

*Original Research Article*

# The Prevalence of Sleep Problems and its Impact on Sleep Quality and Academic Performance

Gwiria M.H. Satti<sup>1,2\*</sup>, Hanan F. Alsaaid<sup>3</sup>, Nihal M. Nabil<sup>1,4</sup>, Abdullah A. Saeed<sup>1</sup>,  
Nasir AlHamdan<sup>1</sup> and Nahid K. El-bakri<sup>5</sup>

## Abstract

<sup>1</sup>Department of Medical Basic Sciences, Faculty of Medicine, King Fahad Medical City, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia.

<sup>2</sup>Department of Biochemistry, Faculty of Medicine, University of Khartoum, Sudan

<sup>3</sup>Department of Physiology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

<sup>4</sup>Department of Anatomy, Alexandria University, Egypt

<sup>5</sup>Research Center, King Fahad Medical City, Riyadh, Saudi Arabia

\*Correspondence Author's E-mail:  
[gsatti@kfmc.med.sa](mailto:gsatti@kfmc.med.sa)

**This cross-sectional study examines the prevalence of sleep habits and problems among female medical students, and their correlation with perceived sleep quality and academic performance, using a self-administered questionnaire of Sleep and Daytime Habits (QS and DH). Grade Point Average (GPA) and Self Perceived Performance Grade (SPPG) were recorded. About 25% reported sleep problems. Perceived sleep quality was reported as excellent by 55.2% during no exams and by 28% during examination periods. The most prevalent sleep habit is going to bed late at night (Prevalence; 0.97), followed by drinking coffee late at night (Prevalence; 0.61). Taking sleeping pills prevalence was 0.21. The most two prevalent sleep problems were difficulty in falling asleep and wake up because of noise reaching a prevalence of 0.84, and 0.82 respectively. Leisure activity has significant correlation to both quality of sleep and GPA;  $p < 0.05$ . The quality of sleep was significantly correlated with getting late to bed, nightmares, tired feeling in the morning and using sleeping pills ( $p < 0.05$ ). GPA was only negatively correlated with sleep latency, and use of sleeping pills ( $p < 0.05$ ). Proper counseling, better planning and support should be provided to students likely to suffer from sleep disorders.**

**Keywords:** Academic performance, Medical students, Riyadh, Sleep problems, Sleep

## INTRODUCTION

Most adults take a consolidated 7-hour sleep during the night. The amount and timing of sleep and sleep architecture (sleep stages) are determined by several factors, important among which are the environment, circadian rhythms and time awake (Ferrara, 2001). Sleep is important for memory consolidation and learning and its deprivation results in sleepiness and impaired neurocognitive and psychomotor performance, learning abilities and consequent academic performance (Nojomi et al., 2009; Cursio et al., 2006). The prevalence of sleep disturbances appear to be of significant magnitude affecting about one third of adults ranging from 10 – 48%

(Cursio et al., 2006; Aldabal and Bahammam 2011; Bilcher and Walters 1997). Sleep disturbance is a considerable issue among adolescents and adults and it is associated with age, gender, living conditions, doing exercise and workload (Bilcher and Walter 1997; Doi et al., 2000; Lager et al., 2000). Students and educators typically do not realize that sleep habits may affect academic performance (Bilcher and Walters 1997). Medical students are a unique group of young adults whose academic commitments and lifestyle can impact their sleep habits and result in sleep deprivation ((Bahammam et al., 2005). The continuous academic

demand on this group of students may result in irregular sleep/wake patterns and poor sleep quality, which may in turn negatively impact academic performance (Wolfson and Carskadon 2003). In general, the relationship between sleep/wake habits and the academic performance of medical students is insufficiently addressed in the literature (Abdulghani et al., 2012). Students in Saudi Arabia and other Gulf countries tend to sleep poorly during schools nights. Many of them sleep after school hours from late afternoons through the evenings during school days to make up for the nights. On the night before an exam many of them continue without sleep until the exam finishes and then they tend to collapse. Few studies have been published about sleep patterns among medical students in Kingdom of Saudi Arabia (KSA) in King Saud University (Bahammam et al., 2005; Abdulghani et al., 2012; Bahammam et al., 2012). No similar studies were done on medical students in the Faculty of Medicine of King Fahad Medical City, King Saud Bin Abdulaziz University for Health Science. This work aims to examine the prevalence sleep habits and sleep problems among female medical students and their correlation with perceived sleep quality, perceived academic performance and actual GPA.

## METHODS

### Study setting

The study was conducted in the Faculty of Medicine of King Fahad Medical City (KFMC) King Saud Bin Abdulaziz University for Health Science (KSAU-HS).

