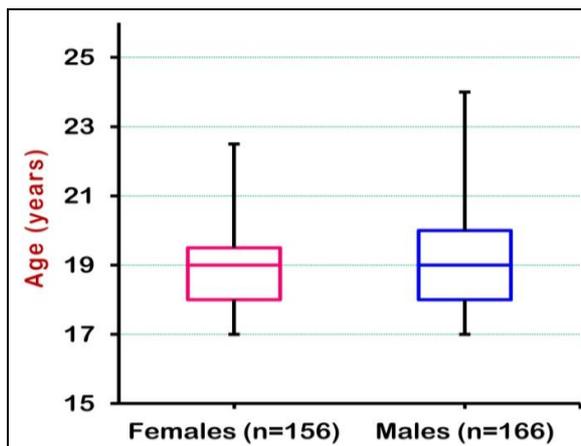
## 3. Results and discussion

A total of 322 medical students (females = 156; 48.44%; males = 166; 51.56%) participated in this study. There was significant ( $Z=2.123$ ;  $p=0.033$ ) gender difference in the age-wise distribution of participants. The minimum age, first quartile and median age was identical for both genders, while the third quartile and maximum age was higher for males (Fig. 1).

**Table 1:** Age distribution of respondents

Parameter	Females (n=156)	Males (n=166)
Mean Age (years)	18.87	19.26
SD (years)	1.09	1.34
95% CI (years)	18.69 – 19.04	19.06 – 19.46
Z value	2.123	
'p' value	0.033 *	

SD = Standard deviation; CI = Confidence interval; \*Significant  
Z = Standard error of difference between two means



**Fig 1:** Box plot of age distribution of respondents

The gender differences among those staying in hostels and those staying at their homes was not statistically significant ( $Z=0.823$ ;  $p=0.412$ ). In the present study, 130 (40.37%) respondents reported sleep disturbances due to change of environment. A Texas-based study found that among hostel inmates, reduced family supervision and exposure to a new environment can lead to irregular sleep patterns [21].

The mean duration of sleep for medical students in a study from Hong Kong was  $6.6 \pm 1.2$  hours [15]. In a study conducted in Western Maharashtra, the sleep quality was found to be better among female students as compared to males and the authors attributed the probable reason to higher frequency of addictions among males [17].

Table-2 depicts the gender differences in sleep-related parameters. 52.56% female students reported that they did not experience sleep disturbances during menses.

**Table 2:** Gender differences in sleep-related parameters

Parameter	Females (n=156)	Males (n=166)	Z value	'p' value
Daily physical activity	27	33	0.592	0.555
Daily tea consumption	56	69	1.043	0.298
Daily coffee consumption	13	09	1.034	0.303
Daily cola drink consumption	04	02	0.901	0.368
Frequent health problems	15	11	0.983	0.327
Frequent sleep medications	03	04	0.299	0.764
Sleeping before midnight	89	71	2.561	0.010 *
Sleep duration < 6 hours	25	42	2.049	0.040 *
Frequent afternoon naps	17	16	0.372	0.711
Frequent leisure time	18	31	1.781	0.750
Feeling refreshed after sleep	125	134	0.134	0.896
Long study hours	65	67	0.238	0.810
Use of mobile phones at night	119	137	1.388	0.164
Disturbed sleep in new place	65	65	0.458	0.645
Disturbed sleep after movies	50	47	0.730	0.465
Disturbed sleep during exams	92	109	1.238	0.214
Experiencing exam fear	94	85	1.633	0.103
Experiencing parental pressure	36	24	1.985	0.046 *

Z = Standard error of difference between two proportions; \*Significant

In the present study, 16.02% females and 25.30% males slept for less than six hours, 42.77% females and 57.05% males slept before midnight and 23.07% females and 14.45% males reported that they experienced parental pressure. The gender differences were significant (Table-2). 119 (76.28%) females and 137 (82.53%) males used mobile phones at night. Excessive use of mobile phones suppresses melatonin secretion, <sup>[22, 23]</sup> headache, impaired short term memory, lack of concentration, dizziness, increased frequency of seizures in epileptic children, high blood pressure <sup>[24-26]</sup> and altered sleep electroencephalograms <sup>[27]</sup>. It is theorized that suppression of nocturnal secretion of melatonin is associated with evening exposure to electro-magnetic frequencies <sup>[28]</sup> that are generated by mobile phones.

#### 4. Conclusion

The findings of the present study revealed significant gender differences in self-reported duration of sleep, sleeping before midnight and in experiencing parental pressure. Students of both used mobile phones at night. The findings indicate that the students needed counseling and support. Follow-up studies would be required to determine whether long-term sleep disturbances in the students adversely affect their academic performance

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