

Sleep Quality among Medical Students at King Abdulaziz University: A Cross-sectional Study

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Abstract

Poor sleep quality and Excessive Daytime Sleepiness (EDS) can affect the performance of medical students, their future work as practitioners, and the whole health care system. The study was done to determine the prevalence and predictors of poor sleep quality among medical students in King Abdulaziz University (KAU), Jeddah, Saudi Arabia.

A cross-sectional study was done among 576 medical students who were selected through multi-stage stratified random sample. A standardized, confidential, self-administered data collection sheet was utilized. Pittsburg Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Hospital Anxiety and Depression Scale (HADS) were utilized. Descriptive, inferential statistics and multiple logistic regression analysis were done.

Results revealed that prevalence of poor sleep quality and EDS among medical students were 70.4% and 37.3%, respectively. Poor sleep quality was associated with students' gender, age, high-Grade Point Average (GPA), anxiety, depression, EDS and drinking caffeinated beverages. Students with poor sleep quality had low ability to attend educational sessions. After controlling confounding, the first predictor of poor sleep quality was having anxiety. Those with morbid anxiety were about 4 times more liable to have poor sleep quality compared to others (aOR=3.92; 95% CI: 2.46-6.24). The second predictor of poor sleeping was enrollment in the basic academic years.

It is concluded that poor sleep quality was prevalent among medical students in KAU. Anxiety and enrollment in basic-years were the predictors. Screening programs for sleep disorders, anxiety, and depression among medical students are required. Sleep educational programs, stress management courses and lifestyles modifications are recommended.

Keywords: Sleep quality; Daytime sleepiness; Anxiety; Depression; PSQI; ESS

Introduction

Sleep medicine is an important medical discipline [1] which has gained a considerable attention nowadays [2]. Poor sleep quality is considered one of the most striking public health problems. The rates of poor sleep quality is increasing in both developing and modern societies [3,4]. It was estimated that the prevalence of sleep disorders among the general population ranged from 22%-65% [5,6].

Sleep deprivation may have grave health consequences; resulting in increasing disease morbidity and mortality. It was postulated that sleep deprivation may be associated with defect in the immune function, and may be implicated in the pathogenesis of psychological problems and metabolic problems (diabetes mellitus, metabolic syndrome and obesity) [7]. Attention and concentration difficulties were linked to poor sleep quality among students [8] as good sleep is essential for the best of neuro-cognitive functions, psychomotor performance, physical and mental health [4].

Medical students are vulnerable group to poor sleep [4]. Studies showed that prevalence of poor sleep quality is higher among medical compared to non-medical students and the general population. Medical students are considered a stressful group of students [9,10] and this may be attributed to their extended study years, high academic load (long duration and high concentration), clinical duties, emotionally challenging work, and the highly demanding lifestyle [4].

Poor sleep quality and Excessive Daytime Sleepiness (EDS) may affect the performance of medical students [11] and their future work performance as practitioners. So, this can affect the health care system also [4]. Abdulghani et al. conducted a study in Riyadh and reported that 36.6% of their medical students had abnormal sleep habits [5]. Screening for poor sleep quality among medical students is an essential step for identifying the magnitude of the problem, and managing it. This can ultimately lead to improve the quality of patients' care provided by upcoming future physicians [4].

Limited number of studies were done to determine sleep quality among a large sample of medical students from all grades in King Abdulaziz University (KSA), Jeddah, Saudi Arabia. So, it is necessary to explore this important issue among a big sample of students. The objective of the study was to identify the prevalence and predictors of

poor sleep quality among medical students in KAU, Jeddah, Saudi Arabia.

Material and Methods

Ethical statement

The study was complied with standards of “Helsinki declaration”. The study proposal was approved by the Institutional Review Board (IRB) of KAU, with a Reference Number of 336-14. Approval for using PSQI was obtained from the auhor. Administrative approvals and participants’ informed written consents were taken. A cross-sectional study was conducted among medical students who completed the freshman year, during 2015/2016. A multi-stage stratified random sampling technique (considering gender and academic year) was used. The sample size was calculated according to the formula [12]:

$$n=Z^2 \times p \times q/d^2$$

The total calculated sample was size 560 participants; Z=1.96, p was set as 0.37 (according to the recent study from Riyadh) 5, q=1- p=0.63, and d was set at 0.04.

