Original Article

Sleep Patterns and Predictors of Poor Sleep Quality among Medical Students in King Khalid University, Saudi Arabia

Aesha Farheen Siddiqui[1], Hasan Al-Musa[1], Hasan Al-Amri[2], Abdulkareem Al-Qahtani[3], Mushabab Al-Shahrani[3], Mohammad Al-Qahtani[3]

[1] *Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

[2] *Department of Psychiatry, College of Medicine, King Khalid University, Abha, Saudi Arabia*

[3] *College of Medicine, King Khalid University, Abha, Saudi Arabia*

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Abstract

***Background*: Sleep problems and poor sleep quality are important issues for medical students. This study aimed to investigate the sleep patterns, measure the prevalence of poor sleep quality, and identify the predictors of poor sleep among medical students in King Khalid University (KKU), Saudi Arabia.**

***Methods*: This cross-sectional study enrolled 318 medical students during October–November, 2015. Participants were selected by convenience sampling and data were collected using self-administered questionnaires to obtain information regarding socio-demographic variables and indicators of sleep quality.**

***Results*: The overall mean sleep quality score was 6.79 with a standard deviation of 3.06. Poor sleep quality was reported by 74.2% students. Significantly high mean sleep quality scores (Pittsburgh Sleep Quality Index) were observed for students with very poor subjective sleep quality (mean = 10.50, SD = 2.58), least sleep efficiency (mean = 11.21, SD = 2.23), shorter sleep duration (mean = 7.83, SD = 2.88), sleep onset latency more than 30 minutes (mean = 7.82, SD = 2.53), sleeping after midnight (mean = 7.53, SD = 2.95), and use of sleep aiding medication (mean = 8.78, SD = 3.5). Significant differences were observed between good sleepers and poor sleepers regarding these sleep characteristics. Poor sleep was predicted by sleep behaviours such as going to sleep after midnight (AOR = 2.18, 95% CI: 1.20, 3.94) and sleep duration of less than seven hours (AOR = 7.49, 95% CI: 4.24, 13.22).**

***Conclusion*: Medical students of KKU have poor sleep quality. Longer sleep latency, going to sleep after midnight, and shorter sleep duration are important problems in this group.**

***Keywords*:** *sleep, habits, sleep deprivation, sleep initiation and maintenance disorders, medical students, Saudi Arabia*

Introduction

Sleep is a biological necessity (1). It is important for maintaining good physical, mental, and emotional health (2) and is one of the most important factors that establish quality of life (3). Sleep is critical for memory consolidation, learning, decision making, and critical thinking (4, 5). Sleep is thus necessary for the optimal operation of key cognitive functions related to academic success in higher education. Higher education forces students to shift to an irregular

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sleep–wake cycle influenced by their study and work schedules.

The magnitude of the problem can be assessed on the basis of studies that demonstrate that both sleep deprivation and poor sleep quality are prevalent in college student populations. University students reported at least twice as many sleep difficulties as the general population according to a study in the United States (6). A regional study reported that about half to three quarters of college students reported sleepiness during the day as a result of insufficient sleep, which can end in serious outcomes, including poor academic performance, reduced coping mechanisms for college and life requirements, and increased risk for road traffic accidents (7).

Sleep deprivation has been shown to have a significant impact on mood, alertness, cognitive functions, and motor activity. These are important aspects in the life of medical students which is a typical group as medical studies are more demanding in terms of course content as well as working hours (8). Medical students and house medical staff work for long hours daily, thus raising concerns about the severe effects of poor sleep quality in student training, medical errors, and patient safety (9). It has been reported that sleep quality affects medical student's physical and mental health, and consequently their working capacity (10). This in turn may influence the community in the form of accidents and medical error.

Many factors are responsible for altered sleep habits. In current times, use of the internet and social media is the most important cause for going to sleep late. Another cause of not going to sleep until late is the use of central nervous system stimulants such as caffeine, caffeinated drinks, and caffeinated cocktails with alcohol. Furthermore, certain medical problems including obstructive sleep apnoea, chronic sleep deprivation, narcolepsy, cataplexy, depression, and idiopathic hypersomnia disrupt sleep (11, 12). It is also understood that many students are themselves unaware of their sleep deprivation or poor sleep quality. They may not seek counselling or advice regarding this important problem.

