

## Original article

# Study of sleep pattern and sleep problems of under graduate students from different professional courses

<sup>1</sup>Modi Sarita , <sup>2</sup>Bose Sukhwant

<sup>1</sup> Associate Professor, Physiology Department, SAIMS, Indore , India

<sup>2</sup> Physiology Department, Director Professor, Convener, METS, SAIMS, Indore, India

**Corresponding author:** Sarita Modi

Sri Aurobindo Institute Of Medical Sciences and PG institute, engineering and Pharmacy college , Department of Physiology. , Indore (M. P.), India

---

## Abstract

**Introduction:** Sleep pattern and problems affect learning, memory, repair, growth and immunity. Accordingly it affects the academic performance of the students. The present study was undertaken to compare the sleep pattern of students pursuing various professional courses.

**Material and methods:** A questionnaire based study of sleep habits and problems was carried out in 1056 undergraduates of Sri Aurobindo college of medical sciences and technology. The total sleep time (TST), sleep latency, wake up time after sleep offset and sleep problems were recorded. Sleep efficiency and sleep debt were calculated. Excessive daytime sleepiness (EDS) was measured by Epworth sleepiness scale.

**Statistical analysis:** The data was analyzed by using statistical software SPSS version 17.0. The probability value  $p < 0.05$  was considered as significant while  $p < 0.01$  and above were considered as highly significant.

**Results :** The mean sleep time of students was 6.2-6.8 hours. Significant difference was observed between TST of males and females ( $p < 0.001$ ). Day napping was more common in MBBS, Nursing & physiotherapy students. Sleep debt was very common in all the groups with highest and equal percentage seen in M.B.B.S. and pharmacy students. EDS was present in 20.5% of students with highest proportion in Pharmacy students.

**Conclusion:** TST was less than the ideal sleep time in students of all the groups , The TST and sleep efficiency was less, sleep latency and EDS was more in Pharmacy students.

**Key words-** Total sleep time, Sleep debt, excessive day time sleepiness

---

## Introduction

Sleep is active, repetitive and reversible state of perceptual disengagement from the environment.<sup>[1]</sup> It is a physiological process essential to life. It serves several different functions such as growth and repair, learning and memory consolidation and all these occur throughout the brain and the body.<sup>[2][3][4]</sup> Studies have shown that sleep deprivation can cause psychiatric disorders and dysfunctions such as

decreased work efficiency and learning disability.<sup>[5][6]</sup>

An average adult needs 7-9 hours of sleep each night, teenagers 9.5 hours and infants 16 hours per day.<sup>[7]</sup>

College students are well known for keeping erratic sleep schedules. Even a small reduction in the amount of sleep, especially when accompanied with a varying sleep schedule, may cause fatigue. When College life starts, the students face lot of challenges like new schedules and environment, social

obligations as well as academic stress.<sup>[8]</sup> So in most of them sleeping habits change, they go late to bed, have longer sleep latency and get up early for their schedule.<sup>[9]</sup> This results into short total sleep time.<sup>[10]</sup> The other reason for sleep deprivation may be use of technology and substances that compromise sleep quality and quantity. All these factors cause sleep debt and day time sleepiness.<sup>[11]</sup> Excessive daytime sleepiness(EDS) is associated with increased risks for accidents, decreased productivity and difficulties in interpersonal relationship.<sup>[12]</sup>

Students who take sufficient sleep may still struggle with sleepiness due to sleep problems. Sleep deprivation and associated symptoms have become an epidemic problem in under graduate students during academic endeavors. These problems have not adequately been judged but even ignored in Indian students. Consequently, the sleep disorders are the topics of major concern impacted longitudinally and demographically. The present study was designed to study the sleep pattern and sleep problems in under graduate students of academic endeavors selected from different professional courses.

### **Aims and objectives**

- 1] To study and compare the sleep pattern and problems in undergraduates.
- 2] To find out the prevalence of sleep debt and EDS.

### **Material and methods**

An observational study was conducted amongst undergraduate medical, dental, nursing, paramedical, engineering and pharmacy students enrolled at Sri Aurobindo Institute of Medical Sciences and Technology Indore during the period of July to September 2014. A total of 1070 subjects of both sexes were recruited from the above population of

under graduate students aged between 17 and 25 years, selected by using a purposive sample. Amongst them 14 students having past history of sleep disorders and currently using sedative medications or narcotics for any acute or chronic medical condition were excluded from the study.