A standardized, anonymous, confidential, self-administered data collection sheet was used. It inquired about personal, socio-demographic information, habits and educational achievement. Pittsburgh Sleep Quality Index (PSQI) self-rated scale, [13] the standardized ESS scale [14] and Hospital Anxiety and Depression Scale (HADS) [10] were used. All these scales had good validity and reliability [10,13,14]. Sleep hygienic practices were also determined. The face and content validity of the sheet was assessed by 2 experts. Internal-consistency reliability was found to be 0.81 using Cronbach's alpha test.

Statistical analysis

SPSS version 21 (SPSS Inc., Chicago, IL) was used. The seven components PSQI were summed and the total score ranged from 0 to

21. The higher scores (a total score ≥ 5) indicates poorer sleep quality [13]. ESS score was calculated, and participants who had a score >10 were classified as having EDS [14]. Furthermore, the score of HADS (HADS-Anxiety) and (HADS-Depression) [10], crowding index and Body Mass Index (BMI) were calculated. Descriptive statistics was done. Inferential statistics were done using Pearson's Chi-Square (X^2), Odds Ratio (OR) with 95% Confidence Intervals (C.I.s). A multiple logistic regression analysis was done to detect the predictors of poor sleep quality after controlling confounding factors, with calculation of the adjusted Odds Ratio (aOR). All P-value <0.05 were considered statistical significant.

Results

The total number of students participated in the research was 576 students, with a slight increase more than the sample for the stratification purpose. Their mean age was 21.0 ± 1.46 years. Most of participants (88.5%) were night users of social media. The prevalence of morbid anxiety (HADS-A) was 34.0% (28.6% and 41.9% among males and females, respectively). The prevalence of morbid depression (HADS-D) was 16.8% (16.0% among males 17.3% among females). It was found that 70.4% of our participants had poor sleep quality as classified by PSQI, and 37.3% had EDS. The calculated means of total PSQI, nocturnal sleep duration, and sleep latency were 7.23 ± 2.97 hours, 5.65 ± 1.45 hours, 28.0 ± 22 minutes, respectively.

Table 1 shows that females reported significantly higher prevalence of poor sleep quality (73.8%) compared to males (64.6%). Younger students (aged ≤ 21 years) were about two and half times more prone to have poor sleep quality compared to older participants (OR=2.4; 95% CI: 1.62-3.55). Obese students, smokers and the night users of social media had a higher prevalence of poor sleep quality compared to their comparative partners, but without statistical significant difference ($P>0.05$).

Sleep quality/Variable	Poor (No=406)		Good (No=170)		X^2	P	OR	95%	C.I.
	No.	%	No.	%					
Gender									
Female	273	73.8	97	26.2	5.41	0.02	1.55	1.07	2.23
Male	133	64.6	73	35.4	5.41				
Age									
≤ 21	272	74.9	91	25.1	9.32	0.002	1.76	1.22	2.54
≥ 21	134	32.9	79	37.1					
Educational year									
Basic	188	80.7	45	19.3	19.57	0.000	2.40	1.62	3.55
Clinical	218	63.6	125	36.4					
Residence									
With family	360	69.4	159	30.6	3.17	0.08	0.54	0.27	1.07
Dormitory	46	80.7	11	19.3					

Marital status									
Single	390	70.7	162	29.3	0.18	0.65	1.20	0.51	2.87
Married	16	66.7	8	33.3					
Crowding index									
≥ 2 persons/room	54	70.1	23	29.9	0.01	0.94	0.98	0.58	1.66
≤ 2 persons/room	352	70.5	147	29.5					
Having other job									
Yes	10	71.4	4	28.6	0.01*	0.94	1.05	0.32	3.39
No	396	70.5	166	29.5					
BMI									
Normal ^{RC}	273	70.4	115	29.6	1.24	0.5	1	-	1
Overweight	83	68.0	39	32.0			0.9	0.58	1.39
Obese	50	75.8	16	24.2			1.32	0.72	2.41
Smoking									
Yes	30	75.0	10	25.0	0.42	0.52	1.28	0.61	2.67
No	376	70.1	160	29.9					
Night use of social media									
Yes	360	70.6	150	29.4	0.05	0.82	1.07	1.07	1.87
No	45	69.2	20	30.8					

*Fisher's exacts test; ^{RC}Referent category

Table 1: Relationship between sleep quality with personal, socio-demographic variables and habits of medical students in King Abdulaziz University.