It is important to pay attention to sleep disorders in medical students because of their negative impact on quality of life, cognitive performance, and other associated health disorders. These problems can be solved by carefully investigating the prevalence of such problems and finding a solution. However, despite the importance of sleep hygiene, few studies in Saudi Arabia have assessed sleep quality and sleep problems of medical students. Owing to the special status of the medical student as described above, this study was conceptualised with the objective of describing the sleep patterns, measuring the prevalence of poor sleep quality and identifying the predictors of poor sleep among this group of students of (KKU), Saudi Arabia. To our knowledge, this is the first study about sleep quality, among medical students of this region (Southwest) of Saudi Arabia. The structure of the medical course in King Khalid University is similar to medical courses in other parts of Saudi Arabia, and the study findings can be generalised to medical students across Saudi Arabia. With this data, awareness can be raised in both medical students and teaching staff about the dangerous effects of sleep disturbances.

Material and Methods

This cross-sectional study was conducted on medical students of King Khalid University, Abha, Saudi Arabia in October–November 2015. Based on a prior similar study in Jizan, Saudi Arabia (13), reporting a 65% response distribution for poor sleep quality and using a 95% confidence interval with margin of error as 5%, the target sample size was calculated as 327. The sample size was increased to 375, expecting some students to incompletely answer the questionnaire or not return it. The required number of students was selected by convenience sampling method from pre-clinical and clinical levels of KKU medical college, excluding those with any diagnosed sleep or psychiatric disorder. Proportionate numbers of male and female students (2:1) were recruited until the sample size was reached.

Study Instrument

A self-administered questionnaire was constructed for extracting information on sociodemographic characteristics, physical activity patterns, sleep quality and daytime sleepiness of students. The physical activity patterns, daytime sleepiness and its effect on sleep quality are described elsewhere by the researchers. The sleep quality is based on the Pittsburgh Sleep Quality Index - PSQI (14). The PSQI is a 19-item self-reported questionnaire that evaluates sleep quality over the previous

month. The developers of this instrument have reported that the PSQI has internal consistency and a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components (14). The PSQI yields seven sleep components related to sleep habits including duration of sleep, sleep disturbance, sleep latency, habitual sleep efficiency, use of sleep medicine, daytime dysfunction and overall sleep quality. The sleep components yield a score ranging from 0 to 3, with 3 indicating the greatest dysfunction. The sleep component scores are summed to yield a total score ranging from 0 to 21 with higher total scores (referred to as global scores) indicating poor sleep quality. Participants with a global score of ≥ 5 were classified as poor sleepers. Those with a score of < 5 were classified as good sleepers. For analysis, we computed dichotomous variables of optimal and suboptimal sleep quality for the sleep quality subscales, which consist of sleep latency, sleep efficiency, going to sleep after midnight, sleep duration and use of sleep medication. Specific categories were long sleep latency (≥ 30 minutes versus < 30 minutes); poor sleep efficiency (< 85% versus ≥ 85%); short sleep duration (< 7 hours as compared to ≥ 7 hours), going to sleep after midnight (yes or no), sleep medication use during the past month (yes or no).

Statistical Analysis

The data entry and analysis was performed using the software package, Statistical Package for Social Sciences, version 17.0 (15). Categorical variables were expressed as proportions and continuous variables were expressed as the mean ± standard deviation (SD).

The independent sample *t*-test and one-way ANOVA were used for analysing the continuous variables and studying the differences between groups for mean sleep quality scores. Chi-square test was used to compare categorical data and to find the association of socio-demographic variables and sleep characteristics with sleep quality. Multivariate logistic regression (main effect model) was applied to ascertain the predictors of poor sleep quality. All associations were considered significant at $P < 0.05$.

Ethical Consideration

The study was conducted with approval of the institutional ethics committee of King Khalid University (REC#2015-05-12). The students were briefed about the purely scientific objective of the study and their informed consent was obtained for participation. Anonymity and confidentiality of the information were assured and participants were free to withdraw from the study at any stage.