Age, sex, weight, height, body mass index, dietary habits, exercise and sleep parameters were recorded. Subjects were divided into six groups as per professional courses. After necessary instructions and information about the study, the subjects were explained about the complete study procedure in his/her own language and their willingness to participate in the study was recorded in a consent form dully signed by them. The survey questionnaire was designed from standard sleep medicine text book & earlier studies.<sup>[13,14]</sup> It assessed sleep habits on various parameters like total sleep time (TST), time to go to bed, wake up time, time to leave bed, problems when trying to sleep & during sleep. Excessive daytime sleepiness(EDS) was measured by Epworth sleepiness scale. Those with scores above 10 were considered to have significant levels of daytime sleepiness.<sup>[15]</sup> Sleep debt was also determined by calculating the difference between recommended sleep time and total sleep time.<sup>[16]</sup> Sleep efficiency was calculated by the formula - TST / total time in bed X100.

### **Statistical analysis**

The data was analyzed by using statistical software SPSS version 17.0. Continuous variables were expressed as mean  $\pm$  standard deviation while the results on categorical measurements presented in numbers (percentage). The Pearson's Chi-Square test was used to observe the association of type of diet and day nap with sex, and sleep problems amongst students as per professional courses. One-way

analysis of variance (ANOVA) used to identify the significance of mean differences of sleep parameters in different professional courses and sexes. The probability value  $p < 0.05$  was considered as significant while  $p < 0.01$  and above were considered as highly significant.

### Observations and results

Out of a total of 1056 subjects, 558 (52.8%) subjects were male and 498 (47.2%) were female. Subjects pursuing MBBS, BDS and Nursing courses were 24.8%, 6.8% and 24.2% respectively while 23.4%, 10.0% and 10.7% students were studying Engineering (BE), Physiotherapy (BPT) and Pharmacy (B Pharma) respectively.

#### Demographics and general characteristics

The age of all subjects was obtained with a span of 17 to 25 years with a mean spread of age  $19.65 \pm 1.59$  years. The other characteristics of the subjects are depicted in Table 1. The students pursuing MBBS had higher mean weight (61.1 kg) and body mass index ( $27.2 \text{ kg/m}^2$ ) as compared to others. Average working hours were slightly higher and equal for nursing (7.6 hours) and engineering (7.6 hours) students, followed by medical (7.5 hours) students as compared to others. Students pursuing different professional courses had significantly different age ( $p=0.000$ ), weight ( $p=0.000$ ), height ( $p=0.000$ ), body mass index ( $p=0.000$ ) and working hours ( $p=0.000$ ) and these difference among six groups reached at high level of significance.

Gender difference among the six groups was statistically significant ( $p=0.000$ ). In total, most of the students (63.1%) were vegetarian and the same was reported within individual courses. The type of diet was found to be significantly associated ( $p=0.000$ ) with different educational specialties of students. Overall, the statistical agreement showed

that the type of diet of students is the significant factor that related with professional courses.

#### Gender difference

Average age of males (19.82 years) was slightly higher than females (19.82) but on statistical analysis, the difference was significant as seen in the table No.2. Mean time to go to bed (9.65 pm) amongst male students was significantly early as compared to female students (10.34 pm). Total sleep time in normal days amongst male students was (6.47 hours) which was little less than female students (6.67 hours) which confirmed statistically highly significant ( $p=0.002$ ). TST during examination amongst males (4.75 hours) was little higher than females (4.69 hours) which was not statistically significant. Difference in time to fall asleep and wake up time after sleep offset between male and female students couldn't reach statistical significance. Females required more time (11.54 minutes) to leave the bed after waking up as compared to males (10.80 minutes) but the differences were statistically insignificant. The sleep efficiency of male (92.75%) and female (92.88) students were approximately same and thus couldn't reach statistical significance ( $p=0.649$ )

Nocturnal awakening was reported frequently in 63 (11.30%) males and 66 (13.3%) females, occasionally in 263 (47.1%) male students and 249 (36.7%) females and was never experienced by 232 (41.6%) males and 183 (36.7%) females as shown in table No. 2 The difference of nocturnal awakening with gender (male/female) was statistically insignificant.

#### Sleep Parameters

Table 3 depicts the comparison of sleep parameters in students of different courses. Duration of sleep during examination was found to be significantly

reduced as compared to normal days noted in all groups. During normal days the sleep duration of physiotherapy students (6.8 hours) was highest and lowest in pharmacy students (6.2 hours) while during examination highest amongst dental students (5.1 hours) and lowest in pharmacy students (4.4 hours). The TST of students of various groups has been shown in figure 1. The sleep latency of pharmacy students was 22.6 minutes, followed by nursing students 20.6 minutes while it was least in dental students that is 15.1 minutes and these difference were highly significant ( $p=0.000$ ). The trend for wake up time after sleep offset amongst all students was found to be approximately similar but statistically significant. The sleep efficiency was highest (93.8%) in Dental and physiotherapy students and lowest (92.1%) in Pharmacy students. Overall the sleep efficiency was significantly different amongst six groups. Average daytime duration of napping was lowest in engineering (0.4 hours) students but higher and similar in medical and physiotherapy (0.7 hours) students and was statistical significant. The proportion for day nap in medical students (60.3%) was highest while it was least in engineering (28.3%) students but the association of day nap with six groups was highly significant showed that the day nap was highly influenced by the opted professional courses amongst students.

