

# Sleep Quality and Academic Performance Among Medical College Students

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## Abstract

**Background:** Sleep plays a very important role in a human health. Poor sleep quality remains as a frequent feature of student life. Quantity and quality of sleep in addition to average sleep time are strongly linked with students' learning abilities and academic performance.

**Subjects and method:** The study was a descriptive cross-sectional study conducted to assess sleep quality among medical college students – University of Babylon using Pittsburgh Sleep Quality Index (PSQI). This study was done during April 2016.

**Results:** Mean age of students was  $(20.63 \pm 0.65)$ . Majority was female. According to PSQI (60.4%) of students were poor sleeper. Significant association between quality of sleep and academic performance was found in our study, (72.9%) of those fail in one or more subjects have poor sleep quality.

**Conclusion:** Poor sleep quality was regarded as an important problem among medical college students. Majority of students (60.4%) was poor sleepers. Our study shows significant relation between sleep quality and academic performance among students of Babylon University –College of Medicine.

**Key words:** Medical students, Pittsburgh Sleep Quality Index, academic performance.

## الخلاصة

المقدمة: يعتبر اخذ القسط الكافي من النوم عنصر مهم جدا لصحة الانسان. ان اضطراب النوم وعدم الحصول على القسط الكافي منه يعتبر من اهم المشاكل في حياة طلبة كلية الطب والكليات الاخرى مما يؤدي الى ضعف المستوى الدراسي.

طريقة العمل: الدراسه هي دراسه مقطعيه لتحديد نسبة قلة وضعف نوعية النوم عند طلبة كلية الطب –جامعة بابل. النتائج: معدل ضعف نوعية النوم واضطرابه عند طلبة كلية الطب –جامعة بابل هو (٦٠,٤%) ووجد تاثير سلبي لضعف نوعية النوم على المستوى العلمي للطلاب.

الاستنتاج: اضطراب النوم وعدم الحصول على القسط الكافي منه يعتبر من اهم المشاكل في حياة طلبة كلية الطب. معدل ضعف نوعية النوم واضطرابه عند طلبة كلية الطب –جامعة بابل هو (٦٠,٤%) مما يؤثر سلباً على المستوى العلمي للطلاب.

الكلمات المفتاحية: طلبة كلية الطب، مقياس كفاءة النوم، المستوى الدراسي.

## Introduction

Sleep is an active, repetitive and reversible behavior plays an important role in a human health. It is important for physical, intellectual and emotional health (El Desouky *et al.*, 2015; Slats *et al.*, 2013).

In addition to air, water, and food, sleep is regard as an essential biological necessary for our bodies (Gregory *et al.*, 2004). Sleep is essential for learning, memory consolidation, make decisions, and critical thinking. Sleep act on stabilize and improve a wide spectrum of memory contents (Diekelmann and Born, 2010). Sleep deprivation not only affect memory consolidation but also has a negative impact on the encoding process (Van Der Werf *et al.*, 2009; Yoo *et al.*, 2007; Van Der Werf *et al.*, 2011). All these cognitive functions are essential during higher education, especially for medical students which are exposed to excessive knowledge during a short period of time.

Multiple factors affect sleep habit such as use of coffee or tea, excessive use of social media, use of drugs and medical problems such as obstructive sleep apnea and

depression(Pagel, 2009). In addition to that obesity and overweight regard as one of the most of important causes of poor sleep quality(Kohatsu *et al.*, 2006).

Research on sleep quantity and quality in USA reported that sleep deprivation and poor sleep quality are endemic among American people and regard as a significant public health problem (Morin,2002). According to Jensen, 2003Forty million American suffer excessive sleepiness (Jensen,2003).

Many researches strongly indicated that quantity and quality of sleep in addition to sleep time are linked with students' abilities of learning and academic performance. Lower academic performance was associated with late bedtime on weekdays and weekends. (Ahmed *et al.*, 2012; Curcio *et al.*, 2006).