Results

Basic information about the study group is presented in Table 1. A total of 318 students returned completely filled forms, generating a response rate of 85%. Of these, 206 were males and 112 were females. The mean age of the study group was 22.35 years, ranging between 22 and 27 years. One hundred students were in preclinical years (academic levels 3–6) and 218 students studying in clinical years (academic levels 7–12). Most of them were non-smokers and lived in private accommodation. Twenty-six students had been previously diagnosed with a chronic disease (Diabetes/Hypertension/Bronchial asthma).

Table 1. Socio-demographic characteristics of study group

Variable	*n* (318)	%
Age		
Up to 22	151	47.5
More than 22	167	52.5
Gender		
Male	206	64.8
Female	112	35.2
Level of study		
Preclinical	100	31.4
Clinical	218	68.6
Marital Status		
Single	291	91.5
Married	27	8.5
Housing		
Own	277	87.1
Rented	41	12.9
Smoking		
No	276	86.8
Yes	42	13.2
Chronic Disease		
No	292	91.8
Yes	26	8.2

Table 2 describes the mean and standard deviation of sleep quality in respondents. The mean PSQI score was 6.79, which indicates overall poor sleep quality. Average sleep latency was 24.35 minutes. Mean time for going to sleep

was calculated as almost an hour past midnight (12:47 am). Sleep duration was normally distributed with mean duration six hours and standard deviation of about two hours.

Table 2. Average measures of sleep quality

Sleep Variable	Mean (SD)
PSQI Scores	6.79 (3.06)
Time of going to sleep	12.47 am (1.63)
Sleep Latency (minutes)	24.35 (22.24)
Sleep duration (Hours)	6.07 (1.94)

We compared the mean scores between different groups based on various socio demographic and sleep characteristics using independent samples *t* test and one-way ANOVA. Table 3 describes these results. None of the sociodemographic variables showed any significant difference in the mean sleep quality score. Only the variables with significant differences between mean PSQI scores are described here. There was a significant difference in the mean PSQI scores of students who reported a good sleep quality (mean = 3.07, SD = 0.93), compared to those with a poor sleep quality (mean = 8.08, SD = 2.42); (t = 13.23, df = 316). Students with sleep duration less than seven hours had a significantly higher mean PSQI score compared to those with more than seven hours sleep (mean = 7.83, SD = 2.88); (t = 9.82, df = 316); P < 0.01. Students going to sleep later than midnight had significantly poorer sleep quality (P < 0.01), than those going to sleep earlier (t = 4.07, df = 316). The group using medicine to aid sleep had significantly poorer sleep quality scores (mean = 8.78, SD = 3.5) compared to the group who did not use medication, at P < 0.05, (t = 2.50, df = 316). It is notable that subjective assessment of very good or good sleep quality was reported by 109

Table 3. PSQI scores and comparison of sleep characteristics of the study group

Sleep characteristics	*n* (%) 318 (100)	Mean Difference/ partial η2*	95% CI of the difference	df	*t* value/ F value*	*P*
Sleep quality						
Poor sleeper	236 (74.2)	-5.01	-5.5 to -4.4	316	18.23	<0.001
Good sleeper	82 (25.8)					
Subjective Sleep quality						
Very good	109 (34.3)	0.42	–	(3,314)	76.448*	<0.001
Fairly good	133 (41.8)					
Very bad	40 (12.6)					
Fairly bad	36 (11.3)					
Sleep efficiency						
≥ 85%	209 (65.7)	0.37	–	(3,314)	62.12*	<0.001
75–85%	55 (17.3)					
65–75%	26 (8.2)					
< 65%	28 (8.8)					
Sleep onset latency						
Within 15 mins	111 (34.9)	0.50	–	(3,314)	5.49*	0.001
15–20 mins	81 (25.5)					
20–30 mins	54 (17)					
More than 30 mins	72 (22.6)					
Sleeping after midnight						
Yes	146 (45.9)	1.37	0.7 to 2.0	316	4.07	<0.001
No	172 (54.1)					
Sleep duration (Hours)						
Sleep less than seven hours	212 (66.7)	3.14	2.5 to 3.7	316	9.82	<0.001
Sleep more than seven hours	106 (33.3)					
Medicine use for sleep						
Yes	14 (4.4)	-2.08	-3.7 to -4.4	316	2.50	0.013
No	304(95.6)					

df = degree of freedom.