#### Sleep problems

professional courses. The data suggests that most of the students were sleep deprived and symptoms related to sleep disorders and effect of such deprivation on their academic and subjective performance needs further research.

Amongst the troubles while trying to sleep like anxiety/disturbing thoughts was found to be more common in medical (52.3%) students . Feeling

suffocated was detected more frequently in 13.7% nursing students. Very few students complained for pain, see or hear that do not exist as trouble when trying to sleep amongst all groups. Approximately more than one-third students amongst all groups reported no trouble when trying to sleep. These differences in causes of trouble when trying to sleep were significantly associated with groups which reflected that it was a significant factor that influenced the students courses.

During sleep Act your dreams was the commonest problem seen and was observed in 25.66 % students. It was highest in physiotherapy (36.2%) students. Snoring was the second most common problem observed in 8.4% of students, amongst which M.B.B.S students (12.2%) showed the highest prevalence. Stop breathing, wake up gasping, and grinding teeth was highlighted in few students amongst all groups.

The causes of nocturnal awakenings in students of different courses have been depicted in Figure 2. Waking up for toilet was the commonest cause in MBBS, BDS, Nursing and BPT students, while thirst was responsible for awakening in engineering and pharmacy students.

#### Sleep debt and EDS

As seen in table No. 5 sleep debt was overall seen in 89% students, amongst which MBBS & Pharmacy students showed the highest incidence. Daytime sleepiness was observed in 20.5% of students. Amongst them the proportion of daytime sleepiness was highest in Pharmacy students (46%) and lowest in engineering (7.3%) students.

#### Discussion

Good sleep quality is important for physical and emotional well-being. Nevertheless, we believe that

this health need may be overlooked by college and university students in today's fast paced society. They may not understand or recognize that disruption of good sleep habits can reduce their academic achievement. College students are always sleep deprived due to their demanding curriculums and erratic sleep schedules. In our study the mean sleep time of students pursuing various courses was 6.2-6.8 hours which was less than the ideal time of 7-9hrs/night required in young adults.<sup>[16]</sup> Forquer et al reported 7.2 ±1.2 hrs total sleep time in 331 students of university in USA.<sup>[17]</sup> Gender wise TST in females was more than males but still less than ideal sleep time. Amongst the university students around the world from both the East and the West, sleep deprivation is common. Our findings are in consonance with other studies which have indicated that 24% of university students in the United Kingdom,<sup>[18]</sup> 30% in Korea<sup>[19]</sup> and 49% in Taiwan<sup>[20]</sup> reported that they obtained < 7 hours of sleep per night. Hence sleep debt was also observed in all the groups. Day napping was common in MBBS, Nursing & physiotherapy students as compared to BDS, Pharmacy & engineering students. In a Lithuanian survey<sup>[21]</sup> comparison of sleep problems in medical students with students in law and economics showed that medical students had the highest prevalence of poor sleep and poorer associated quality of life compared to other student groups. Palatty PL et al in their study compared sleep patterns between medical and law students in India and found that 60.8% of law students had refreshing sleep at night as opposed to just 47.1% of medical students.<sup>[22]</sup> In the present study Anxiety and disturbing thoughts was the most common problem seen when students tried to sleep. It was observed

that M.B.B.S students were most affected by this problem as compared to other groups.

When the problems arising during sleep were studied and compared it was observed that act your dreams was most commonly seen in (36.2%) Physiotherapy students as compared to other groups. Snoring was most commonly seen in (12.2%) MBBS students. A study evaluated risk factors for sleep apnea amongst Pakistani medical students and reported that 27% of males and 12% of females had disruptive snoring.<sup>[23]</sup> Students with sleep disorders probably do not achieve optimal academic performance, and up to 27% of students may be at risk for at least one sleep disorder.<sup>[24]</sup>

