

**Original Research Article:**

## **The relationship between sleep quality and daytime sleepiness on the academic performance of medical students**

**Jyoti Priya<sup>1</sup> , Sarbil kumari<sup>2</sup> ,Jairam Singh<sup>1</sup>**

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor

Department Of Physiology, Vardhman Institute of Medical Sciences,Pawapuri .

Corresponding Author: Dr. JYOTI PRIYA

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### **ABSTRACT**

**Aims and Objectives:** This study aimed to assess the relationship between sleep habits and sleep quality with academic performance in medical students.

**Materials and Methods:** This work is a cross-sectional questionnaire-based study conducted at VIMS , Pawapuri during the month of January in 2017 .The participants in this study were 307 undergraduate M.B.B.S students of the 1<sup>st</sup>,2<sup>nd</sup> ,3<sup>rd</sup> and 4<sup>th</sup> academic year of this college . A self-administered questionnaires were distributed to the students which collected information regarding participants' age, gender,habitat ,physical activity ,body mass index, addictions, year of study, marks (in percentage ) scored in the recent exam, residence and background , Pittsburg quality of sleep index (PQSI) score and Epworth daytime sleepiness scale .

**Result** A total of 307 responses with a rate of 80% were obtained . According to the PSQI score, 67.42% of participants were considered to have abnormal sleep quality and 37.13% reported daytime sleepiness. Academic performance of the students had a significant relationship with the sleep quality (PSQI) ( $p < .003$ ) and also with daytime sleepness (ESS SCORE ) ( $P < .001$ )

**Conclusions:** A very high prevalence of poor sleep quality and daytime sleepiness was found among the medical students who had a poor academic performance.

**Keywords:** Medical Students, Pittsburgh Sleep Quality Index(PSQI), Sleep Quality, Epworth Daytime Sleepiness Scale (EDSS)

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### **Introduction**

Sleep is an important component of normal human physiology. It serves a restorative homeostatic function and appears to be crucial for normal thermoregulation and energy conservation <sup>(1)</sup>. Sleep deprivation and symptoms related to sleep disorders have not only been ignored but also inadequately understood. The prevalence of sleep disorders in the general population has been estimated to be 15% -- 35% <sup>2,3</sup>. Medical students are especially vulnerable to poor sleep, perhaps due to the long duration and high intensity of study, clinical duties that include overnight on-call duties,

work that can be emotionally challenging, and lifestyle choices<sup>(4)</sup>

Research on sleep disturbances in undergraduate medical students is of particular interest because of the known relationship between sleep and mental health<sup>(5)</sup> and the concern that the academic demands of medical training can cause significant stress<sup>(6,7)</sup>. A large body of evidence supports the notion that good quality sleep is important for optimal neurocognitive and psychomotor performance as well as physical and mental health<sup>(8)</sup>

Many factors determine sleep quality, and some of the important ones are age, gender, habitat, body mass index (BMI), physical activity or sports, smoking<sup>(9)</sup>. Recent studies have demonstrated that the sleep-wake cycle of medical students is characterized by insufficient sleep duration, delayed sleep onset, and occurrence of napping episodes during the day<sup>(10, 11)</sup>, which has been found to affect cognitive function in medical students<sup>(12)</sup>. Moreover, multiple studies have indicated a high correlation between sleep duration and performance in some activities and in subjective alertness<sup>(13, 14)</sup>. Medical students require cognition and alertness abilities that are impeded by sleep disorders<sup>(12)</sup>.

Despite inherent importance of sleep, there is limited information about sleep behavior and its impact on the academic performance of the students<sup>(15)</sup>. This study was designed to assess the impact of quality of sleep and daytime sleepiness on the academic performance of the undergraduate medical students .

## **Methodology**

### **Study design**

This cross-sectional study was conducted at VIMS in Pawapuri during the month of January in 2017 .The participants in this study were 307 undergraduate M.B.B.S students of the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> academic year of this college . Among them, 72 were female and 235 were male. Students who were willing to participate were given a brief description about the study and its aims & objectives. Verbal consent of each student was taken and were assured about the confidentiality . Students with chronic diseases or sleep disorders were excluded . The ethics committee of the institute approved the study. Recruitment and collection of data continued for four weeks in the month of January . A self-administered questionnaires were distributed to the students

which collected information regarding participants' age, gender, habitat, physical activity, body mass index, addictions, year of study, residence and background, Pittsburg quality of sleep index (PQSI) score and Epworth daytime sleepiness scale .The recruitment and collection process was carried out under the supervision of the authors and the help of 10 previously trained senior medical students . After completion, the questionnaires were collected from the students and the incomplete ones were removed from the study.

