International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 3, Issue 2, pp: (545-552), Month: October 2015 - March 2016, Available at: www.researchpublish.com

Prevalence of Inadequate Sleep and Poor Sleep Hygiene and Its Association with Academic Performance in Male Medical Students in Eastern Province, Saudi Arabia

Adel Nasser Al Bargi[1], Ammar Abdulfattah Al Kkubaish[2], Abdullah Khaled Al Maqhawi[3], Ahmed Al Zubair[4], Saleh Al Mogairen[5], Abdulsattar Khan[6], SayedIbrahim Ali[7]

[1,2,3,4,5,6,7] King Faisal University, College of Medicine, AlAhsaa

Abstract: **The aim of this study is to describe sleep hygiene and habits among, and to investigate the relationships between sleep habits sleep quality and the academic performance among Saudi medical students in eastern province, Saudi Arabia. The study population consisted of male undergraduate medical students at King Faisal University. Target population was found to be 451 students, as follow:Year 1(55), Year 2 (73), Year 3 (78), Year 4 (86), Year 5 (90), and Year 6 (69). Frequency scores are calculated for each item, and higher frequency scores indicate worse sleep hygiene. Analysis of variance (ANOVA) and t-test were used to test significance between continuous variables, while a Chi-square test was used to test independency between categorical data. In this study, a p-value of less than 0.05 was considered as significant in all .Results: A total of 370 out 451 male medical students registered at college of medicine, King Faisal University, Al Ahsaa have returned the questionnaire. Out of which, 14 were excluded due to history of chronic diseases, namely sickle cell anemia, systemic hypertension, gastro-esophageal reflux disease and bronchial asthma. The overall response rate was 78.5 % (table 4). Target population was found to be 451 students, as follow:Year 1(55), Year 2 (73), Year 3 (78), Year 4 (86), Year 5 (90), and Year 6 (69). , the results indicate that sleep hygiene practices were generally good among 4 out of the 5 categories of the sleep hygiene, namely, in the use of sleep-disturbing products, engaging in activating or arousing activities close to bedtime, the use of the bed for activities other than sleep, and maintaining a comfortable sleeping environment. This is consistence with a US study published in 2009 [61]. In the other hand, adherence to proper sleep scheduling was low. Notably, variable sleep schedule among university students is generally high, this finding has been shown in many studies.**

Keywords: **prevalence, Hygiene, academic performance, Medical students.**

I. INTRODUCTION

Sleep is an essential element of good health. It is one of the most basic physiological needs of human beings. Its quality is strongly related to psychological and physical health and other measures of well-being [1].The pattern of adequate sleep and wakefulness in different subjects is known to vary with people's age, the demands of their occupation, their physiological and psychosocial characteristics, psychiatric illness, and some types of physical illness. [2] It has been postulated that inadequate sleep is associated with numerous adverse effects, one of which is impaired academic performance.

Aim of the Study:

The aim of this study is to describe sleep hygiene and habits among, and to investigate the relationships between sleep habits sleep quality and the academic performance among Saudi medical students in eastern province, Saudi Arabia.

II. METHODS

Study setting and time: King Faisal University in Eastern Province (Al Ahssa city), Saudi Arabia, from February to March, 2014.**Study Design:** This is Cross-sectional study through self-administered questionnaire.**Study Population:**The study population consisted of male undergraduate medical students at King Faisal University. Target population was found to be 451 students, as follow:Year 1(55), Year 2 (73), Year 3 (78), Year 4 (86), Year 5 (90), and Year 6 (69)**.Inclusion Criteria:**Full time, registered, male undergraduate students at college of medicine in King Faisal University in Eastern Province, Saudi Arabia.**Exclusion Criteria:** Students who has been diagnosed with a chronic medical condition including any psychiatric illness.Students who are using drugs that can affect sleep.**Sampling:** All male medical students (target population) were involved in the study (table 1). Announcements were made through direct contact via the investigators or group leaders.

Table 1: all male medical students enrolled in King Faisal University, Al Ahassa, Saudi Arabia.

Study level	Number of students (% of total population)
1st year	55 (12.2)
2nd year	73 (16.2)
3rd year	78 (17.3)
4th year	86 (19.1)
5th year	90 (20.0)
6th year	69 (15.3)
Total	451

Data Collection Tool and Technique: Data will be collected from students by self-administered questionnaires namely, Sleep hygiene questionnaire] [9], Pittsburgh Sleep Quality Index (PSQI) [appendix C] [6], and investigator-designed questionnaire [appendix E] for socio-demographics and studying variables. These [appendix B, C] questionnaires are validated reliable already published questionnaires [6, 9].**Statistical Analysis:**Statistical analysis was performed using SPSS program 21st version. Descriptive analysis was presented in form of tables and graphs. The mean frequency (number of days per week) of sleep hygiene was calculated. The mean represent the number of days/week in which the participants engaged in a particular behavior. Frequency scores are calculated for each item, and higher frequency scores indicate worse sleep hygiene. Analysis of variance (ANOVA) and t-test were used to test significance between continuous variables, while a Chi-square test was used to test independency between categorical data. In this study, a p-value of less than 0.05 was considered as significant in all