Ficker et al observed that Medical students classified as frequent snorers more frequently failed their Internal Medicine examination (47%) than did occasional snorers (22.2%) or non-snorers (12.8%).<sup>[25]</sup> Obstructive sleep apnea is suspected to have cognitive effects in both children and adults.<sup>[26]</sup> As seen in table No. 5 Sleep debt was very common in all the groups with highest and equal percentage seen in M.B.B.S. and pharmacy students. Similarly table No. 6 shows that EDS was present in 20.5% of students, it was commonest in Pharmacy students (46%), followed by Physiotherapy and M.B.B.S. students. It was less in Engineering, nursing and BDS students. This may be due to the habit of day napping (overall 48%) which was more common and frequent in MBBS students. EDS is more prevalent in western population as compared to Asian population as day time napping is culturally accepted in Asian culture which lessens EDS. Our study showed EDS ranging from 7.3%-46% in various groups. This is in agreement with the study of Digdon reported a 19.3% to 45.5% prevalence of daytime sleepiness amongst students in Canada.<sup>[27]</sup> Similar prevalence has been

shown by Schneider *et al* in their study of Brazilian college students, who reported that 50.8% of students were daytime sleepers, while Chung *et al* reported 42% daytime sleepiness in their study among Hong Kong Chinese Adolescents.<sup>[28,29]</sup> A study of Malaysian medical students revealed ESS > 11 in 35.5% students.<sup>[30]</sup> Collectively, despite variations in data collection methodologies, socio-demographic and lifestyle characteristics of study subjects, daytime sleepiness amongst young adults is a prevalent and growing problem across the globe.

**Limitations of the study**

The present study though reported many important findings but it also has certain limitations. It was a questionnaire based study and students may not have given accurate information. So it may be less valid as compared to actigraphy measurements. But Wolfson and his colleagues have demonstrated the validity of self reported survey on sleep pattern in adolescents<sup>[31]</sup>

**Conclusion:**

- 1] The TST and sleep efficiency were least in Pharmacy students amongst all.
  - 2] Sleep debt was present in all the groups as all the students choose their career as per their aptitude and try to excel in it.
  - 2] EDS was less as the habit of day napping prevailed
- Sleep self-awareness and general knowledge appear insufficient in many studied cohorts, so increasing education about sleep for students might be beneficial. The knowledge of importance of sleep and consequences of sleep deprivation should be emphasized and translated into practice. Universities and colleges should understand and publicize that optimizing schedules for students to accommodate different intrinsic circadian rhythms might be beneficial

Table 1: Demographics and general characteristics of students of different professional courses

Variable		MBBS (n <sub>1</sub> =262)	BDS (n <sub>2</sub> =72)	B. Sc. (N) (n <sub>3</sub> =256)	B. E. (n <sub>4</sub> =247)	B. P. T. (n <sub>5</sub> =106)	B. Phar. (n <sub>6</sub> =113)	P value
Age (years)		19.7±1.8	18.8±1.0	19.9±1.5	19.6±1.3	19.9±2.3	19.6±1.2	0.000 **
Height (cms)		164.5±9.5	160.5±9.0	159.9±17.7	168.4±10.2	159.4±7.0	165.4±9.2	0.000 **
Weight (kgs)		61.1±13.1	53.9±11.2	52.9±9.4	58.1±11.2	52.7±11.3	55.4±9.0	0.000 **
BMI (kg/m <sup>2</sup> )		27.2±5.8	24.0±5.0	23.5±4.2	25.8±5.0	23.4±5.0	24.6±4.0	0.000 **
Working hours		7.5±0.5	7.0±0.0	7.6±0.5	7.6±0.5	7.3±0.5	7.0±0.0	0.000 **
sex	Male	127 48.5%	15 20.8%	102 39.8%	207 83.8%	22 20.8%	85 75.2%	0.000 **
	Female	135 51.5%	57 79.2%	154 60.2%	40 16.2%	84 79.2%	28 24.8%	
Type of diet	Vegetarian	152 58.0%	48 66.7%	136 53.1%	182 73.7%	77 72.6%	71 62.8%	0.000 **
	Mixed	110 42.0%	24 33.3%	120 46.9%	65 26.3%	29 27.4%	42 37.2%	

\*\* The differences are highly significant at 0.000 levels of significance.

**Table 2: Comparison of sleep parameters between male and female**

Variable	Mean ± SD		p value	
	Male	Female		
Age (years)	19.82±1.51	19.49±1.75	0.001 <sup>**</sup>	
Total sleep time in normal days (hour)	6.47±1.09	6.67±1.02	0.002 <sup>**</sup>	
Total sleep time during examination (hour)	4.75±1.50	4.69±1.37	0.498 <sup>⊗</sup>	
Went to bed by (pm)	9.65±3.73	10.34±2.85	0.001 <sup>**</sup>	
Time to fall asleep (minute)	19.03±15.45	19.02±15.25	0.991 <sup>⊗</sup>	
Wake up time by	6.55±0.92	6.53±0.81	0.724 <sup>⊗</sup>	
Wake up time after sleep offset (minute)	10.80±10.70	11.54±10.22	0.254 <sup>⊗</sup>	
Sleep efficiency (%)	92.75±4.88	92.88±4.25	0.649 <sup>⊗</sup>	
Nocturnal awakening	Frequently	63 (11.3%)	66 (13.3%)	0.242 <sup>⊗</sup>
	Occasionally	263 (47.1%)	249 (36.7%)	
	Never	232 (41.6%)	183 (36.7%)	

<sup>\*\*</sup> Mean difference/difference is highly significant at the 0.002 and 0.001 levels of significance. <sup>\*</sup> Mean difference/difference is significant at the 0.013 level of significance. <sup>⊗</sup> Mean difference/difference is not significant (insignificant) at the 0.05 level of significance.