(34.3%) and 133 (41.8%) students respectively. On testing for significance, the one way ANOVA showed a significant difference across the groups in their PSQI scores, F(3,314) = 76.45, with those reporting very bad sleep quality having the highest mean PSQI scores (mean = 10.50, SD = 2.58). Also, almost two-thirds of students (65.7%) scored 85% or more in the sleep efficiency component, however, here the one way ANOVA also revealed a significant difference between the groups, F(3,314) = 62.12; $P < 0.01$; with the least sleep efficiency group (< 65%) having the highest mean PSQI scores (mean = 11.21, SD = 2.23). Sleep onset latency within 15 minutes was reported by 111 (34.9%) students and within more than 30 minutes by 72 students. There were significant differences between the groups; F (3,314) = 5.49, $P < 0.05$. Post hoc analysis using the Tukey HSD and Scheffe test confirmed that sleep quality was significantly poorer in students who reported poor subjective quality of sleep ($P < 0.001$) compared to those who reported a better sleep quality; in students with longer sleep latency i.e., more than 20 minutes ($P = 0.018$) and more than 30 minutes ($P = 0.006$) as compared to the other groups and in those reporting poorest sleep efficiency i.e. < 65% ($P < 0.001$) compared to those with better sleep efficiency.

After the analysis, we designated two groups of students based on their PSQI scores; 'poor sleepers' with PSQI score ≥ 5, and 'good sleepers' with PSQI scores < 5. We further analysed the differences between these two groups for various socio-demographic and sleep characteristics using the chi square test. To remove the effect of confounding and to identify the predictors of poor sleep quality we analysed our data using multinomial logistic regression (main effect model). The Cox and Snell Pseudo-R^2 was 0.22 and Nagelkerke's Pseudo-R^2 was 0.32. The classification table overall percentage correct was 80.5%. Odds ratios, 95% confidence intervals, and the significance levels are displayed in Table 4.

Students going to sleep late (after midnight) were more likely to have poor sleep quality, compared to those who did not go to sleep late, which was significant ($P < 0.05$, AOR = 2.18, 95% CI: 1.20, 3.94). Students with sleep duration of less than seven hours were significantly more likely to have poor sleep quality, compared to students with seven or more hours of sleep per night; ($P < 0.001$, AOR = 7.49, 95% CI: 4.24, 13.22). Specific sleep behaviours of going to sleep late and shorter sleep duration were thus identified as predictors of poor sleep quality. On the other hand socio demographic characteristics, namely; age, gender, marital status, level of study, housing, and presence of a chronic disease, smoking status and also the use of sleep medication, did not show any significant association with sleep quality.

Discussion

The current study revealed important information about the sleep habits and problems of an important group of young people i.e. medical students. The outstanding result of the present study was that almost three-quarters of the study group had poor sleep quality. These findings are supported by many of the studies on medical students worldwide that have shown a high proportion of students with poor sleep quality (16–19). The average sleep duration of our study group was six hours and it followed a normal distribution. This result is similar to the results in quite a few studies from different parts of the world with average sleeping hours around six hours per day. One study in Ethiopia revealed mean sleep duration of less than six hours by 44% of students (20). In studies in Pakistan (21) and Palestine (22). The mean total sleep time was also reported as six hours. In a study in India, majority of the medical students slept between six and seven hours (23). It is well known that medical course places critical demands on student's time and these findings point to the fact that this time is etched out from the student's sleeping hours.

An important finding of the study was that, on probing for subjective sleep quality, an overwhelming majority of students reported a very good or good sleep quality. In addition, almost two- thirds of students scored 85% or more in the sleep efficiency component; which indicates very good sleep efficiency. This contradictory finding of poor measured sleep quality coupled with good subjective sleep was also reported in other studies, including a study in Ethiopia which reported a good or very good subjective sleep quality by a majority of students, while a high percentage (55.8%) had high PSQI scores indicating poor sleep quality (20). In the present study, the statistical analysis, however, confirmed a significantly poorer sleep quality in those students who reported poor sleep efficiency and poor subjective sleep quality. These findings indicate that there is habitual acceptance of any sleep as good sleep by medical students.