### Study design and duration:

A descriptive cross sectional study was performed in the period from February to March 2012, at the Faculty of Medicine KFMC in KSAU-HS

### Participants

Participants were Fourth and Fifth year female medical students of the years 2011/2012. All were full time students that work between 8 a.m. to 4 p.m. None of the students had paid jobs as they usually live with their families, they do not pay university fees and they get monthly bursaries from the government for their personal expenses.

### Data collection

#### Questionnaire on sleep and daytime habits (QS&DH)

This questionnaire is based on the "Questionnaire on

sleep and daytime symptoms' (Janson et al., 1995) and modified by (Veldi et al., 2005). It includes demographic characteristics (4 questions), sleep and daytime habits (20 questions), life style and academic progress (5 questions). The questions on work while studying and night time work while studying were omitted as they do not apply to our students.

The actual GPA of the students obtained at the end of the year and self-perceived academic performance were included in the correlation studies.

### Ethical considerations

Ethical approval (IRB No. 11-085) was obtained from Institutional Review Board of King Fahad Medical City.

### Statistical analysis

Categorical variables were expressed as proportions, and Spearman Rank Correlation Coefficient was used for correlation between sleep quality and sleep pattern. The results were considered statistically significant when  $p < 0.05$ . Standard statistical software (SPSS, Statistical Package for the Social Sciences, version 17.0, Chicago, IL, USA) was used for data analysis. Frequency tables were used to study the frequency of sleep problems and night-time and daytime habits among subjects.

## RESULTS

The questionnaire was distributed to the all 73 medical students in the fourth and fifth year. Only 67 (92%) students completed and returned the questionnaires. The majority of them were single and median age was 22 (20-23) years. They were all Saudi nationals.

Table 1 summarizes self-reported sleep quality, actual GPA, and self-perceived academic progress, leisure activity & living conditions. More than half (55.2%) of the students rated their reported sleep quality as very good or excellent during non-examination periods while only 28% of the students rated it as very good or excellent during examinations. In Table 2, the prevalence of some sleep habits during one week period showed that the most prevalent sleep habit is going to bed late at night, of 0.97, where more than 43% experience that more than 3 times per week, followed by 0.61 for drinking coffee late at night, while taking sleeping pills prevalence was only 0.2. On the contrary the most two prevalent sleep problems were difficulty in falling asleep and wake up because of noise of 0.84, and 0.82 respectively.

Spearman correlation analysis between day time habits, sleep problems and each of sleep quality and GPA showed that sleep quality is significantly correlated to leisure activity ( $R = 0.404$ ;  $p = 0.001$ ), and unusual time

**Table 1.** Self-reported sleep quality, GPA, Academic Progress, Leisure Activity and Living Conditions. (N = 67)

Parameter	Excellent	Very Good	Good	Acceptable	Not Acceptable
Sleep Quality					
Usual (No examinations)	8 (11.9)	29 (43.3)	16.9 (23.9)	13.0 (19.4)	1 (1.5)
Examination period	2 (3.0)	17 (25.4)	17 (25.4)	21 (31.3)	1 (1.5)
Academic Progress (SPPG)	13 (19.4)	21 (31.3)	24 (35.8)	7 (10.4)	2 (3)
Leisure Activity	11 (16.4)	20 (29.9)	19 (28.4)	6 (9.0)	11 (16.4)
Living Conditions	40 (59.7)	23 (34.3)	4 (6.0)	0.00	0.00

**Table 2.** Sleep habits and sleep problems among study subjects during one week (N=67)

Frequency Sleep habit/ problem	Never N (%)	>- 1 N (%)	1-2 N (%)	3-5 N (%)	6 + N (%)	Prevalence
Late going to sleep at night	2 (2.7)	10 (14.9)	26 (38.8)	12 (17.9)	17 (25.4)	0.97
Drinking coffee late at night	27 (40.3)	16 (23.9)	11 (16.4)	8 (11.9)	5 (7.5)	0.61
Using sleep pills at night	55 (82.1)	8 (11.9)	0 (0)	2 (3.0)	2 (3.0)	0.21
Difficulty in falling asleep	12 (19.7)	19 (28.4)	24 (35.8)	6 (9.0)	6 (9.0)	0.82
Wake up because of noise	13 (19.4)	20 (29.9)	17 (25.4)	11 (16.4)	8 (11.9)	0.84
Wake up because of nightmares	32 (47.8)	23 (34.3)	7 (10.4)	3 (4.5)	2 (2.3)	0.5
Sleep talking	57 (85.1)	6 (9.0)	3 (4.5)	1 (1.5)	0 (0)	0.15
Sleep walking	65 (97.0)	2 (3.0)	0 (0)	0 (0)	0 (0)	0.03
Excessive leg movement	57 (86.4)	6 (9.1)	1 (1.5)	2 (3.0)	0 (0)	0.13
Snoring	45 (68.2)	7 (10.6)	5 (7.6)	2 (3.0)	7 (10.6)	0.31
Teeth crushing	26 (38.8)	21 (31.3)	11 (16.4)	5 (7.5)	4 (6.0)	0.55

**Table 3.** Spearman order correlation between sleep habits, leisure activity, living conditions, academic progress and each of sleep quality and GPA, (N = 67).

