

Assessment of sleep quality and daytime sleepiness in dental undergraduate students in Eastern India

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International Journal of Science and Technology Research Archive, 2024, 07(01), 027–035

Publication history: Received on 19 May 2024; revised on 10 July 2024; accepted on 13 July 2024

Article DOI: <https://doi.org/10.53771/ijstra.2024.7.1.0054>

Abstract

Introduction: Sleep is essential for mental health of all ages. Deprivation of sleep leads to multiple cognitive disturbances, behavioural changes, fatigue and even accidents. Excessive daytime sleepiness is defined as greater probability of falling asleep in situations where the individual should be awake. Dental and medical students are the major groups of society suffering from abnormal sleep leading to lower academic performance. The aim of this study was to evaluate sleep quality and excessive daytime sleepiness among First year dental students at a private institution in Eastern India.

Materials and methods: It was a Descriptive, Epidemiological, Institution based Cross-sectional study. The Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) were administered to 84 First year dental students to assess sleep quality and daytime sleepiness.

Results: Poor sleep was found to be prevalent in 50% of the participants. Day-scholar students had significantly higher daytime sleepiness than those residing in Hostel ($p=0.0097$). Married Students had significantly poorer quality of sleep and increased daytime sleepiness than unmarried students. ($p<0.0001$). By Pearson's correlation, there was strong positive correlation between Sleep Quality and Excessive daytime sleepiness, meaning poor sleep was positively correlated with excessive daytime sleepiness. ($p<0.00001$)

Conclusion: A high prevalence of poor sleep quality and excessive daytime sleepiness was found among undergraduate students in Dentistry. Demographic and social factors like age, gender, residence can influence quality of sleep and daytime sleepiness. There is positive correlation between poor sleep and excessive daytime sleepiness. Students should be targeted with Counselling programs with the goal of their sleep improvement.

Keywords: First year Dental students; Questionnaire based study; Pittsburgh Sleep Quality Index (PSQI); Epworth Sleepiness Scale (ESS)

1 Introduction

Sleep is an essential human condition characterized by a state of inactivity, muscle relaxation and a reduction in conscience in response to external cues and lower heart rates [1]. Healthy sleep is important for the mental health of all ages –adult, adolescent and even children [2]. According to National Sleep Foundation, young adults (18-25) and adults (26-64) should receive 7 to 9 hours of sleep but not less than 6 hours of sleep. Absence or deprivation of sleep leads to multiple cognitive disturbances, behavioural changes [3], neuropsychiatric problems, fatigue, sensor registering problem and even accidents while driving due to attention deficit. Sleep disturbances can be of different types---- insomnia, sleep apnoea, parasomnia, restless leg syndrome [4-9]and all these ultimately reflect in detrimental effect to

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the society as well as individual. There can be a relationship between sleep quality and excessive daytime sleepiness, with the latter defined as the greater probability of falling asleep in situations in which the individual should be awake [10], naturally leading to greater inattention, causing higher risks of car accidents, deficit of attention and learning [11].

It has been observed in several studies that the dental and medical students are the major groups of society who suffer from somniphathya (abnormal or disordered sleep). These sleep disturbances may be due to irregular timings, inadequate sleep duration, pressure of studies and examinations, language barrier specially in East India or even change in surroundings due to new place, homesickness, poor diet, inexperience to handle patients [12] etc. Based on this premise, recent studies [13-15] have verified a clear relationship between sleep disorders and lower undergraduate academic performance. The effect of these factors have been identified as a potential cause in onset of depressive symptoms in learning environment (Machado AV et al.) [12]. Sleep alteration is frequently found to be related with these factors and in turn anxiety levels of university students.

So it is very important to have a better understanding of the major contributing factors in the disturbed sleep pattern of the dental students specially the 1st year dental students. Thus, as a result of the strong impact on the quality of sleep and level of health of the population, it is essential to monitor the risk profiles and outline more adequate prevention strategies, to better control the effects originated from sleep disorders. The present article aimed to assess the quality of sleep and excessive daytime sleepiness and their inter relation in First year undergraduate Dental students in Eastern India.