Table 2 demonstrates that students who obtained excellent grades (GPA ≥ 4.5) in the preceding semester had significantly higher prevalence of poor sleep quality compared to others (P<0.05). Participants who attended <50% of the educational sessions were more poor sleepers compared to others. It is apparent from the table that prevalence of poor sleep quality was higher among students diagnosed

as having morbid anxiety (83.2%) or borderline anxiety (73.5%) compared to normal students (54.1%). A highly statistical significant difference was present (P<0.001). A similar trend was observed regarding depression (p<0.01). The table also reveals presence of positive association between poor sleep quality and daytime sleepiness (X²=6.46, P<0.05).

Sleep quality/Variable	Poor (No=406)		Good (No=170)		X ²	P	OR	95%	C.I.
	No.	%	No.	%					
GPA									
≥ 4.5	235	73.9	83	26.1	3.98	0.04	1.44	1.06	2.06
≤ 4.5	171	66.3	87	33.7					
Attending sessions									
≥ 50%	373	69.3	165	30.7	5.23	0.02	0.34	0.13	0.89
≤ 50%	33	86.8	5	13.2					
Anxiety									

Morbid	178	83.2	36	16.8	42.65	0.000	4.20	2.70	6.62
Border line	122	73.5	44	26.5			2.35	1.51	3.67
NormalRC	106	54.1	90	45.9			1	-	-
Depression									
Morbid	80	82.5	17	17.5	13.92	0.001	2.57	1.64	4.55
Border line	114	75.5	37	24.5			1.69	1.09	2.60
NormalRC	212	64.6	116	65.4			1	-	-
Daytime sleepiness									
Abnormal	165	76.7	50	23.3	6.46	0.01	1.46	1.12	2.41
Normal	241	66.8	120	33.2					
RC: Referent category									

Table 2: Relationship between sleep quality with academic variables, anxiety, depression and daytime sleepiness among medical students in King Abdulaziz University.

Relationships between sleep quality and medical students' sleep and poor sleep quality (P<0.05). On the other hand, taking daytime hygienic practices is presented in Table 3. A significant statistical association was found between consumption of caffeinated beverages nap and practicing physical exercise were not associated with sleep quality.

Sleep quality/Variable	Poor (No=406)		Good (No=170)		X ²	P	aOR	95%	C.I
	No.	%	No.	%					
Consumption of caffeinated beverages									
Yes	247	74	87	26	4.59	0.03	1.48	1.03	2.13
No	159	65.7	83	34.3					
Daytime nap									
Yes	360	71.9	141	28.1	3.47	0.06	1.61	0.97	2.66
No	46	61.3	29	38.7					
Practice physical exercise									
Yes	184	69.2	82	30.8	0.41	0.52	0.89	0.69	1.27
NO	222	71.6	88	28.4					

Table 3: Relationships between sleep quality and sleep hygienic practices among medical students, King Abdulaziz University.

Logistic regression analysis Table 4 illustrates that the first predictor of poor sleep quality was having anxiety. Those with morbid anxiety were about 4 time more prone to poor sleep quality compared to others (aOR: 3.92; 95% CI: 2.46-6.24). The educational year of student was the second predictor; students enrolled in the basic medical years were about twice more likely to be poor sleepers compared to those in the clinical years (aOR: 1.82; 95% CI: 1.11-3.00).

Variable	Beta	P	aOR	95% CI
Anxiety				
Morbid Anxiety	1.366	0.000	3.92	2.46-6.24
Borderline Anxiety	0.555	0.031	1.74	1.05-2.88

No Anxiety^{RC}	1			
Basic Academic years	0.60	0.018	1.82	1.11-3.00
Constant	-2.648			

Table 4: Logistic regression analysis of the predictors of poor quality of sleep among medical students, King Abdulaziz University.

Discussion

Our results revealed presence of high prevalence of poor sleep quality (70.4%) among medical students. This may be attributed to numerous activities and stresses facing medical students, which may necessitate excessive study during night. This rate coincides with other two recent studies from Pakistan [9] and Spain [11]. Such high rates of poor sleep among medical students from different countries requires great concerns for dealing with stresses facing medical students. This can be improved through counseling and regular education to improve behavior and lifestyle. On the other hand, lower rates of poor sleep were reported from older studies from the USA [15] and Lithuania [16]. This discrepancy may be attributed to the differences in sample sizes, race, target population, or the time of conduction of the studies. In addition, nowadays there is a marked increase in the night use of social media, which may increase the percentages of poor sleepers (as apparent from the current study).