Table 4. Comparison of sociodemographic, sleep characteristics between poor and good sleepers

Characteristics	Poor quality sleepers (236)	Good quality sleepers (82)	Crude OR	95% CI	Unadjusted *P*-value	Adj. OR	95% CI	Adjusted *P*-value
SOCIO-DEMOGRAPHIC								
Age								
Up to 22	114	37	1.13	0.68–1.88	0.61	1.43	0.66–3.11	0.35
More than 22	122	45						
Gender								
Male	152	54	0.93	0.55–1.59	0.81	0.81	0.42–1.55	0.52
Female	84	28						
Level of study								
Preclinical	77	23	1.24	0.71–2.16	0.44	1.67	0.73–3.82	0.22
Clinical	159	59						
Marital status								
Single	215	76	0.80	0.31–2.07	0.65	0.50	0.16–1.56	0.23
Married	21	6						
Housing								
Owned	210	67	1.80	0.90–3.61	0.09	1.85	0.80–4.29	0.14
Rented	26	15						
Smoker								
Yes	34	8	1.55	0.68–3.51	0.28	2.4	0.90–6.38	0.07
No	202	74						
Chronic disease								
Yes	20	6	1.17	0.45–3.03	0.74	1.69	0.56–5.14	0.35
No	216	76						
SLEEP BEHAVIOURS								
Sleeping after midnight								
Yes	122	24	2.58	1.50–4.43	<0.001*	2.18	1.20–3.94	0.010*
No	114	58						
Sleep duration								
<7 hours	186	26	8.01	4.57–14.03	<0.001*	7.49	4.24–13.22	<0.001*
≥7 hours	50	56						
Used sleep medication								
Yes	12	2	2.14	0.46–9.78	0.31	2.27	0.42–12.0	0.33
No	224	80						

*= significant, Crude OR (COR) = Unadjusted odds ratio, Adj.OR (AOR) = Adjusted odds ratio

A good proportion of students in this study reported going late to bed which is a common finding also reported in other studies (3, 7, 21–22).The interesting finding in the current study is related to sleep onset latency i.e. time taken to fall asleep after going to bed. Normal sleep onset latency should be within 15–20 minutes. Shorter as well as longer sleep onset latency indicates poor sleep (24). In the present study, sleep onset latency within 15 minutes was reported by more than one-third of students. Shorter sleep onset latency indicates sleep deprivation. All these findings may be explained by the fact that most medical students realise and accept early on in their academic course that it is demanding in terms of both physical and mental effort. It is habitual to study for long hours into the night as it is easier to concentrate, and also it is easier to find a continuous study period at this time of the day. Earlier studies have also concluded that due to demands of the academic environment, most medical students are involved in the late night study and excessive internet use and some also consume stimulants to stay awake at night (25). A study conducted in Lebanon among university students also concluded that almost 90% of the respondents went to bed late. Although there was no question in this study regarding use of stimulants or excessive internet usage as reasons for going to sleep late, these could be among the reasons for poor sleep habits like going to bed late and poor quality of sleep. Analysis of factors associated with sleep quality revealed that there are significant differences between good sleepers and poor sleepers as regards sleep characteristics like total sleep hours, sleep latency, and sleep efficiency. However, age, gender, level of study, marital status, housing, presence of a chronic disease and smoking status did not show any significant association with sleep quality.

Multiple logistic regression analysis revealed that sleep behaviours such as sleep duration and going to sleep after midnight are predictors of poor sleep quality. These findings are in agreement with prior studies, which suggested that sleep practices are related to overall sleep quality (21, 26, 27). The data from regression modelling in the study by Franklin Brown et al. indicated that sleeping behaviour, such as variable sleep schedules contributes to poor sleep quality (27).