Sleep habits of student usually characterized by later wake-up time on weekends and bad and short sleep duration on weekdays (Gilbert and Weaver, 2010). University students complain of sleep difficulties, at least twice than general population (Brown *et al.*, 2001).

Poor Sleep quality and quantity impairs different functions including physical, emotional and cognitive functions, especially among medical college students and hospital staff which work for a long duration, and this increase possibility of poor sleep quality leading to poor training and medical errors with risk on patients.(Bysse *et al.*2003).

Medical students expose to sleep deprivation because their lifestyle and academic commitments affect their habits of sleep and result in sleep difficulties (Bahammam *et al.*, 2005).The academic needs of students results in irregular sleep/wake patterns, which negatively affect school performance (Wolfson and Carskadon, 2003).

### **Aim of study:**

1. Assess quality and patterns of sleep among medical college students. According to these instrument students either have "poor" or "good" sleep quality. Instrument score obtain by examining seven components including subjective quality of sleep, latency of sleep, duration of sleep, habitual sleep efficiency, sleep disturbances, use of medications, and daytime dysfunction over the last month. PSQI was validated among students in sub-Saharan Africa (Aloba *et al.*, 2007).
2. To assess the association between sleep quality and different variables including (age, gender, residence, marital status, body mass index) and to assess effects of sleep quality on academic performance of medical college students.

### **Subject and methods**

#### **Study Location:**

This study was carried out at College of medicine-University of Babylon. A study was included all students of third grade who give consent to participate in the study. Out of (186) students in third grade, (169) were participating in the study. Data was collected during April 2016.

#### **Study design:**

This study was a descriptive cross-sectional study which performed to assess sleep quality among medical college students – University of Babylon using the Pittsburgh Sleep Quality Index (PSQI).

### **Study Population:**

Third stage, students of Medical College –University of Babylon was regarded as the study population. One hundred sixty nine students had been included in the survey and data was collected using a specially designed questionnaire.

### **Ethical approval:**

The purpose and method of the study were explained to students before beginning and verbal consent of participation was taken.

Scientific Committee of Community Medicine department and the Research, Ethical Committee of Medical College-University of Babylon were approved this study.

### **Data Collection:**

Data collected from all eligible third grade medical students who was given verbal consent to participate in a study by questionnaire which was used to collect the information. Data was collected during student's preparation for second course examination April 2016. Questionnaire form consists of two parts. The first part represents socio-demographic characteristics, including (age, gender, residence, marital status and weight and height of student) and midyear examination results for medical student which regard as a marker for academic performance. The second part represents instrument used to assess sleep quality of students Pittsburgh Sleep Quality Index (PSQI).

### **Instrument Pittsburgh Sleep Quality Index (PSQI)**

Pittsburgh Sleep Quality Index (PSQI) consists of nineteen questions (9 main questions and 10 sub questions) to assess sleep quality of student. Internal homogeneity, reliability and validity of PSQI were obtained. A global PSQI score more than 5 give a diagnosis in sensitivity about (89.6%) and specificity about (86.5%) with kappa statistics equal 0.75, ( $p < 0.001$ ) in differentiation of good from poor sleepers. The PSQI can be used to assess sleep quality in both psychiatric clinical practice and research activities. (Buysse *et al.*, 1989). Score was obtained according to student answer regarding usual sleep habits for most of nights and days in the past month. Questions include (first question when have you usually gone to sleep, second question how long by minutes has it taken you to sleep each night, third question what time that you usually gotten up in the morning, fourth question how many hours of actual sleep did you had at night and how many hours were you lie in bed, fifth question consist of 10 sub questions regarding troubles in sleep because of [a. Cannot get to sleep within a time of 30 minutes, b. Wake up early morning or in middle of night, c. Use frequently bathroom, d. cannot breath in comfortable way, e. Cough or snore in loud way, f. Feel very hot, g. Feel very cold, h. Have bad dream or i. Have pain and j. Other causes of disturb sleep]. Sixth question was about using of medicine to get sleep. Seventh one was about trouble in staying awake while driving, eating meals and engaging in social activity. Eight question about effect of sleep problems on students enthusiasm to do things and perform jobs. The answer of fifth, sixth, seventh and eight questions include four options which are (not at all during the last month (0), once during a week (1), twice during a week (2), three times or more during a week (3)). Ninth question was about subjective student assess of his or her sleep quality answer to this question include four options include (very good, fairly good, fairly bad and very bad) (Buysse *et al.*, 1989).