Nighttime and daytime habits and sleep problems	Sleep quality		GPA	
	R	P-level	R	P-level
1. Time of going to bed	0.227	0.065	-0.096	0.441
2. Duration of daytime naps	0.199	0.134	-0.107	0.427
3. Sleep quality	-----	-----	-0.002	0.986
5. Unusual time for going to bed	0.285	0.019	0.126	0.315
6. Daytime naps	0.028	0.823	0.026	0.834
7. Academic progress (self-reported)	0.075	0.547	0.801	0.00
8. Leisure activity	0.407	0.001	0.273	0.027
9. Living conditions	0.095	0.445	-0.201	0.105
10. GPA	-0.007	0.986	-----	-----

**Table 4.** Spearman order correlation between day time habits, sleep problems and each of sleep quality and GPA, (N = 67).

Nighttime and daytime habits and sleep problems	Sleep quality		GPA	
	R	P-level	R	P-level
1. Sleep latency	0.079	0.524	-0.278	0.024
2.Nocturnal awakenings	0.035	0.776	-0.056	0.654
3. Difficulty in getting to sleep at night	0.319	0.008	-0.170	0.172
4. Sleeping pills	0.304	0.012	-0.277	0.024
5. Waking up because of nightmares	0.344	0.004	-0.131	0.296
6. Waking up because of sleep talking	0.102	0.412	-0.110	0.381
7. Waking up because of sleep walking	0.105	0.396	0.060	0.630
8. Waking up because of nocturnal eating	0.124	0.318	-0.126	0.315

**Table 4.** Continue

9. Waking up because of the restless leg syndrome	0.318	0.009	-0.002	0.988
10. Snoring	0.003	0.981	-0.068	0.590
11. Nocturnal bruxism	0.147	0.239	-0.041	0.745
12. Early morning awakening	0.117	0.346	-0.147	0.239
13. Tired feeling in the morning	0.490	0.001	-0.015	0.908
14. Daytime sleepiness	0.097	0.434	0.008	0.952
15. Daytime sleepiness during the lectures	0.141	0.254	-0.176	0.158
16. Daytime sleepiness during free time	0.141	0.258	-0.084	0.506
Drinking coffee late at night	0.142	0.253	-0.147	0.240
17. GPA	-0.007	0.986	-----	

of going to bed ( $R= 0.285$ ;  $p= 0.019$ ), GPA was found to be significantly correlated to Leisure activity ( $R= 0.273$ ;  $p= 0.027$ ) and academic progress ( $R=0.801$ ;  $p=0.00$ ). (Table 3)

Table 4 shows correlation between sleep problems with either sleep quality or GPA. Sleep quality was significantly correlated with difficulty in getting to sleep at night ( $R= 0.319$ ;  $p= 0.008$ ), use of sleeping pills ( $R=0.304$ ,  $p=0.012$ ), waking up because of the restless leg syndrome and nightmares ( $R=0.318$ ,  $p=0.009$ ), ( $R=0.344$ ,  $p=0.0040$ ) respectively, and feeling tired in the morning ( $R=0.490$ ,  $p=0.001$ ). However, GPA showed negative correlation to sleep latency ( $R=-0.278$ ,  $p=0.024$ ) and use of sleeping pills ( $R=-0.277$ ,  $p0.024$ ).

## DISCUSSION

The current study highlighted the most prevalent sleep habits and problems among medical students, as well as, its correlation with sleep quality and academic performance. The most prevalent habits were drinking coffee at night and late going to bed which is correlated to quality of sleep. Leisure activity was found to be correlated to both quality of sleep and GPA. While the most prevalent sleep problems was difficulty in falling asleep which was correlated to sleep of quality and wake up because of noise. Use of sleeping pills was correlated to both quality of sleep and GPA.

Drinking coffee is one of the dominant traditions in Saudi Arabia as well as the Gulf area hence, it is also prevalent among the students. The latter may lead to delayed onset of sleep which we noticed that it affected sleep quality. It has been reported earlier that drinking coffee at night did not affect sleep quality (Veldi et al., 2005), while in our study an indirect effect is detected. The prevalence of sleep problems shown in our study is late going to bed at night, followed by difficulty in falling sleep and wake up because of noise and nightmares. Previous studies reported that sleep problems are common in young medical students, and the prevalence of habitual sleep problems was reported to be 6-9% (Janson et al., 1995; Veldi et al. 2005). Our results

showed that prevalence of the different problems was 3-9% which is in concordance with previous reports.