**Table 3: Comparison of sleep parameters according to professional courses**

Variable	MBBS (n <sub>1</sub> =262)	BDS (n <sub>2</sub> =72)	B. Sc. (N) (n <sub>3</sub> =256)	B. E. (n <sub>4</sub> =247)	B. P. T. (n <sub>5</sub> =106)	B. Phar. (n <sub>6</sub> =113)	P value
Duration of sleep in normal days (hours)	6.5±0.9	6.6±1.1	6.6±1.0	6.6±1.2	6.8±1.1	6.2±1.1	0.000 <sup>**</sup>
Duration of sleep during examination (hours)	4.9±1.3	5.1±1.3	4.6±1.6	4.8±1.6	4.5±1.1	4.4±1.3	0.000 <sup>**</sup>
Sleep latency (minutes)	19.7±14.3	15.1±10.5	20.6±17.4	16.7±15.1	17.8±12.7	22.6±17.0	0.001 <sup>**</sup>
Wake up time after sleep offset (minutes)	6.7±0.8	6.7±0.8	6.6±0.7	6.6±1.0	6.6±0.8	6.0±0.7	0.000 <sup>**</sup>
Sleep efficiency (%)	92.5±4.1	93.8±3.4	92.2±4.8	93.3±5.4	93.8±3.4	92.1±4.4	0.002 <sup>**</sup>
Duration of day nap (hours)	0.7±0.7	0.5±0.6	0.6±0.8	0.4±1.9	0.7±0.8	0.5±0.7	0.065 <sup>⊗</sup>
Yes	158 60.3%	35 48.6%	147 57.4%	70 28.3%	56 52.8%	45 39.8%	0.000 <sup>**</sup>
No	104 39.7%	37 51.4%	109 42.6%	177 71.7%	50 47.2%	68 60.2%	

<sup>\*\*</sup> The differences are highly significant at 0.002, 0.001 and 0.000 levels of significance. <sup>⊗</sup> Mean difference/difference is not significant (insignificant) at the 0.05 level of significance.

Table 4: Comparison of Sleep problems in various professional courses

<i>Variable</i>		<b>MBBS (n<sub>1</sub>=262)</b>	<b>BDS (n<sub>2</sub>=72)</b>	<b>B. Sc. (N) (n<sub>3</sub>=256)</b>	<b>B. E. (n<sub>4</sub>=247)</b>	<b>B. P. T. (n<sub>5</sub>=106)</b>	<b>B. Phar. (n<sub>6</sub>=113)</b>	<b>P value</b>
<b>Trouble when try to sleep</b>	Anxiety/disturbing thoughts	137 52.3%	33 45.8%	70 27.3%	83 33.6%	38 35.8%	51 45.1%	0.000**
	Feeling suffocated	3 1.1%	3 4.2%	35 13.7%	31 12.6%	8 7.5%	11 9.7%	
	Pain	4 1.5%	3 4.2%	11 4.3%	12 4.9%	6 5.7%	2 1.8%	
	See or hear that do not exist	8 3.1%	0 0.0%	19 7.4%	21 8.5%	17 16.0%	6 5.3%	
<b>Trouble during sleep</b>	Snore	32 12.2%	2 2.8%	26 10.2%	15 6.1%	9 8.6%	5 4.4%	0.001**
	Stop breathing & wake up gasping	2 0.8%	3 4.2%	2 .8%	8 3.2%	2 1.9%	4 3.5%	
	Grind teeth	7 2.7%	0 0.0%	11 4.3%	13 5.3%	4 3.8%	3 2.7%	
	Act dreams	48 18.3%	14 19.4%	77 30.1%	67 27.1%	38 36.2%	27 23.9%	
	No	173 66.0%	53 73.6%	140 54.7%	144 58.3%	52 49.5%	74 65.5%	

\*\* The differences are highly significant at 0.000 and 0.001 levels of significance.