### Scoring

The PSQI Consist of seven components, Score for each of them range from 0 to 3 and 3 indicating greatest dysfunction. The global score ranged from 0 to 21. The Score was collected according to student answer and as follow:

1. Component one: question 9 Score (0 for very good, 1 for fairly good, 2 for fairly bad and 3 for very bad).
2. Component two: question 2 Score (<15minutes (0), 16-30 minutes (1), 31-60 minutes(2), more than 60min (3)) plus question 5 a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3).
3. Component three: question 4 Score (>7 hours (0), 6-7 hours (1), 5-6 hours (2), less than 5 hours (3)).
4. Component four: (total number of hours sleep) / (total number of hours in bed) x 100 if results (>85%=0, 75%-84%=1, 65%-74%=2, <65%=3).
5. Component five: summation of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3).
6. Component six: question sixth score.
7. Component seven: question 7 plus question 8 score if results (0=0; 1-2=1; 3-4=2; 5-6=3).

Global score which, represents sleep quality of student was obtained by summation of scores of seven components. Global score greater than 5 represents poor sleep quality while score equal or less than 5 represents good sleep quality (Buysse *et al.*, 1989; Seblewengel *et al.*, 2014).

### Data Analysis

Statistical analysis was performed using SPSS (statistical package of social sciences) version 17. Categorical variables were presented with frequencies and percentages. Continuous variables were presented with Means and standard deviation. Student t-test was used to compare two means. Pearson's chi square ( $X^2$ ) and Fisher-exact test were used to assess the association between categorical variables. A p-value of equal or less than 0.05 was considered significant.

### Results

#### The Distribution of Students According to Socio-demographic Variables

Table 1 shows the distribution of medical college students, according to socio-demographic variables includes (age, gender, residence and marital status). Mean age was (20.63  $\pm$  0.65) and majority of students (60.4%) were females, majority (98.8%) were single and majority (80.5%) came from urban areas.

#### The Distribution of Students According to Body Mass Index

Figure 1 shows the distribution of students according to body mass index. The majority (77.5%) of students presented with normal body mass index (18.5-29.9).

#### The Distribution of Students According to Midyear examination results

Figure 2 shows the distribution of students according to midyear examination results. The majority (71.6%) of the students were successful in all subjects in that examination.

#### The Distribution of Students According to Sleep Characteristics

Table 2 shows distribution of students according to sleep characteristics including (period in minutes student take to fall sleep each night, period of actual sleep, students subjective assessment of his or her sleep quality).

#### Distribution of Students According to Sleep Quality

Figure 3 shows distribution of students, according to sleep quality. The majority of students (60.4%) presented with poor sleep quality (PSQI score >5).

### **Mean Differences of Age and BMI According to Quality of Sleep**

Table 3 shows mean differences of age and BMI of students, according to sleep quality. No significant differences were found between means of age and BMI according to quality of sleep.

### **The Association between Quality of Sleep and Socio-demographic Characteristics**

Table 4 shows the association between sleep quality and socio-demographic characteristic among medical college students. There was no significant association between quality of sleep and those characteristics among study group of students.

### **The Association between Quality of Sleep and Academic performance**

Table 5 shows the association between quality of sleep and academic performance according to first course results of students. There was a significant association between quality of sleep and academic performance among the study group of students, (72.9%) of those students fail in one or more subjects were presented with poor sleep quality.

