

Sleep Habits in First Year Medical Students at AIIMS Patna and its Impact on their Academic Performance

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Abstract

Introduction: - Sleep is an important biological necessity. Sleep timing and duration affects many functions of our body like, endocrine, metabolic, and neurological functions which are critical to the maintenance of individual health. College students often have erratic sleep schedules, poor sleep hygiene and poor sleep quality, which might affect their performance and cognitive functions. **Objective:** To characterize sleep habits and day and night habits in medical students using sleep quality assessment (PQSI scale) and Epworth sleepiness scale; to estimate how subjective sleep quality is associated with sleep problems in students; to estimate how academic progress is associated with subjective sleep quality. **Materials and Method:** A cross-sectional design- A self-administered paper questionnaire was administered of first-year through final-year MBBS students. Students data on sleep quality was collected routinely as part of orientation program to assess students' need in department of Physiology. Data on academic performance (first professional marks) was accessed from examination controller. Pittsburgh sleep quality index and Epworth sleepiness scale scoring was done. **Results:** A total of 90 medical students of AIIMS Patna, aged 16 to 25 years completed the study. Sleep habits of students shows an extreme range of 2 to 4 hrs minimum sleep to 7 to 9 hrs of maximum sleep. Maximum students take 6 to 7 hrs sleep. No statistically significant difference in academic performance between the different Epworth sleepiness score is observed. Negative correlation was obtained between the PSQI and grade average.

Keywords: Sleep deprivation, academic performance, ESS score, Global PQSI

Introduction

Today, prolonged wakefulness is a widespread phenomenon¹. Chronic sleep restriction is endemic in modern society². Sleep timing and duration affects many functions of our body like, endocrine, metabolic, and neurological functions which are critical to the maintenance of individual health. If left untreated, sleep disorders and chronic short sleep can lead to heart disease, high blood pressure, Obesity, Diabetes and all-cause mortality chronic disabilities and disorders such as arthritis, kidney disease, pain, human immunodeficiency virus (HIV), epilepsy, Parkinson's disease, and

depression are also common due to Sleep deprivation. Among older adults, health-related quality of life decreases due to untreated sleep disorders which affect cognitive and medical functioning of the body, leading to functional limitations and loss of independence, and are associated with increased chances of death³.

Adequate sleep optimally impacts mental functioning also. It impacts students' performance on examinations and ultimately grades received. The pattern of sleep one experiences in a 24-hour period directly correlates with physical health, mood, and mental functioning. Suboptimal sleep is a national problem, with many not obtaining the recommended 7 hours of sleep each night. Increasing awareness of the positive effects of adequate sleep and increasing the proportion of adults who obtain sufficient amounts of sleep to improve health, wellness, productivity, quality of life, and public safety is a goal for our healthcare system⁴ Studies assessing the impact of sleep on academic

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performance focus primarily on teens, adolescents, and students⁴. Few studies have explored sleep habits in populations of undergraduate medical students. Those studies that have, found sleep complaints were common in medical students and poor sleep habits were correlated with changes in academic performance^{5,6}. However, studies that provide knowledge about sleep habits among students have yet to be conducted in India. In a study, the sleep-wake pattern and effect of academic schedules and individual characteristics on the sleep-wake cycle and academic performance were examined. The relation between attention and working memory, and sleep deprivation is well established⁷. In previous studies, long-term memory with sleep deprivation has been measured with a variety of tasks, and the results are variable¹.

Sleep deprivation also affects other parameters. It impairs visuomotor performance, which is measured with tasks of digit symbol substitution, letter cancellation, trail-making or maze tracing. A study suggests that Sleep deprivation impedes engagement of spatial attention, which can be observed as impairments in saccadic eye movements⁷. Reasoning ability during Sleep Deprivation has for the most part been measured with Baddeley's logical reasoning task or its modified versions. Again the results are inconsistent (deteriorated performance was reported by few no effects were noted by others^{8,9}). In addition to the cognitive domains described above, total Sleep deprivation affects several other cognitive processes as well. It increases difficulties in utilizing new information in complex tasks requiring innovative decision-making. Deterioration in decision-making also appears as more variable performance and applied strategies, as well as riskier behaviour^{9,10}.

According to the well-controlled studies, the less sleep obtained due to sleep restriction, the more cognitive performance is impaired¹¹. Several tasks have been used in the sleep deprivation studies. For example, motor function, rhythm, receptive and expressive speech, and memory measured with the Luria-Nebraska Neuropsychological Battery deteriorated after one night of SD, whereas tactile function, reading, writing, arithmetic and intellectual processes remain intact¹².

More recent meta-analysis shows that Sleep deprivation causes a significant decrease in both the clinical and overall performance of both residents and non-physicians¹³. Certain studies suggest factors like social and academic demands, part-time jobs and

irregular school schedules, affect the sleep-wake cycle of college students⁵.

Aim and objectives:

1. To characterize sleep habits in medical students using sleep quality assessment (PQSI scale) and Epworth sleepiness scale;
2. to estimate how subjective sleep quality is associated with sleep problems in students;
3. to estimate how academic progress is associated with subjective sleep quality;
4. to estimate the prevalence of self-reported sleep problems in first year medical students at AIIMS Patna.