The analysis was performed using Graphpad instat prism 6. T-test was then used for processing quantitative information and chisquare test for the qualitative information. Statistical significance was accepted at P<0.05. .Instrumental tools used in the study

**Pittsburg Quality of Sleep Index (PQSI)**<sup>16</sup> It is a self report instrument to assess the quality of sleep. The Pittsburgh sleep quality index (PSQI), a self-rated questionnaire that assesses sleep quality over a time interval was adopted in the survey. Seven properties of sleep were evaluated by this questionnaire:

1. Sleep quality of the individual
2. Time it takes for an individual to sleep
3. Duration of sleep
4. Sleep efficiency
5. Bedtime problems
6. Use of sleeping medication
7. Impairment in daily functioning

The scores for each question range from 0 to 3, with 0 indicating the highest sleep quality and 3 indicating the lowest one. The seven component scores are then added to yield a global PSQI score in the range of 0 to 21; the higher the score is, the worse the sleep quality. A global score equal or greater than 5 indicates poor sleep quality in the past month.

**Epworth Daytime Sleepiness Scale (EDSS)<sup>17</sup>:** It is a scale intended to measure daytime sleepiness that is measured by use of a very short questionnaire. This can be helpful in diagnosing sleep disorders. It was introduced in 1991 by Dr. Murray Johns of Epworth Hospital in Melbourne, Australia. The questionnaire asks the subject to rate his or her probability of falling asleep on a scale of increasing probability from 0 to 3 for eight different situations. The scores for the 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 10 and 11 are border line and 12-24 range indicates that expert medical advice should be sought.

#### **Result**

A total of 307 responses were obtained of which 67.42 % were considered poor sleepers. The mean age of the participants, which ranged from 17 to 24 years, was 20.54 . Among this population, 235 (76.54%) were male and 72 (23.45%) were female. The students were distributed among the four academic years. Daily sleeping hours of 4 - 6 hours were reported by 213 (69.38 %) of the participants and 7 - 10 hours by 66 (21.49%). A small numbers of students 28(9.12%) slept less than 4 hours or more than 10 hours . Among the students, 100 (32.54%) had normal PSQI scores and 207 (67.42%) had PSQI > 5 scores.indicating poor quality.

Daytime sleepiness was assessed using the ESS. The ESS is a standardized validated subjective way to assess daytime sleepiness. 193 students had ESS <10 while 114 (37%) students had ESS >10 indicating increased daytime sleepiness among them.

Table 1 presents the complete demographic characteristics and other study variables Table 2:

analysis of sleep quality (psqi) with marks obtained

Table 3 presents the analysis of marks obtained with epss scale.

The academic performance of the student was measured by the marks obtained by them in percentage in their recent previous examinations. Thereafter they were classified into 4 categories.First category comprised students scored marks >70%, second of 60 to 69.9%,third was from 50% to 59.9% and fourth was of those who had failed with marks <50%.Only 14 (4.56%) students had marks >70%.,69 (35.83%) student scored between 60 to 69.9% ,85 (38.11%) students scored between 50 to 59.9% and 49( 21.5%) students had failed with <50% marks.

Table 2 presents the analysis of the marks obtained with PSQI scores and they show a significant relationship ( p<.003) .100 (32.57%)students had psqi <5 while 207(67.43%) had poor sleep quality psqi>5. Among the student who had failed of category IV, 74.2% students had poor sleep quality while in category I with marks >70%, only 28.6% had poor sleep quality.In category II and III ,62.7% and 72.6% students had sleep problems respectively.

Table 3 presents the analysis of the marks obtained with EPSS scores and they show a significant relationship ( p<.0001) .37.13% students had daytime sleepiness.Among those students with marks <50%of category IV,59.1% students had daytime sleepiness while in category I with marks >70%, no one complained of daytime sleepiness.In category II and III, 32.7% and 33.3% students respectively had daytime sleepiness. Sleep quality was significantly poor among students having daytime sleepiness with (EPSS>10)

**Table 1: Demographic Characteristics and Other Variables of the Study Population**

Variables		NO(%)
GENDER	MALE	235 (76.5)
	FEMALE	72 (23.4)
Academic year		
	FIRST	90(29.3)
	SECOND	72(23.4)
	THIRD	61 (19.9)
	FOURTH	84 (27.4)
HABITAT		
	HOSTEL	274 (89.3)
	HOME	33 (10.7)
BMI		
	<18.5	61(19.9)
	18.5-24.9	135 (44)
	25- 29.9	73 (23.8)
	>30	38 (12.4)
SLEEP HOURS		
	4-6	213 (69.4)
	7-10	66 (21.5)
	OTHERS	28 (9.1)
PQSI		
	<5 (NORMAL)	100 (32.6)
	> 5 (ABNORMAL)	207(67.4)
EPSS		
	<10(NORMAL)	193 (62.9)
	>10 (ABNORMAL)	114 (37.1)