### **The Association between Sleep duration and Academic performance**

Table 6 shows the association between sleep duration and academic performance. There was no significant association between duration of sleep and academic performance among the study group of students.

## **Discussion**

This study was done at College of Medicine-University of Babylon to assess sleep quality among medical college students and to find the impact of sleep quality and sleep duration in period of preparation to examination on academic performance of them. Mean time for actual sleep (in hours) was (6.018±1.44) and majority of students(62.7%) had actual sleep at night ( $\geq 6$ ) hours. Mean time for students to fall sleep (in minutes) was (25.00±17.44)and majority of students (57.3%) need 15 minutes or more to fall sleep.

In similar study done in Saudi Arabia (44.7) of students had actual sleep at night ( $\geq 6$ ) hours and (78.1%)not get sleep immediately. (Al Ghamdi,2013) .

Students should always have adequate time for sleep at least (7-9 hours) to get maximum academic performance (Anderson *et al.*,1991), sleep hours less than this lead to mental tension, poor timing, muscular fatigue and lack of coordination (Brendel *et al.*,1990).In a current study only (27.8%) had actual sleep more than 7 hours this low percentage are similar to results was obtained in Kenya that only (31.6%) undergraduate students get actual sleep at night for 7 hours or more (Gikunda *et al.*, 2014).

In current study (60.4%) of third grade medical students presented with poor sleep quality (PSQI score  $> 5$ ).These results similar to results obtain by study done in Faculty of Nursing and Allied Health Sciences in Jazan city at kingdom of Saudi Arabia that(62.5 %) of students have poor sleep quality. Another study done in medical school university of Munich - Germany which find that (59%) of students presented with poor sleep quality in period of preparation for examination (K. Ahrberg *et al.*2012) , Our results also consistent with other researches showing that more than (50%) of college populations complain of poor sleep quality and sleep disturbances (Lund *et al.*, 2010; Sing and Wong, 2010).Similar results were found in a study done in the USA that (70%) of university students had poor sleep quality (Gilbert S. *etal.*2010).This higher percentage of poor sleep quality among medical students can be explained by long duration and high intensity of study, clinical duties and work that can be changed or disturb the lifestyle and sleep habit(Wong J. *et al*,

2005). Poor sleep quality among medical students usually associated with depressive symptoms and anxiety (Eller *et al.*, 2006). Many studies show that sleep disturbance lead to drop in mood and cause changes in different hormones (Steiger, 2007).

The significant relation between sleep quality and academic performance was found in our study and (72.9%) of those fail in one or more subjects have poor sleep quality. Similar study shows that both inadequate and adequate sleeps are significantly related to academic performance. Adequate sleep and academic performance shows positive correlation ( $r = 0.769$ ) while the negative correlation value of ( $r = - 0.518$ ) indicates that inadequate sleep lead to poor academic level (Williams *et al.*, 2014). Other study show that sleeps quantity had a significant effect on academic performance of students in public universities. (Gikunda *et al.*, 2014). Similar study show that students who complain from sleep disorders have poor academic performance compared to those who have had an adequate amount of sleep (Veldi *et al.*, 2005). Similar studies find similar results that sleep deprivation has negatively correlated with academic performance (Zailinawati *et al.*, 2009; Curcio *et al.*, 2006). Studies also revealed that students who have adequate sleep pattern perform better academic results and this may be related to that adequate sleep are important for consolidation of memory which could have important implications for school success (Howell, 2004; Loayza HMP. *et al.*, 2001)

### Conclusion:

This study was done to assess the quality and patterns of sleep among medical college students. Mean time for actual sleep (in hours) was ( $6.018 \pm 1.44$ ) and the majority of students (62.7%) had actual sleep at night ( $\geq 6$ ) hours. Majority of students presented (60.4%) with poor sleep quality (PSQI score  $> 5$ ). Our study shows a significant relationship between quality of sleep and learning ability and (72.9%) of those fail in one or more subjects have poor sleep quality.