The results of this study demonstrate that student's perception of their sleep quality is contrary to the objective measurements, indicating that students are usually not aware of the extent of their own problem. This has important implications, as sleep quality affects many aspects of physical and emotional health like cognition and memory, depression, irritability, and may also affect academic performance. Due to the growing concerns about the association of poor sleep quality with many physical and mental diseases, it is imperative to conduct additional research to examine potential causes, and implement appropriate preventive measures and treatment when needed. Though this study provides important insights into the sleep habits of medical students, it does have certain limitations. One major limitation is that all components of sleep quality that were assessed are subjective, and rely on the respondent's self-assessment.

Conclusion

This study has revealed exceptional information on the sleep quality of medical students. It established that most medical students have a poor sleep quality, which could be related to their sleep habits. Poor sleep quality did not show any significant relation to socio-demographic factors. This study highlights a strong need for integrating sleep hygiene education for young students, to improve their sleeping practices and consequent physical and mental health.

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Conflict of Interest

None

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Authors' Contribution

Conception and design: HAM, HAA, AAQ, MAS, MAQ
Analysis and interpretation of the data: AFS
Drafting of the article: AFS
Critical revision of the article for important intellectual content: AFS
Final approval of the article: AFS, HAM, HAA
Provision of study materials or patients: HAM, HAA, AAQ, MAS, MAQ
Statistical expertise: AFS
Administrative, technical, or logistic support: HAM, HAA
Collection and assembly of data: AAQ, MAS, MAQ

Correspondence

Dr. Aesha Farheen Siddiqui
MBBS (GMC, Barkatullah University, Bhopal, India)
MD - Preventive & Social Medicine (MGMMC, Indore University, India)
Dip. Family Medicine (AHERF, New Delhi and RCGP, UK)
Assistant Professor,
Department of Family and Community Medicine,
College of Medicine, King Khalid University,
Abha, Saudi Arabia
tel: 00966-591472255
E-mail: draeshasiddiqui@gmail.com

References

1. Gregory JM, Xie X, Mengel SA. Sleep (Sleep loss effects on everyday performance) model. *Aviat Space Environ Med*. 2004 Mar;**75(3 Suppl.)** A125–A133.

2. Colten HR, Altevogt BM, editors. *Sleep disorders and sleep deprivation: An unmet public health problem*. Institute of Medicine (US), Committee on Sleep Medicine and Research, Washington (DC): National Academies Press (US); 2006. http://dx.doi.org/10.17226/11617.

3. Ezquiaga AD, Vas CP, Neito GP, Blanco SA, Schweimer M, Roca L, et al. Sleep quality evaluation in medical students. *J Neurol Sci*. 2015;**357(Supp. 1)**:e435. http://dx.doi.org/10.1016/j.jns.2015.09.063.

4. Harrison Y, Horne JA. The impact of sleep deprivation on decision making: A review. *J Exp Psychol-Appl*. Sept 2000;**6(3)**:236–249. http://dx.doi.org/10.1037//1076-898X.6.3.236.

5. Mednick S, Nakayama K, Stickgold R. Sleep-dependent learning: A nap is as good as a night. *Nat Neurosci*. 2003;**6**:697–698. http://dx.doi.org/10.1038/nn1078.

6. Brown F, Buboltz W, Soper B. Prevalence of delayed sleep phase syndrome in university students. *Coll Stud J*. 2001;**35**:472–476.

7. Mirghani HO, Ahmed MA, Elbadawi AS. Daytime sleepiness and chronic sleep deprivation effects on academic performance among the Sudanese medical students. *J Taibah Univ Med Sci*. 2015;**10(4)**:467e470. http://dx.doi.org/10.1016/j.jtumed.2015.05.003.

8. Mirghani HO, Mohammed OS, Almurtadha YM, Ahmed MS. Good sleep quality is associated with better academic performance among Sudanese medical students. *BMC Res Notes*. (2015);**8**:706. http://dx.doi.org/10.1186/s13104-015-1712-9.

9. Buysse DJ, Barzansky B, Dinges D, et al. Sleep, fatigue, and medical training; setting an agenda for optimal learning and patient care. A report from the conference 'Sleep, fatigue, and medical training: optimizing learning and the patient care environment'. *Sleep*. 2003;**2**:218–225.