Table: 5 Sleep Debt \* Educational Status

Sleep debt	Educational Status						Total
	MBBS	BDS	B. Sc. Nursing	B. E.	B. P. T.	B. Pharmacy	
No	21	10	24	35	17	9	116
	8.0%	13.9%	9.4%	14.2%	16.0%	8.0%	11.0%
Yes	241	62	232	212	89	104	940
	92.0%	86.1%	90.6%	85.8%	84.0%	92.0%	89.0%
Total	262	72	256	247	106	113	1056
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



Table: 6 Epworth sleepiness scale \* Educational Status

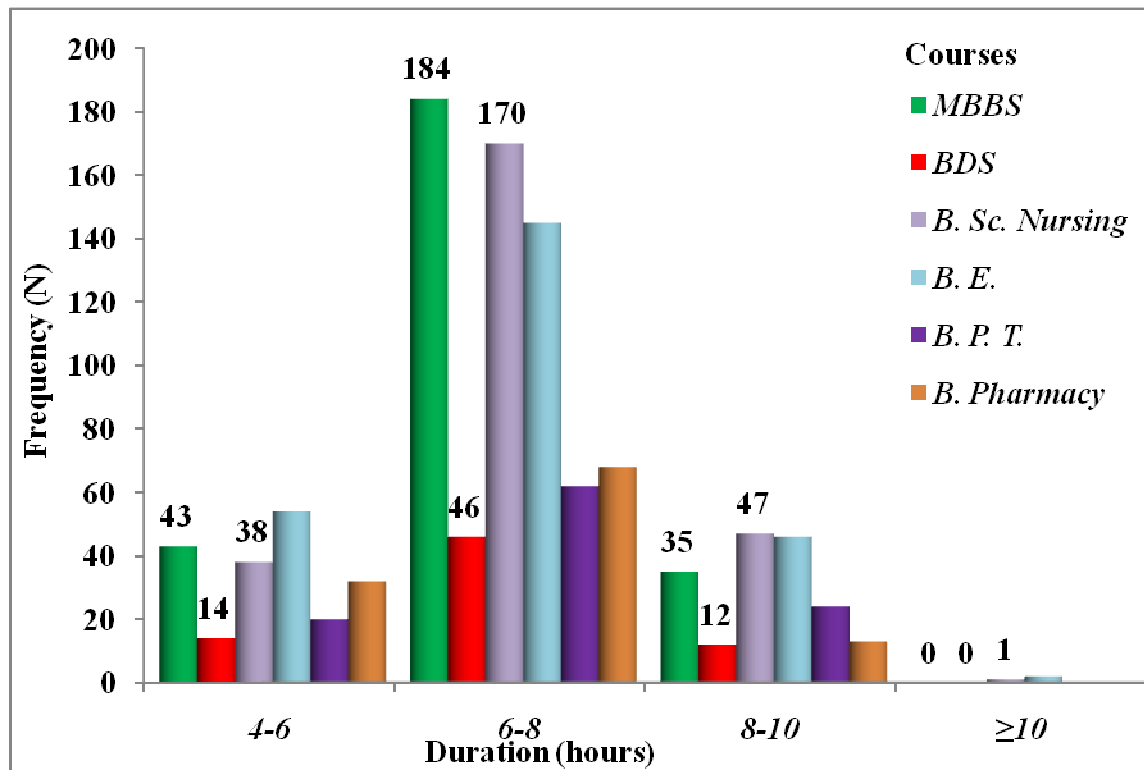
EDS score	Educational Status						Total
	MBBS	BDS	B. Sc. Nursing	B. E.	B. P. T.	B. Pharmacy	
<10	201	58	227	229	63	61	839
	76.7%	80.6%	88.7%	92.7%	59.4%	54.0%	79.5%
≥10	61	14	29	18	43	52	217
	23.3%	19.4%	11.3%	7.3%	40.6%	46.0%	20.5%
Total	262	72	256	247	106	113	1056
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

**Total Sleep Time of all groups**

Educational Status		Hours	Frequency	Percent
MBBS	Valid	4-6	43	16.4
		6-8	184	70.2
		8-10	35	13.4
		Total	262	100.0
BDS	Valid	4-6	14	19.4
		6-8	46	63.9
		8-10	12	16.7
		Total	72	100.0
B. Sc. Nursing	Valid	4-6	38	14.8
		6-8	170	66.4
		8-10	47	18.4
		≥10	1	.4
		Total	256	100.0
B. E.	Valid	4-6	54	21.9
		6-8	145	58.7
		8-10	46	18.6
		≥10	2	.8
		Total	247	100.0
B. P. T.	Valid	4-6	20	18.9
		6-8	62	58.5