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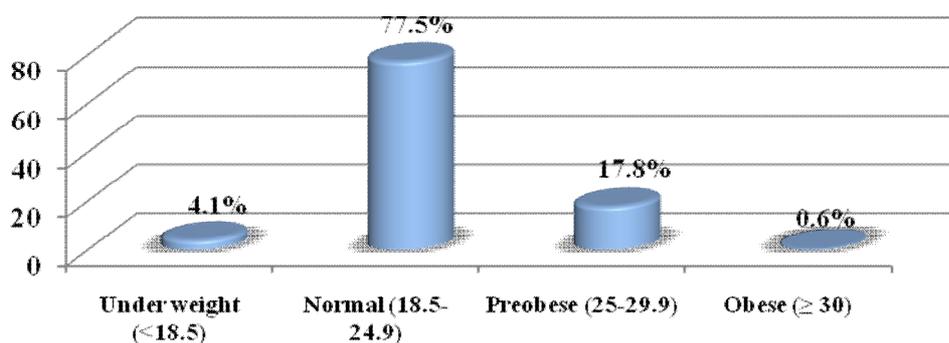
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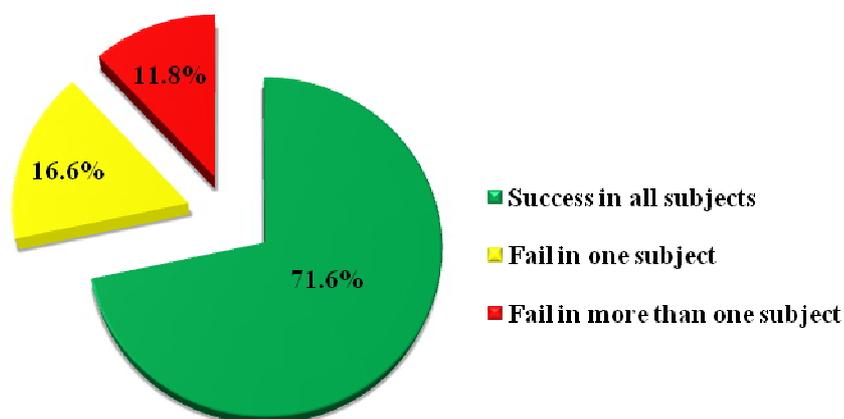
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**Table 1: The Distribution of students according to socio-demographic variables**

Socio-demographic variables		
(19-24)	(20.63 ± 0.65)	<b>Age (years)</b>
39.6%	67	<b>Gender</b>
60.4%	102	Male
100.0%	169	Female
		Total
80.5%	136	<b>Residence</b>
19.5%	33	Urban
100.0%	169	Rural
		Total
98.8%	167	<b>Marital status</b>
1.2%	2	Single
100.0%	169	Married
		Total



**Figure 1: Distribution of students according to body mass index**



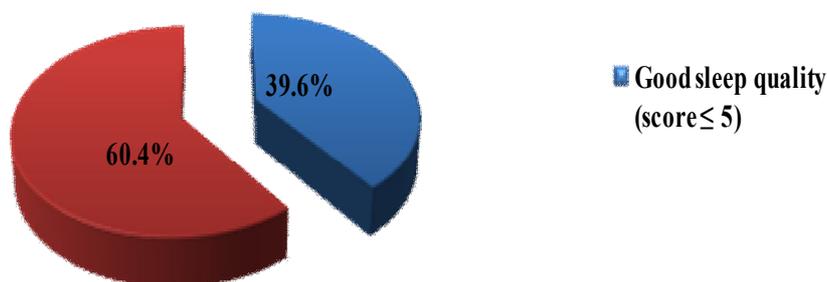
**Figure 2: Distribution of students according to midyear examination results**