III. RESULTS

Response rate:A total of 370 out 451 male medical students registered at college of medicine, King Faisal University, Al Ahsaa have returned the questionnaire. Out of which, 14 were excluded due to history of chronic diseases, namely sickle cell anemia, systemic hypertension, gastro-esophageal reflux disease and bronchial asthma. The overall response rate was 78.5 %. Target population was found to be 451 students, as follow:Year 1(55), Year 2 (73), Year 3 (78), Year 4 (86), Year 5 (90), and Year 6 (69)

Demographic Characteristics: The study population is all male medical students enrolled in King Faisal University, Al Ahassa, Saudi Arabia. Almost all the participants were Saudi nationals. The Mean age of participating students was 21.9 ± 1.9 years (mean ± standard deviation). Majority (95.7%) of the students were unmarried. And more than three-quarters (n=286, 81.5%) are living in houses (table 5).More than one-half (57.6%) of the students are having an income of up to 990 SR/month. And about one-eighth (14.2%) of the students have a part-time job besides studying (figure 1). Most of the students were found to be healthy and 28 students stated that they have a chronic disease, out of whom, 14 were excluded from the study as follows, 5 due to sickle cell anemia, 4 were having hypertension, 1 was having gastro-esophageal reflux disease, and 5 bronchial asthma patients.

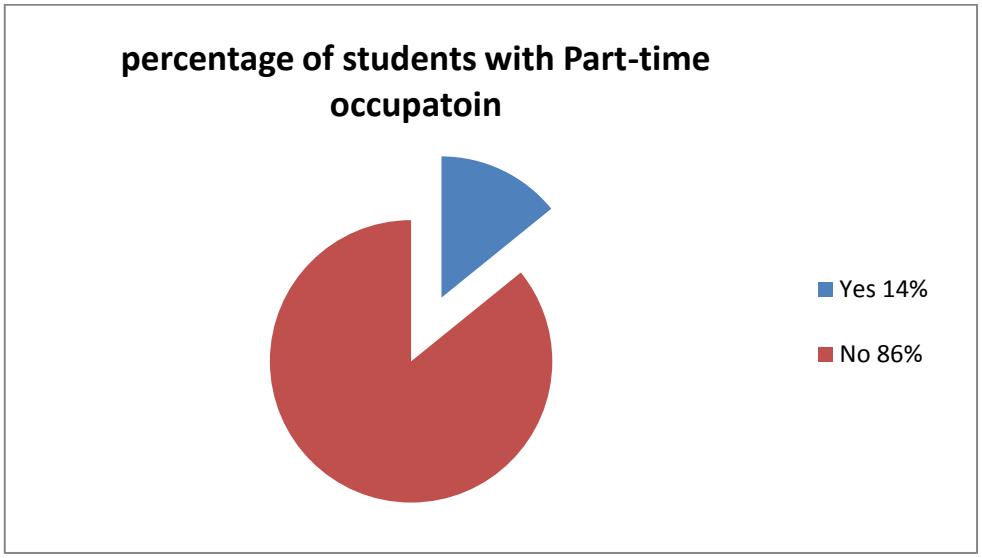

Figure 1: Percentage of people with part-time occupation

Table 2: Socio-demographic characteristics of the sample population

Characteristic	N (%)
Age (years)	
19- 24	333 (93.5)
≥25	23 (6.5)
Marital status*	
Single	335 (95.7)
Engaged	8 (2.3)
Married	7 (2)
Type of residence*	
House	286 (81.5)
Apartment	62 (17.7)
Others	3 (0.9)
Total monthly income (SR)*	
Up to 990	201 (57.6)
991-3000	80 (22.9)
3001-10000	21 (6.0)
>10000	47 (13.4)
History of chronic disease**	
Yes	28 (7.6)
No	341 (9.2)

*There is some missing data.

** Among total respondents.

Sleep Hygiene: The mean frequency of sleep hygiene among study population is shown in (table 6). It represents the mean number of days/week in which the participants engaged in each particular behavior. Higher frequency scores indicate worse sleep hygiene except item 2 and 3. Item 2 (Woke up at approximately the same time) and Item 3 (Went to bed at approximately the same time) are features of good sleep hygiene, and these items are scored in reverse in the analysis. **Prevalence:** Over one half of our sample (53.6%; n = 177) met the clinical cutoff of the Pittsburgh Sleep Quality Index (PSQI) for poor sleep quality (table 3). However, using a higher cut point in our analysis, about two-fifth (N=95, 28.8%) of the students were having a PSQI total score > 7. Out of the 356 participants, 82 were having a PSQI score of 6 or 7 and considered indeterminate and were excluded from the association's analysis. Also 26 students were excluded because of incomplete data.