10. Mume CO, Olawale KO, Osundina AF. Excessive daytime sleepiness, nocturnal sleep duration and psychopathology among Nigerian university students. *South Afr J Psychiatry*. 2011;**17(4)**:108–111.

11. Pilcher JJ, Walter AS. How sleep deprivation affects psychological variables related to college students cognitive performance. *J Am Coll Health*. 1997;**46**:121–126. http://dx.doi.org/10.1080/07448489709595597.

12. Pagel JF. Excessive daytime sleepiness. *AM Fam Physician*. 2009;**79(5)**:391–396.

13. Mahfouz MS, Ageely H, Al-Saruri SM, Aref LA, Hejje NH, Al-Attas SA, et al. Sleep quality among Students of the Faculty of Medicine in Jazan University, Saudi Arabia. *Middle East J Sci Res*. 2013;**16(4)**:508–513. http://dx.doi.org/10.5829/idosi.mejsr.2013.16.04.75151.

14. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psyciat Res*. 1989;**28(2)**:193–213. http://dx.doi.org/10.1016/0165-1781(89)90047-4.

15. SPSS Inc. Released 2008. SPSS Statistics for Windows, Version 17.0, Chicago: SPSS Inc.

16. Lund HG, Reider BD, Whiting AB, Prichard JR.Sleep patterns and predictors of disturbed sleep in a large population of college students. *J Adolesc Health*. 2010;**46**:124–132. http://dx.doi.org/10.1016/j.jadohealth.2009.06.016.

17. Suen LK, Tam WW, Hon KL. Association of sleep hygiene-related factors and sleep quality among university students in Hong Kong. *Hong Kong Med J*. 2010;**16**:180–185. http://dx.doi.org/10.1080/07420520802397186.

18. Lima PF, DeMedeiros ALD, Rolim SAM, Junior SAD, Almondes KM, Araujio JF. Changes in sleep habits of medical students according to class starting time: a longitudinal study. *Sleep Sci*. 2009;**2(2)**:92–95.

19. Cheng SH, Shih CC, Lee IH, Hou YW, Chen KC, Chen KT, et al. A study on the sleep quality of incoming University students. *Psychiatry Res*. 2012;**197(3)**:270–274. http://dx.doi.org/10.1016/j.psychres.2011.08.011.

20. Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological correlates among university students in Ethiopia: a cross-sectional study. *BMC Psychiatry*. 2012;**12**:237. http://dx.doi.org/10.1186/1471-244x-12-237.

21. Surani AA, Zahid S, Surani A, Ali S, Mubeen M, Khan RH. Sleep quality among medical students of Karachi, Pakistan. *J.Pak Med Assoc*. 2015;**65(4)**:380–382.

22. Sweileh WM, Ali IA, Sawalha AF, Abu-Taha AS, Zyoud SH, Al-Jabi SW. Sleep habits and sleep problems among Palestinian students. *Child Adolesc Psychiatry Mental Health*. 2011;**5**:25. http://dx.doi.org/10.1186/1753-2000-5-25.

23. Giri PA, Baviskar MP, Phalke DB. Study of sleep habits and sleep problems among medical students of Pravara Institute of Medical Sciences, Loni, Western Maharashtra, India. *Ann Med Health Sci Res*. 2013;**3**:51–54.

24. Dement WC, Vaughan C. *The promise of sleep: A pioneer in sleep medicine explores the vital connection between health, happiness, and a good night's sleep*. New York: Dell Publishing; 1999.

25. Mume CO, Olawale KO, Osundina AF. Excessive daytime sleepiness, nocturnal sleep duration and psychopathology among Nigerian university students. *South Afr J Psychiatry*. 2011;**17(4)**:108–111.

26. Suen LK, Hon KLE, Tam WW. Association between sleep behavior and sleep-related factors among university students in Hong Kong. *Chronobiol Int*. 2008;**25(5)**:760–775. http://dx.doi.org/10.1080/07420520802397186.

27. Brown FC, Buboltz WC Jnr, Soper B. Relationship of sleep hygiene awareness, sleep practices and sleep quality in university students. *Behav Med*. 2002;**28(1)**:33–38.