Objectives of the Study

- Primary Objective

To evaluate sleep quality and excessive daytime sleepiness among 1st year dental students

- Secondary Objectives

To assess the factors associated with poor sleep among 1st year dental students

To evaluate if any interrelation exists between sleep quality and excessive daytime sleepiness.

2 Materials and Methods

Study was conducted after obtaining the ethical clearance from Institutional Ethics Committee of Medical College, Kolkata.

- **Study Type:** Descriptive, Epidemiological, Institution based
- **Study Design:** Cross-sectional
- **Study Area:** The study was conducted at Kusum Devi Sunderlal Dugar Jain Dental College & Hospital, Kolkata
- **Study Period:** Total study duration was 3 months. (September 2023- November 2023)

2.1 Study Population

The study population was all the First year Dental (BDS) students, who got admission at Kusum Devi Sunderlal Dugar Jain Dental College & Hospital, Kolkata, in 2023-24 session.

2.2 Inclusion Criteria

- All First year Undergraduate BDS students enrolled in Kusum Devi Sunderlal Dugar Jain Dental College & Hospital in 2023-24 session.
- Those who gave written consent for participation.

2.3 Exclusion Criteria

- Those who could not be approached for data collection.
- Those who would not give consent.
- Students who were already diagnosed with depression and taking treatment for any Psychiatric condition.

- **Sample Size:** The total number of 1st year BDS students enrolled in Kusum Devi Sunderlal Dugar Jain Dental College & Hospital was 102. Out of them, 84 participated in the study.
- **Sampling Design:** Complete enumeration was done [16]
- **Study Tool:** The data was collected with the application of two surveys: the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS).

The questionnaire was divided into three parts. First part comprised of demographic information like age, gender, residence and Marital status. The second part of the questionnaire was based on PSQI guidelines and the third part involved survey based on Epworth Sleepiness Scale (ESS).

In Accordance with several other studies [17], Pittsburgh Sleep Quality Index (PSQI) was selected as the data collecting tool. The PSQI is a subjective measurement tool that analyses the quality of sleep within one month. The Indian version of the PSQI was applied [18]. The survey consists of 19 self-applied questions, divided into seven groups: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficacy, daytime dysfunction, sleep disturbances and use of sleep medication. Each component of the PSQI is awarded a score ranging between 0 and 3 points, with the sum of these values constituting a global score, varying from 0 to 21 points.

A global score of >6 was the optimal cut-off point for distinguishing Normal Sleepers (NS) and Poor Sleepers (PS) students. [18].

Excessive daytime sleepiness was evaluated using the Epworth Sleepiness Scale (ESS) [10]. This scale is designed based on a simple questionnaire, of easy application and interpretation, aimed at providing a general measurement of daytime sleepiness. This questionnaire is also self-applicable, analysing the possibility of falling asleep under 8 ordinary situations [10]. According to the scenarios proposed, the patient chooses between 0 and 3, characterising the probability of falling asleep. The global score ranges from 0 to 24, with up to 10 points considered normal, while scores higher than 10 can be associated to excessive daytime sleepiness and scores greater than 16 points being considered characteristic of excessive daytime sleepiness [19].

Data collection and interpretation: The study was conducted during the middle of the academic year 2023-2024. Questionnaires were distributed by the authors during one lecture for with prior permission from the Dean of the institution and the aims of the study were explained. The time allocated for completion of the questionnaire was 30 minutes. The questionnaire was distributed and submitted anonymously for assuring confidentiality to the students. All participants took part in the study voluntarily and no incentives were used for the respondents. Students who could not be approached for data collection after three attempts were excluded from the study.

2.4 Statistical Analysis Plan:

The data was entered and analyzed using SPSS (statistical package for the social sciences) statistical software 22 version. Means and standard deviations were determined for stress scores of individuals for each item and used to compare the genders. Students' t-test (unpaired) was used for two group comparisons like gender difference. A p value of less than 0.05 was considered statistically significant. Descriptive statistics, Pearson's correlation and Chi square test were used to determine the significant differences.