**Table 2: The Distribution of students according to sleep characteristics**

(%)	N	Sleep characteristics
42.6%	72	<b>Period taken to fall sleep (in minutes)</b> <15 minute (16-30) minutes (31-60) minutes >60 minutes Total
42.0%	71	
11.2%	19	
4.1%	7	
100.0%	169	
27.8%	47	<b>Sleep duration (in hours)</b> >7 hours (6-7) hours (5-6) hours <5 Total
34.9%	59	
24.9%	42	
12.4%	21	
100.0%	169	
13.6%	23	<b>Subjective sleep assessment</b> Very good Fairly good Fairly bad Very bad Total
52.1%	88	
21.9%	37	
12.4%	21	
100.0%	169	

Ⓐ mean time for actual sleep (in hours) was (6.018±1.44). Mean time for student to fall sleep in minutes was (25.00±17.44).

Ⓐ Mean PSQI score for students under study was (6.68±3.64).



**Figure 3: Distribution of students according to sleep quality**

**Table 3: mean differences of age and BMI according to sleep quality**

P-value	t-test	Mean ± SD	N	Sleep Quality	Variable
0.411	0.825	20.66 ± 0.7	102	Poor (>5)	Age (years)
		20.58 ± 0.55	67	Good (≤5)	
0.383	-0.875	22.47 ± 2.92	102	Poor (>5)	BMI (Kg/m <sup>2</sup> )
		22.87 ± 2.74	67	Good (≤5)	

\*p value ≤ 0.05 was significant

**Table 4 Association between sleep quality and socio-demographic characteristics**

95% CI	Odds ratio	P-value	$\chi^2$	Sleep quality		Study variables
				Good ( $\leq 5$ )	Poor ( $> 5$ )	
0.415-1.458	0.778	0.433	0.614	29 (43.3)	38 (37.3)	<b>Gender</b>
				38 (56.7)	64 (62.7)	<b>Male</b>
				67 (100.0)	102 (100.0)	<b>Female</b>
0.729-3.374	1.569	0.247	1.339	51 (76.1)	85 (83.3)	<b>Residence</b>
				16 (23.9)	17 (16.7)	<b>Urban</b>
				67 (100.0)	102 (100.0)	<b>Rural</b>
0.094-24.89	1.53	1.000 <sup>f</sup>		66 (98.5)	101 (99.0)	<b>Marital status</b>
				1 (1.5)	1 (1.0)	<b>Single</b>
				67 (100.0)	102 (100.0)	<b>Married</b>
						<b>Total</b>

\*p value  $\leq 0.05$  was significant. F:fisher-exact test.

**Table 5 Association between sleep quality and academic performance**

95% CI	Odds ratio	P-value	$\chi^2$	Total	Academic performance		Study variable
					Success in all subjects	Fail in one or more subjects	
<b>1.045-4.505</b>	<b>2.17</b>	<b>0.035*</b>	<b>4.421</b>	102 (60.4)	67 (55.4)	35 (72.9)	<b>Sleep quality</b>
				67 (39.6)	54 (44.6)	13 (27.1)	<b>Poor (<math>&gt; 5</math>)</b>
				169 (100.0)	121 (100.0)	48 (100.0)	<b>Good (<math>\leq 5</math>)</b>
							<b>Total</b>

\*p value  $\leq 0.05$  was significant.

**Table 6 Association between sleep duration and academic performance**

P-value	$\chi^2$	Total	Academic performance		Study variable
			Success in all subjects	Fail in one or more subjects	
0.773	1.117	47 (27.8)	33 (27.3)	14 (29.2)	<b>Sleep duration (in hours)</b>
		59 (34.9)	40 (33.1)	19 (39.6)	<b>(&gt;7 hours)</b>
		42 (24.9)	32 (26.4)	10 (20.8)	<b>(6-7 hours)</b>
		21 (12.4)	16 (13.2)	5 (10.4)	<b>(5-6 hours)</b>
		169 (100.0)	121 (100.0)	48 (100.0)	<b>(&lt;5)</b>
					<b>Total</b>