Material and method:

The study was conducted in Department of Physiology, AIIMS Patna after taking ethical clearance. Ninety first year medical students of AIIMS Patna, aged 16 to 25 years were included for the study.

After getting informed consent baseline demographic data was collected. All subjects were made to fill a questionnaire through which sleep quality was assessed. Pittsburgh sleep quality index and Epworth sleepiness scale scoring was calculated based on the responses obtained. Academic performance was assessed based on aggregate of total marks obtained in Anatomy, Physiology and Biochemistry by students in 1st Professional MBBS Examination.

Data obtained is presented using appropriate chart type. Kruskal wallis test is used to find if statistically significant difference occurs in academic performance between the different Epworth sleepiness score

Results:

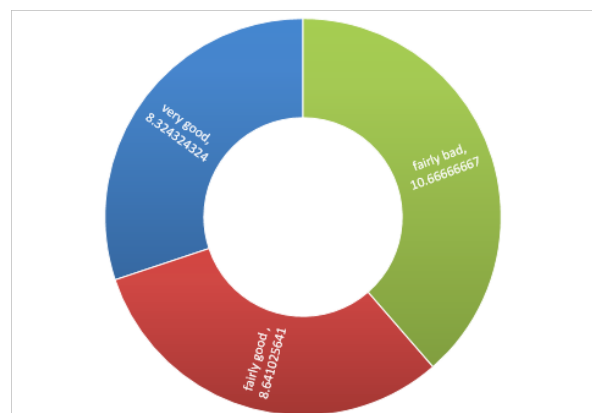


Fig 1 Relation between ESS score and self-rating of sleep

As expected those students who rate their sleep as fairly bad were having maximum Epworth Sleepiness Scale indicating chances of day time sleepiness.

GLOBAL PQSI AND SELF RATING OF SLEEP GROUP

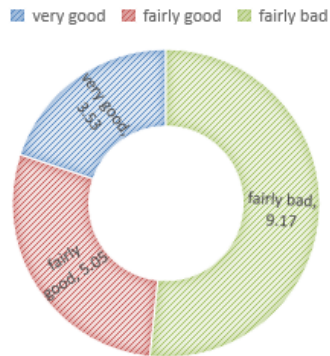


Fig 2:

Pittsburgh Sleep Quality Index (PSQI) is a self-report questionnaire that assesses sleep quality over a 1-month time interval. When global PQSI scores were calculated than it was found that students who had reported their sleep quality as fairly bad were having maximum scores (9.17) while those who rate their sleep quality as very good were having least global PQSI score (3.53).

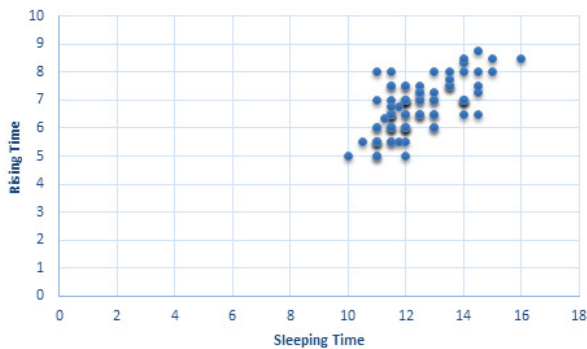


Fig 3 Relation between rising time and sleeping time

Time has been converted into continuous scale. On X axis 5 represents 5 pm, 10 represents 10 pm, 15 represents 3 am and 20 represents 8 am. On Y axis 0 represents 12 am, 1 represents 1 am and likewise 10 represents 10 am

Table 1: Kruskal wallis test to find if statistically significant difference occurs in academic performance between the different Epworth sleepiness score

Kruskar Wallis Test

Groups	N	Mean rank
1	39	45.86
2	16	38.94
3	35	48.10
Total	90	

Independent / grouping variable= ESS score (Epworth sleepiness score)

Dependent variable= academic performance

Students were divided into three groups on the basis of Epworth sleepiness score; first thirty-nine students with lowest Epworth sleepiness score were taken into first group, next 16 in second group and next 15 with maximum Epworth sleepiness score in third group

Groups: is the classification of students in three groups (1, 2 and 3) on the basis of Epworth sleepiness score

N: is the no. Of students in different groups based on Epworth sleepiness score

Mean rank: Mean rank for each group can be used to compare the effect of different Epworth sleepiness score.

Test statistics

	Epworth sleepiness score
Chi square	1.366
Df	2
Asymp. sig.	0.505

Kruskar wallis H test shows that there was no statistically significant difference in academic performance between the different Epworth sleepiness score, $\chi^2(2)= 1.366$, $p=0.505$, with a mean rank percentage marks score of 45.86 for Epworth sleepiness score 1-7, 38.94 for Epworth sleepiness score 8-9 and 48.10 for Epworth sleepiness score 10-15.