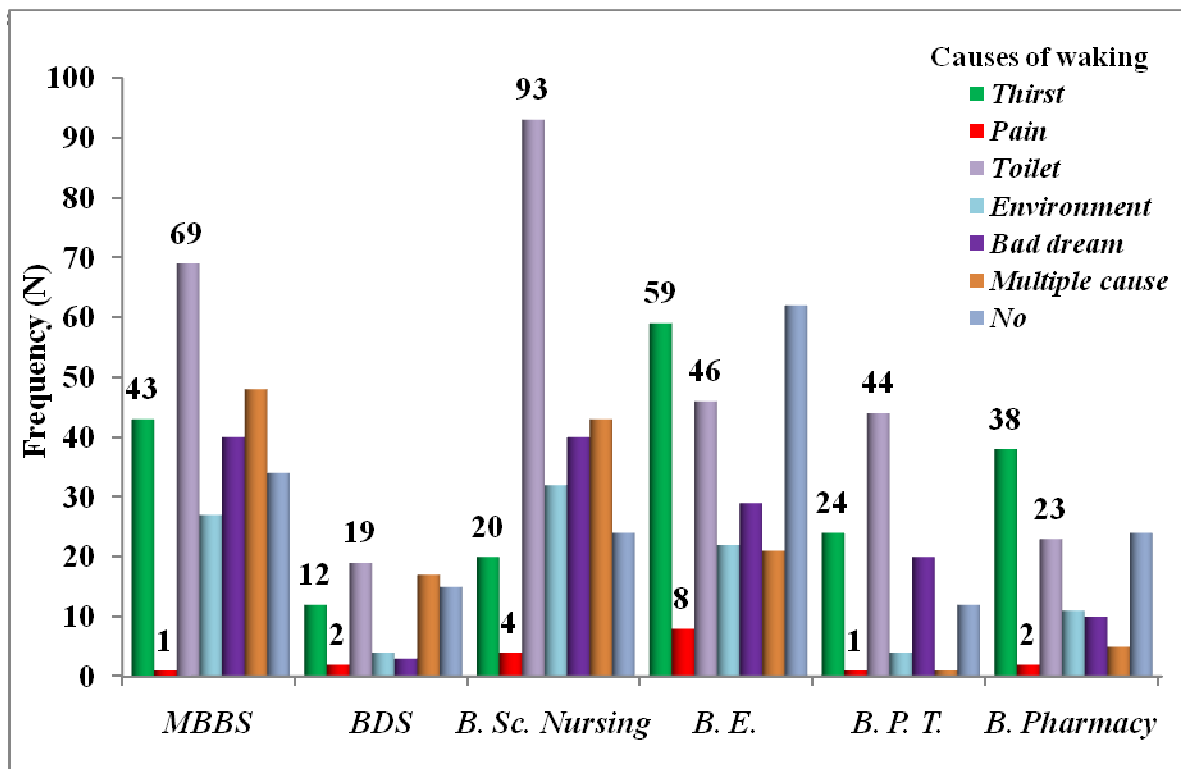
		<b>8-10</b>	24	22.6
		<b>Total</b>	106	100.0
<b>B. Pharmacy</b>	<b>Valid</b>	<b>4-6</b>	32	28.3
		<b>6-8</b>	68	60.2
		<b>8-10</b>	13	11.5
		<b>Total</b>	113	100.0

Figure 1 compares the total sleep time of undergraduate students pursuing different professional courses



Cause of waking	MBBS	BDS	B. Sc. Nursing	B. E.	B. P. T.	B. Pharmacy
Thirst	43	12	20	59	24	38
Pain	1	2	4	8	1	2
Toilet	69	19	93	46	44	23
Environment	27	4	32	22	4	11
Bad dream	40	3	40	29	20	10
Multiple cause	48	17	43	21	1	5
No	34	15	24	62	12	24

Figure 2 : Comparison of causes of nocturnal awakenings amongst different professional courses.



**References :**

1. Carskadon MA, Dement WC. Normal human sleep an overview In: Kryger MH Roth T, Dement WC, editors. Principles and practice of sleep medicine. 4<sup>th</sup> ed. Philadelphia: Elsevier saunders,2005:13-23.
2. Krueger JM, Obal F. Sleep function. Front Biosci, 2003;8:d 511-9.
3. Benington JH. Sleep homeostasis and the function of sleep. Sleep, 2000; 23: 959-966.
4. Curcio G, Ferrara M, De Gennaro L. Sleep loss, learning capacity and academic performance. Sleep Medicine Reviews, 2006; 10: 323-337.
5. Abdulghani HM, Alrowais NA, Bin-saad NS, Al-Subaie NM, Haji AMA , Alhaqwi AI. Sleep disorder among medical students: Relationship to their academic performance. Medical Teacher, 2012; 34: S37-S41.