3 Result

Table 1 Distribution of participants according to their Demographic Characteristics studied

Characteristics	Frequency	Percent
Age group		
18-21	59	70.24
22-25	25	29.76
Gender		
Male	38	45.1

Female	46	54.9
Residence		
Hostel	40	47.62
Day scholar	44	52.38
Marital Status		
Married	35	41.67
Unmarried	49	58.33

Mean age: 20.79± 1.41 years; Mean age of male participants: 20.87 ± 1.6 years; Mean age of female participants: 20.72 ± 1.26 years [Table 1]

Table 2 Observed Characteristics of PSQI score

	Frequency (Percent)	Observed Range	Mean ± SD
Total Participants	84 (100)	1-20	7.8 ± 4.66
Normal Sleepers	42 (50)	1-6	3.93 ±1.55
Poor Sleepers	42 (50)	7-20	11.67 ±3.29

Out of the total 84 students, 42 (50%) scored greater than 6 on the PSQI scale and were considered poor sleepers. [Table 2]

Table 3 Observed Characteristics of PSQI seven components

PSQI components	Observed range	Mean ± SD	SCORE			
			0 (%)	1 (%)	2 (%)	3 (%)
C 1: Subjective sleep quality	0-3	1.27±1.03	26 (31)	19 (22.6)	29 (34.5)	10 (11.9)
C 2: Sleep latency	0-3	0.94±0.75	23 (27.4)	46 (54.8)	12 (14.3)	3 (3.5)
C 3: Sleep duration	0-3	1.18±0.84	16 (19)	44 (52.4)	17 (20.2)	7 (8.3)
C 4: Sleep efficiency	0-3	1.26±0.98	22 (26.2)	28 (33.3)	24 (28.6)	10 (11.9)
C 5: Sleep disturbance	0-3	1.3±0.76	9 (10.7)	47 (56)	22 (26.2)	6 (7.1)
C 6: Use of sleep medication	0-3	0.65±0.84	47 (56)	21 (25)	14 (16.7)	2 (2.3)
C 7: Daytime dysfunction	0-3	1.19±0.92	22 (26.2)	31 (36.9)	24 (28.6)	7 (8.3)

Descriptive statistics, including range, mean and SD of components of PSQI are given in Table 3. Among PSQI 7 components, the worst performance was seen in subjective sleep quality with the highest mean (M= 1.27, SD = 1.03), followed by sleep efficiency (M =1.26, SD = 0.76). It was found that 37(44%) students had taken sleep medications during the last month with different frequencies

Table 4 Observed Characteristics of Daytime Sleepiness (ESS Scale)

Daytime Sleepiness	Frequency (Percent)	Mean ± SD
Normal	51 (60.7)	6.24±2.25
Excessive	19 (22.6)	12.42±1.64
Severe	14 (16.67)	18.07±1.27
Total	84 (100)	9.61±4.98

According to the ESS scale, 19 (22.6%) of the students had excessive daytime sleepiness and 14 (16.67%) had severe daytime sleepiness. [Table 4]

Table 5 Evaluation of the quality of sleep and daytime sleepiness, according to the age group, gender, Residence and Marital Status

Variables	Quality of Sleep (PSQI Score) Mean ± SD	Daytime Sleepiness (ESS Score) Mean ± SD
Age Group		
18-21	7.76±4.87	9.1±4.52
22-25	7.88±4.11	10.8±5.72
p value	0.914	0.15
Gender		
Male	7.21±4.57	8.42±4.2
Female	8.28±4.72	10.59±5.39
p value	0.297	0.046*
Residence		
Hostel	7.2±5.01	8.15±4.36
Day scholar	8.34±4.3	10.93±5.18
p value	0.265	0.0097*
Marital Status		
Married	11.09±4.43	13.6±4.53
Unmarried	5.45±3.17	6.76±2.9
p value	<0.0001*	<0.0001*

*Significant difference as p<0.05

Table 5 shows the evaluation of the quality of sleep and daytime sleepiness of students investigated, according to age group, gender, residence and Marital status. A significant statistical association was observed between gender and Daytime sleepiness and gender with females having more daytime sleepiness than males (p= 0.046).

It was also observed that Day scholar students had significantly higher daytime sleepiness than those residing in Hostel (p= 0.0097).

Married Students had significantly poorer quality of sleep than unmarried students. (p<0.0001). Married Students also had significantly increased daytime sleepiness than those who are unmarried. (p<0.0001).