Table 2: Chi square test to find an association between academic performance and PSQI score

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	44.828 ^a	37	.176
Likelihood Ratio	57.269	37	.018
Linear-by-Linear Association	.230	1	.631
N of Valid Cases	90		

a. 76 cells (100.0%) have expected count less than 5. The minimum expected count is .34.

The value of the test statistic is 44.828

The corresponding p value of the test statistics is 0.176

Since p value is more than significance level ($\alpha = 0.05$), we do not reject the null hypothesis. We conclude that there is no enough evidence to suggest an association between academic performance and PSQI score.

Table 3: Chi square test to find association between academic performance and early and late risers.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.375 ^a	36	.594
Likelihood Ratio	40.348	36	.284
Linear-by-Linear Association	.017	1	.896
N of Valid Cases	86		

a. 74 cells (100.0%) have expected count less than 5. The minimum expected count is .30.

The value of the test statistic is 33.375

The corresponding p value of the test statistics is 0.594

Since p value is greater than significance level ($\alpha = 0.05$), we do not reject the null hypothesis. We conclude that there is not enough evidence to suggest an association between academic performance and early and late risers.

Discussion

Characterizing sleep habits is necessary in medical students so as to obtain their prevalent sleep pattern and advise changes to improve their sleep hygiene which may affect their academic performance. Sleep habits of students of first year MBBS were studied which showed an extreme range of 2 to 4 hrs minimum sleep

to 7 to 9 hrs of maximum sleep. Maximum students take 6 to 7 hrs sleep. It was found that maximum students sleep between 11 pm and 1 am. Sleep quality based on intake of sleep medication was studied. Although maximum students do not take sleep medication, few students (around 15 to 20%) take medication less than once a week and around 5% take medicine more than once a week. This proportion is higher than normal population¹⁴. It may be because of increased awareness or increased stress among medical students. Maximum students rate their sleep quality as very good or fairly good. It can be said that maximum students have 5 to 9 hrs of sleep which can be said to be optimal period of sleep and be rated as good.

ESS score is widely used in the field of sleep medicine as a subjective measure of a patient's sleepiness during day time. The higher the score, higher is the propensity of person's average sleep in daily life or their day time sleepiness. Figure 1 finds no relation between ESS score and self rating of sleep when ANOVA was applied. However, a higher ESS score is found among students rating fairly bad quality of sleep. While, figure 2 depicts a correlation between PSQI scale and self rating of sleep. PSQI is a self report questionnaire that assesses sleep quality over a 1-month time interval.

Figure 3 shows that those who go to bed early rise early while those who go to bed late rise late in the morning. No relation is found between ESS score and hrs of sleep. A person's need for hrs of sleep may vary from individual to individual. No statistically significant trend was found between hrs of sleep and self rating of sleep, again implying that individual's need varies from person to person. However a trend is obtained.

Further analysis is done to find if academic performance is affected by sleep hygiene. Table 1 shows Kruskal wallis test which shows that there was no statistically significant difference in academic performance between the different Epworth sleepiness score. Table 2 is chi square test to find association between academic performance and PSQI. It shows that there is no enough evidence to suggest an association between academic performance and PSQI score. Table 3 is a chi square test to find association between academic performance and early and late risers. It also shows that there is not enough evidence to suggest an association between academic performance and early and late risers.

A study⁵ determined if sleep deprivation and in a sample of non depressed university students was associated with lower academic performance. A statistically significant negative correlation was obtained between the PSQI and grade average proving that poor sleep quality is associated with lower academic performance. However the findings are not similar in our studies, which need explanation.

A study by [Rodrigues RN](#) et al¹⁵ observed that the sleeper students did not achieve as well as the others on their final examinations.

It was shown by [Jamaan M. Al-Zahrani](#) et al¹⁶ that there is a high prevalence of excessive day time sleepiness among medical students in Alkharj, Saudi Arabia. The disturbed sleep pattern is not associated

with academic performance. Study says that longitudinal investigation are warranted to determine whether prolonged sleep disturbances eventually influence the academic performance of this cohort.

Those with lower PSQI (near 1) have good academic performance. It is also found that those with higher PSQI like 10 and 15 also had good academic performance. Poorest performance is of a student with PSQI score 4. This implies that academic performance depends upon multiple factors apart from sleep pattern. There is no statistically significant difference in academic performance based on hrs of sleep. However the differences are academically significant. Those who sleep for more than 8 hrs have poor academic performance (acad perf score around 49%) while those with 6 to 8 hrs of sleep have a good academic performance score of around 59%. This implies that good sleep hygiene is necessary for a good academic performance.

Conclusion

A total of 90 medical students of AIIMS Patna, aged 16 to 25 years completed the study. Sleep habits of students shows an extreme range of 2 to 4 hrs minimum sleep to 7 to 9 hrs of maximum sleep. Maximum students take 6 to 7 hrs sleep. No statistically significant difference in academic performance between the different Epworth sleepiness score is observed. Negative correlation was obtained between the PSQI and grade average.

Acknowledgement: None

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Institutional ethical committee, AIIMS Patna

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