6. Eliasson AH, Lettieri CJ, Eliasson AH. Early to bed, early to rise! Sleep habits and academic performance in college students. *Sleep Breath*, 2010;14(1):71–75.
7. Ferrara M, Gennaro LD. How much sleep do we need? *Sleep Med Rev* 2001; 5: 155-79.
8. Buboltz WC, Soper B, Brown F, Jenkins S. Treatment approaches for sleep difficulties in college students. *Couns Psychol Q* 2002; 15: 229-37.
9. Pilcher JJ, Ginter DR, Sadowsky B. Sleep quality versus sleep quantity: Relationship between sleep and measures of health, well-being and sleepiness in college students. *J Psychosom Res*, 1997;42:583-96.
10. Moo- Estrella J, Perez-Benitez H, Solis-Rodriguez F, Arankowsky-Sandoval G, Evaluation of depressive symptoms and sleep alterations in college students. *Arch Med Res* 2005; 36:393-8.
11. Hicks R A, Pellegrini RJ. The changing sleep habits of college students. *Percept Motor skills* 1991; 72: 1106.
12. Breslau N, Roth T, Rosenthal L, Andreski P. Daytime sleepiness: an epidemiological study of young adults. *Am J Public Health* 1997;87: 1649-53.
13. Kapur VA. Approach to a patient with sleep complaint. In: Watson NF, Vaughn BV editors. *Clinicians guide to sleep disorders*. New York. NY: Taylor & Francis group: 2007:1-18.
14. Malow BA. Approach to the patient with disordered sleep. In: Kryger MH, Roth T, Dement WC, editors. *Principles and practice of sleep medicine*. Philadelphia, PA Elsevier Saunders; 2005:589-93.
15. Johns MW. A new method for measuring daytime sleepiness: the Epworth Sleepiness Scale. *Sleep* 1991; 14:540-545.
16. Hirshkowitz M. The national sleep time duration recommendations, methodology and results. *Sleep health* 2015.
17. Forquer LM, Camden AE, Gabriela KM, Johnson CM. Sleep patterns of college students at a public university. *J Am Coll Health* 2008; 56: 563-5.
18. Webb E, Ashton CH, Kelly P, Kamali F, authors. Alcohol and drug use in UK university students. *Lancet*. 1996;348:922–5. [[PubMed](#)]
19. Ban DJ, Lee TJ, authors. Sleep duration, subjective sleep disturbances and associated factors among university students in Korea. *J Korean Med Sci*. 2001;16:475–80. [[PubMed Central](#)][[PubMed](#)].
20. Tsai LL, Li SP. Sleep patterns in college students: gender and grade differences. *J Psychosom Res*. 2004;56:231-7. [[PubMed](#)].
21. Preišegolavičiūtė E, Leskauskas D, Adomaitienė V, authors. Associations of quality of sleep with lifestyle factors and profile of studies among Lithuanian students. *Medicina (Kaunas)*. 2010;46:482–9.
22. Palatty PL, Fernandes E, Suresh S, Baliga MS, authors. Comparison of sleep pattern between medical and law students. *Sleep Hypn*. 2011;13:1–2.
23. Pasha SN, Khan UA, authors. Frequency of snoring and symptoms of sleep apnea among Pakistani medical students. *J Ayub Med Coll Abbottabad*. 2003;15:23–5.
24. Gaultney JF. The prevalence of sleep disorders in college students: impact on academic performance. *J Am Coll Health*. 2010;59(2):91–97. [[PubMed](#)]
25. Ficker JH, Wiest GH, Lehnert G, Meyer M, Hahn EG. Are snoring medical students

- at risk of failing their exams? *Sleep*. 1999;22(2):205–209. [PubMed]
26. Alchanatis M, Zias N, Deligiorgis N, Amfilochiou A, Dionellis G, Orphanidou D. Sleep apnea-related cognitive deficits and intelligence: an implication of cognitive reserve theory. *J Sleep Res*. 2005;14(1):69–75.[PubMed]
  27. Digdon NL, Rhodes S. Methods used to cope with sleepiness may perpetuate sleepiness in college students with an evening type circadian preference. *Biol Rhythm Res*. 2009;40:12944.
  28. Schneider ML, Vasconcellos DC, Dantas G, Levandovski R, Caumo W, Allebrandt KV, Doring M, Hidalgo MP. Morningness-eveningness, use of stimulants, and minor psychiatric disorders among undergraduate students. *Int J Psychol*. 2011;46:18.
  29. Chung KF, Cheung MM. Sleep-wake patterns and sleep disturbance among Hong Kong Chinese adolescents. *Sleep*. 2008;31:185–94. [PMC free article] [PubMed]
  30. Zallinawati AH, Teng CL, Chung YC, Teow TL, Lee PN, Jagmohini KS. Daytime sleepiness and sleep quality among Malaysian medical students. *Med J Malaysia*. 2009;64:108-10.[Pubmed]
  31. Wolfson A R et al. Do surveys produce accurate data regarding high school students sleep patterns? *Sleep* 2002, 25 :A96