In the present study, females were more poor sleepers compared to males, which agrees with many previous studies [17-21]. The cause behind gender difference in sleep quality remains unobvious. However, this may be attributed to higher prevalence of psychologic problems as anxiety and depression among females compared to males, and the association between these problems and sleep disturbance [22]. This is also apparent in the current study from the higher rates of psychologic problems-especially anxiety- among females compared to males. On the other hand, a study from India showed that the prevalence of poor sleeping was higher among males compared to females. This may be attributed to the high prevalence of addiction among males in their study. This may increase the daytime sleepiness and poor sleep quality among their males [23].

Younger students (≤ 21 years) and those enrolled in the basic educational years in the current study had higher rates of poor sleep quality compared to comparative partners and enrollment in the basic year was the one predictor of poor sleeping. This may be attributed to the high number of lectures, study load during the early pre-clinical years. Those participants may not adequately adapted to such high load after studying at secondary schools. Anxiety and the pressure of passing the first years of medical school might also play role [24]. This finding coincides with results of a study of Brick et al. from California University, USA [15]. It agrees also with results of a recent study, 2017, from Egypt [21]; as students enrolled in the preclinical years obtained higher score of PSQI compared to others. On contrary, the Indian study [23] revealed a significant positive association between age and poor sleep quality. This inconsistency of results may be because the Indian study was conducted among undergraduates, interns and post-graduate physicians. The latter two groups may have more load, stresses, and night on-calls. This may precipitate poor sleeping; as doctors may suffered from acute sleep deprivation during their on-calls [23,25].

Students lived in university dorms in the present study had a higher prevalence of poor sleep quality compared to those living with their

family. This result coincides with results of the Egyptian study [21]. Regarding academic performance, our results found that better achievers ($GPA \geq 4.5$) had poorer sleep quality compared to others. This result is in line with the results of Bahammam et al. from Riyadh, KSA [26]. However, another Riyadh's study [5] revealed positive correlation between total sleeping hours and GPA. This difference may be because the latter study involved medical students enrolled in the first 3 grades (1st-3rd) of medical education, or may be because they used ESS for assessing sleep quality, or because they had a lower cut-off point for measuring the academic achievement ($GPA \geq 3.75$).

Vagas et al illustrated presence of negative associations between BMI and sleep quality [27]. Similarly, obese students in the current work had a higher prevalence of poor sleep compared to others, but without statistical significant difference.

Smokers in the current study were more poor sleepers compared to others, but without statistical significant difference. On the other hand, the results from India revealed presence of such association [23]. This difference might be explained by the low smoking prevalence among our participants.

EDS was significantly higher among participants with poor sleep quality in the present work compared to others. This result agrees with the results of a many other studies [5,19,20,24]. Our results revealed that most of the students (86.8%) who attended only <50% of the educational sessions were poor sleepers, which is in line with the results from Virginia, USA [28]. A major component of poor sleep quality is later sleep and wake times and this might be the reason behind inability to attend their classes. In the current study, anxiety was the first predictor of poor sleep quality, which is in line with the results of studies from India [23] and Ethiopia [29].

In the current study, anxiety was the first predictor of poor sleep quality among medical students. Similarly, the Egyptian study reported presence of a significant positive correlation between anxiety and PQSI scores [21]. Furthermore, students who were categorized as having morbid depression (HADS-Depression) were more poor sleepers than others. This finding coincides with results from Virginia [28], Ethiopia [28,29] and Egypt [21]. There is an evidence of association between depression and insomnia [4] and hence with poor sleeping.

Our results revealed absence of statistical association between the night use of social media and sleep quality. This may be attributed to the high percentage of those used social media at night, or due to the multitude of other factors masking the effect of electronic usage on poor sleep quality among Saudi medical students.

Concerning sleep hygienic practices, our results found that consumption of caffeinated beverages was associated with poor sleep quality. This result agrees with the findings of Sanchez et al. [30] in their study done among Students from Peruvian College (Peru). In the current study, students who took a daytime naps had a higher percentage of poor sleep quality compared to others, but without statistical significant difference.

Conclusion

A high prevalence of poor sleep quality and EDS were prevailed among medical students in the current study. Gender, age, GPA, anxiety, depression, EDS and drinking caffeinated beverages were associated with poor sleep in bivariate analyses. Anxiety and enrollment in basic academic years were the predictors of poor sleep quality. There is a need for public health policies for screening for sleep quality, anxiety and depression among medical students among medical students. This will help in early detection and management of such conditions. Behavioral and educational interventions for improving sleep quality are essential for ensuring proper sleep and lifestyle of medical students and the future practitioners. Sleep educational programs, stress management courses and lifestyles modifications are required.

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