Table 6 Chi-square test showing association of included variables with sleep quality and daytime sleepiness

Variables	Sleep Quality (%)		χ ² value	p value	Daytime Sleepiness (%)			χ ² value	p value
	Normal Sleepers	Poor Sleepers			Normal Daytime Sleepiness	Excessive Daytime Sleepiness	Severe Daytime Sleepiness		
Age Group									
18-21	31 (52.5)	28 (47.5)	0.513	0.474	8 (13.6)	14 (56)	37 (62.7)	17.325	0.0002*
22-25	11 (44)	14 (56)			14 (56)	5 (20)	6 (24)		
Gender									
Male	21 (55.3)	17 (44.7)	0.769	0.381	26 (68.4)	9 (23.7)	3 (7.9)	3.917	0.141

Female	21 (45.7)	25 (54.3)			25 (54.3)	10 (21.7)	11 (23.9)		
Residence									
Hostel	24 (60)	16 (40)	3.054	0.081	27 (67.5)	9 (22.5)	4 (10)	2.616	0.27
Day scholar	18 (40.9)	26 (59.1)			24 (54.5)	10 (22.7)	10 (22.7)		
Marital Status									
Married	6 (17.1)	29 (82.9)	25.9	<0.0001*	9 (25.7)	12 (34.3)	14 (40)	35.316	<0.0001*
Unmarried	36 (73.5)	13 (26.5)			42 (85.7)	7 (14.3)	0 (0)		

*Significant difference as p<0.05

The chi-square test (χ^2) was used to find if a significant correlation exists between the variables with sleep quality and daytime sleepiness.

It was found that in younger age group (18-21), students had significantly more daytime sleepiness compared to older age group (22-25). (p=0.0002)

Among male students, 21 (55.3%) were Normal Sleepers, whereas 17(44.7%) were Poor Sleepers. 26(68.4%) had Normal Daytime sleepiness, 9 (23.7%) had Excessive Daytime sleepiness while 3(7.9%) had Severe Daytime sleepiness.

Among Female students, 21 (45.7%) were Normal Sleepers, whereas 25(54.3%) were Poor Sleepers. 25(54.3%) had Normal Daytime sleepiness, 10 (22.7%) had Excessive Daytime sleepiness while 11(23.9%) had Severe Daytime sleepiness.

It was also observed that among students who resided in Hostel, 24 (60%) were Normal Sleepers, whereas 16 (40%) were Poor Sleepers. In case of students who were Day scholars, 18 (40.9%) were Normal Sleepers, whereas 26 (59.1%) were Poor Sleepers.

Among students residing in Hostel, 27 (67.5%) had Normal Daytime sleepiness, 9 (22.5) had Excessive Daytime sleepiness while 4(10%) had Severe Daytime sleepiness. In case of Day scholars, 24 (54.5%) had Normal Daytime sleepiness, while 10 (22.7%) each had Excessive and Severe Daytime sleepiness.

On the other hand, among Married students, 6 (17.1%) were Normal Sleepers, whereas 29 (82.9%) were Poor Sleepers. In case of Unmarried students, 36 (73.5%) were Normal Sleepers, whereas 13 (26.5%) were Poor Sleepers. So Married students were found to have poorer sleep quality than those of unmarried students according to our study. (p<0.0001).

Similarly among Married students, 9 (25.7%) had Normal Daytime sleepiness, 12 (34.3) had Excessive Daytime sleepiness while 14(40%) had Severe Daytime sleepiness. In case of Unmarried students, 42 (85.7%) had Normal Daytime sleepiness, while 7 (14.3%) had Excessive Daytime sleepiness. So Married students were found to have more daytime sleepiness than those of unmarried students according to our study. (p<0.0001).