Our study revealed that the student's perception about their quality of sleep is better during non-examination period than exam days. This could be explained by the stress they experienced during exam days. This finding confirms reports of previous studies among medical students and adolescents in Saudi Arabia (Bahammam et al., 2005; Abdulghani et al., 2012; Bahammam et al., 2012). They are also compatible with earlier studies (Nojomi et al., 2009, Gibson et al., 2006; Merdad et al., 2014; Lashkaripour et al., 2012; Sweileh et al., 2011; National Sleep Foundation 2011; Forquer et al., 2008; Kazim and Abrar 2011, Ruchi et al., 2009) reported from other parts of the world. On studying sleeping patterns of medical students of the Arabian Gulf University, 42% of the students viewed their sleeping quality as "good", and their sleeping hours as not optimal (Abdeen et al., 2013). Sleep quality during examination in our current study is significantly lower than during usual times. This is in accordance with the results of the above-mentioned study among medical students in the Gulf University where majority of the students (75%) reported that their sleep is affected particularly by examination and assignments (Abdeen et al., 2013). Another study from Pakistan reported that their medical students had disturbed sleep patterns including delaying sleep time at night, awakening due to noise, experiencing nightmares in agreement with our study (Ali and Majeed 2013).

The current study does not demonstrate a direct association between sleep/wake habits and academic performance among female medical students. Academic performance is significantly associated with sleep latency, use of sleeping pills, self-reported academic progress and leisure activity. The positive effect of leisure activity on academic progress was reported earlier, that students who exercise regularly were less likely to develop sleep disturbance (Nojoomi et al., 2009). Our study did not show any correlation between the quality of sleep and the academic performance. The latter finding is consistent with previous finding by Iqbal et al., 2013 who did not find any significant association between quality of sleep and academic performance (Iqbal et al., 2013). On

the other hand, there is indirect relationship in our study through sleep latency, which negatively correlates with GPA ( $R = -0.278$ ;  $P < 0.024$ ), indicating that increased sleep latency leads to decreased academic performance. It is expected that decreased sleep due to sleep latency affects the academic performance as it may affect the recall and concentration of students. Even though, the students reported sleep latency but few of them used sleeping pills (0.21) which is similar to what was reported by Lashkaripour *et al.*, 2012. Nevertheless, the use of sleeping pills was correlated to the quality of sleep. On the contrary to the study of Assaad *et al* 2014 who reported that poor sleep quality was strongly associated with sleep-enhancing medication use especially more than once per week, the results of the current study did not show adverse effects of sleeping pills on quality of sleep (Assaad *et al.*, 2014). The discrepancy may be explained by the fact that sleep pills are used by small group of our students, or because of underreporting of the sleep quality effect of pills. Our results showed latency in falling asleep is a problem for students in agreement with other studies (Sweilah *et al.* 2011; National Sleep Foundation 2011; Forquer *et al.* 2008). Similarly, a study on Nigerian medical students revealed an observation similar to ours about the effect of sleep latency on sleep quality, but contrary to our results, they showed significant correlation between the use of caffeine and number of hours of sleep and unusual sleep practices such as sleep walking, talking or nightmares (Chinawa *et al.*, 2014). The current study did not reveal considerable effect on the academic progress in agreement with some other studies (Kazim and Abrar 2011; Ruchi *et al.*, 2009). However others reported that good sleeping habits such as regular schedule, sleeping early and rising early in the morning are associated with better academic performance and lower levels of anxiety and depression (Wolfson and Karskadon 2003; Wolfson and Karskadon 1998; Kim *et al.*, 2011). The effect of life-style on sleep quality has been examined by Heath *et al.*, 1998, who also identified an association between this variable and sleep disturbances (Heath *et al.*, 1998). In the present study, no correlation between living conditions and sleep quality was found. On the other-hand, there was a highly significant correlation between leisure activity and academic performance in agreement with other studies (Heath *et al.*, 1998; Ohayon and Smirne 2002; Smith, 2010). Even though, we reported sleep problem but fortunately they do not affect the academic performance of the students in our study. They may have string adaptive mechanisms or the system of evaluation in more culturally adapted.

## CONCLUSION

The study sheds light on the prevalence of sleep problems among the female medical students. The GPA

was only negatively associated with sleep latency, use of sleeping pills. However, they are not prevalent. Proper counseling, better planning and support should be provided to students likely to suffer from sleep disorders.

## Conflict of Interests

Author declare no conflict of interest.

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