Table 2: ANALYSIS OF SLEEP QUALITY (PSQI) WITH MARKS OBTAINED

CATEGORY	MARKS OBTAINED	PSQI<5	PSQI>5	TOTAL NO (%)
I	>70	10	4	14(4.56%)
II	60 – 69.9%	41	69	69 (35.83%)
III	50% -- 59.9%	32	85	85 (38.11%)
IV	<50%	17	49	49(21.50%)
		100 (32.57%)	207 (67.43%)	307 (100%)

TABLE 3 : ANALYSIS OF EPSS SCALE WITH MARKS OBTAINED

CATEGORY	MARKS OBTAINED	EPSS<10	EPSS>10	TOTAL NO(%)
I	70%	14	0	14 (4.56%)
II	60% – 69.9%	74	36	110 (35.83%)
III	50 – 59.9%	78	39	117 (38.11%)
IV	<50%	27	39	66(21.50%)
		193 (62.87%)	114 (37.13%)	307 (100%)

## Discussion

Medical students are a special group of young adults who have various life constraints that can cause irregular sleep habits or shortening of mean sleep length. In the present study, decreased sleep quality and daytime sleepiness was found to be very common among medical students. 235(67.42%) students reported poor sleep quality. and 114(37.13%) students had daytime sleepiness and it had significant impact on the academic performance of the students. Among the students of category I who performed well in their examinations with marks obtained >70%, 71.4% students had good sleep while only 28.6% had poor sleep and none complained of daytime sleepiness. On the contrary students who had failed, 74.2% had sleep problems and 59.1% had daytime sleepiness. This showed a significant impact of the quality of sleep and sleep habits on the academic performance of the medical students. These findings were consistent with the findings of Sepehr Rasekhi et al<sup>18</sup>, wali et al<sup>(19)</sup> and another studies in Iran<sup>(20)</sup>

Sleep deprivation is associated with a variety of adverse consequences and can result in significant changes in cognitive functioning, short-term memory and concentration<sup>(21)</sup>. Medical students suffer high level of stress due to academic demands. Stress associated with insufficient sleep and excessive daytime sleepiness can result in lower academic performance<sup>(22)</sup> compromised learning, impaired mood, and increased risk of motor vehicle accidents. It may also lead to difficulties in interpersonal relationship, depression, anxiety, and alcohol and drug abuse<sup>(23,24)</sup>

Daytime sleepiness was assessed using the ESS. Our analysis showed that 114 (37%) respondents had EPSS score >10 indicating daytime sleepiness and it was very significantly associated with

academic performance. which concurs with the findings published previously by Wali et al (19) and BaHammam (15). People with daytime sleepiness because of insomnia perform poorly in their academic and that may lower their self-esteem and are three times as likely to be involved in road accidents as their well-rested counterparts (Garbarino et al., 2002).<sup>(25)</sup>

As medical colleges strive to provide the optimal learning environment to students, more attention needs to be directed towards consistent measurement of students' quality of life. Medical schools should build reforms in medical education and provide recreation centers in order to minimize the stress and burnout of students. It should also provide a positive environment and greater support for students who have sleep problems or any other issues. This can be achieved by establishing counselling facilities that can serve those with physical and psychological difficulties, aiming for a positive change towards their quality of life. Medical students, on the other hand, would also have to identify their impediments and seek for an advice from the faculty in order to find solutions for it.

The main limitations of the study as in most observational studies on sleep, is that it is based only on subjective assessment by the respondent. False information may be provided by students answering the questionnaires, and students may also be unable to understand or may misinterpret the questions. Moreover, the respondents may not have considered a few nights of sleep difficulty due to stress to be equivalent to insomnia or to a persistent sleep disturbance.

## Conclusions

This study reveals a significant association of sleep quality and daytime sleepiness among medical students. Therefore, undergraduate medical students should be educated about the importance of

adequate sleep to their academic performance. . University authorities should acknowledge that students' sleep habits are significant concerns that may affect their academic performance and hence, warrant educational programs and interventions. The need for further local research on students'

sleep is clear. Research in particular should examine the various factors that may affect the quality and quantity of students' sleep and its effects on academic achievements and solutions that will help students combat sleep difficulties and avert the deleterious effects of sleep deprivation.

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