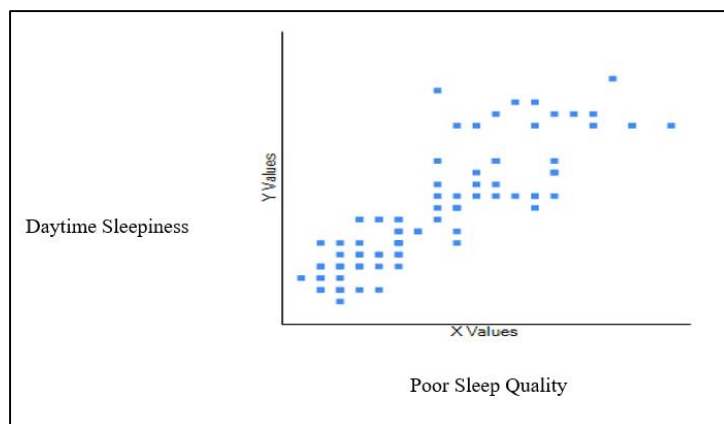


Figure 1 Correlation of Daytime Sleepiness and Poor Sleep Quality by Pearson’s Correlation

The value of R is 0.8533. p value <0.00001. There is a strong positive correlation, which means that high PSQI scores go with high ESS scores (and vice versa)

4 Discussion

In this study, the sleep quality and daytime sleepiness of dental students was assessed and poor sleep was found to be prevalent in half of the participants (50%). Females, age 18-21 years, Day scholar and Married students were more likely to suffer from poor sleep. Similar results were observed by previous authors, who found a 95.3% prevalence of poor quality of sleep [20], and 60.25% poor quality of sleep [21].

On the other hand, these findings were partially in disagreement with the study by M Khan et al [22]

Regarding sleepiness, almost 40% of the students participating in the present study exhibited Excessive Daytime Sleepiness (EDS). These findings are similar to those verified by other authors [23], who studied medical undergraduate students and residents. Another researcher also observed a high prevalence of EDS in psychology undergraduates [24].

This study found that poor sleep and excessive daytime sleepiness affected females more than males. Nadeem A et al. and El Sahly RA et al. had similar findings[25,26] while Attal BA et al. have contradicting results where males had poorer sleep quality[27]. Poorer quality of sleep and excessive daytime sleepiness among females can be explained by the hormonal changes in the menstrual cycle throughout the month. These hormones have been shown to affect the sleep regulatory mechanism, disrupting the females' circadian rhythm. [28]

We observed in our study that Married Students had significantly poorer quality of sleep than unmarried students. ($p < 0.0001$). Married Students also had significantly increased daytime sleepiness than those who are unmarried. ($p < 0.0001$). This may be due to the extra social pressure on them.

According to Pearson's Correlation, there was a strong positive correlation between PSQI scores with ESS scores (and vice versa) that means poor sleep is positively correlated with excessive daytime sleepiness. ($p < 0.00001$)

The data obtained in the study suggest that the professional Dental course influences the quality of sleep and daytime sleepiness of undergraduates. Demographic and social factors like age, gender, Residence play crucial role in sleep. These findings suggest the need of monitoring and counselling of these students to better plan interventions aimed at improving sleeping patterns and improve their overall academic performance.

The study presented some limitations intrinsic to the cross-sectional design adopted. The participants were asked to answer the questions in the context of the past month. Hence there was a chance of recall bias. Factors like overall mental health, food and nutrition, meditation, daily exercise, substance use, exam seasonality and other factors potentially affecting sleep of the students were not studied and would need further research in the future.

5 Conclusion

A high prevalence of poor sleep quality and excessive daytime sleepiness was found among undergraduate students in Dentistry. The data suggest that demographic and social factors like age, gender, Residence can influence their quality of sleep and daytime sleepiness. There is positive correlation between poor sleep and excessive daytime sleepiness. Students should be targeted with Counselling programs with the goal of their sleep improvement.

Future research is recommended with a greater sample size to look at these variables longitudinally at different time of the academic year and also across all the professional years to try and achieve a better understanding of the sleep pattern through the dental curriculum.

Compliance with ethical standards

Acknowledgments

The authors would like to thank the Dean of Kusum Devi Sunderlal Dugar Jain Dental College & Hospital, Kolkata

The authors would also like to convey their thanks to all the faculty and staff of Department of Physiology, Medical College, Kolkata, Prof Kakali Das (Sarkar), HOD, Department of Physiology, Medical College, Kolkata and all the

participants of Kusum Devi Sunderlal Dugar Jain Dental College & Hospital, Kolkata for giving their valuable support throughout the study.

Disclosure of conflict of interest

There was no competing interest.

Statement of informed consent

Informed written consent was obtained from all individual participants included in the study.

Funding

The Equipment from the Department of Physiology of Medical College, Kolkata were used for this research work.

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