Table 3: Prevalence of good and poor sleep quality, among studied population. (PSQI cut point of ≤5 indicates good sleep quality)

Sleep quality	N	Percent (%)
Poor	177	53.6
Good	153	46.4
total	330	100

Total sleep time and sleep latency: The studied sample's total sleep time was found to be 6.45 ±1.26 (mean ± SD) hours with sleep latency (time needed to fall asleep) to be 28.19± 20.814 (mean ± SD) minutes.

Sleep quality and association with socio- demographics related variables: Univariate analysis of independent variables including age, marital status, average total monthly income, academic level and part-time occupation was done (table 4). A significant difference was observed between sleep quality and marital status and students' age. About two thirds (65.5%) of younger students were found to have good sleep quality compared to 49.1% among older students (p=0.029). And three-quarters (75.0%) of married students were found to have poor sleep quality compared to 36.5% in unmarried students (P=0.007).No significant difference was observed between sleep quality and average total monthly income, academic level, residence type and part-time occupation.

Table 4: significant and non-significant socio-demographic related variables and association with sleep quality

Variables	Poor quality No(%)	Good quality No(%)	P value
Age group (yrs.)			
19-23	67 (34.5)	127 (65.5)	0.029
24 -29	27 (50.9)	26 (49.1)	
Marital status			
Unmarried	84(36.5)	146(63.5)	0.007
Married	9 (75.0)	3(25.0)	
Academic level			
Preclinical	41 (36.6)	71 (63.4)	0.619
Clinical	54(39.7)	82 (60.3)	
Residence Type			
House	71 (34.8)	133 (65.2)	0.070
Others	20(50.0)	20 (50.0)	
Part-time Job			
Present	16 (45.7)	19 (54.3)	0.302
Not present	76 (36.5)	132 (63.5)	

Sleep quality and frequency of sleep hygiene practices: Analysis of Variance (ANOVA) was used to compare the total means of different sleep hygiene behavior among good and poor sleepers (table 10). Significant difference was found in the univariate analysis of 9 sleep hygiene behaviors, namely, drank caffeinated beverages 5 to 10 hours before bedtime (P=0.000), drank caffeinated beverage less than 5 hours before bedtime (P=0.001), Engaged in exciting or emotionally upsetting activities near bedtime(P=0.000), Performed activities demanding high levels of concentration near bedtime (P=0.000), Worried, planned, or thought about important matters at bedtime(P=0.019), Lounged around in bed(P=0.001), Slept on an uncomfortable mattress(P=0.002), Slept in a room with an uncomfortable nighttime temperature(P=0.008), and Slept in a noisy environment (P=0.001).No statistically significant difference was found in the following sleep hygiene behaviors namely, Improper sleep scheduling behaviors (Napped during the day, Woke up at approximately the same time and Went to bed at approximately the same time), Smoked a cigarette or chewed tobacco within 2 hours of bedtime or in the middle of the night , Exercised within 4 hours of bedtime, Read in bed, Watched television in bed, Worried, planned, or thought about important matters in bed, and slept in a room that was too bright.

Sleep quality and Sleep hygiene categories: Correlation Coefficient was first done to compare PSQI total score with five thematically related groups based on categories for the ICSD diagnosis of inadequate sleep Hygiene (table 5).A statistically significant correlation was found between PSQI total score and total sleep hygiene score (P< 0.001), Activating or arousing activities near bedtime (P< 0.001), bed activities other than sleep (P=0.038) and sleep environmental conditions (P < 0.001)No statistically significant difference was found in improper sleep scheduling behaviors, and in the sleep-disrupting products category.

Table 5: Correlation Coefficient between sleep quality and sleep hygiene categories

Association	Pearson Correlation	P value
PSQI total score *total sleep hygiene score	0.271	<0.001
PSQI total score* Improper sleep scheduling behaviors	0.000	.993
PSQI total score* Sleep-disrupting products	0.030	0.592
PSQI total score* Activating or arousing activities near bedtime	0.276	<0.001
PSQI total score* bed activities other than sleep	0.116	0.038
PSQI total score* sleep environmental condition	0.195	<0.001

Sleep quality and association with studying habits: Univariate analysis of length of studying hours/ day during the week days and the weekends showed a statistically significant difference among good and poor sleepers (p value < 0.001 and 0.016 respectively). As shown in (figure 2, figure 3), it was found that a linear relationship exists in which good sleep quality is more common among those who study up to 2 hours/day and trends down with those who study less than or more than 2 hours/day.

Sleep quality and association with School attendance: A statistically significant difference was found in school attendance among good and poor sleepers (table 6). More than half (N=137, 53.3%) of the students reported missing classes in the last month. Moreover, about one-half (N=126, 49.2%) of the students are missing classes because of inadequate sleep and sleep disturbance. It was noted that about two-thirds (67.3%) of the poor sleepers are missing classes because of sleep disturbance in comparison with 37.4% in the good sleeper group (p<0.001).

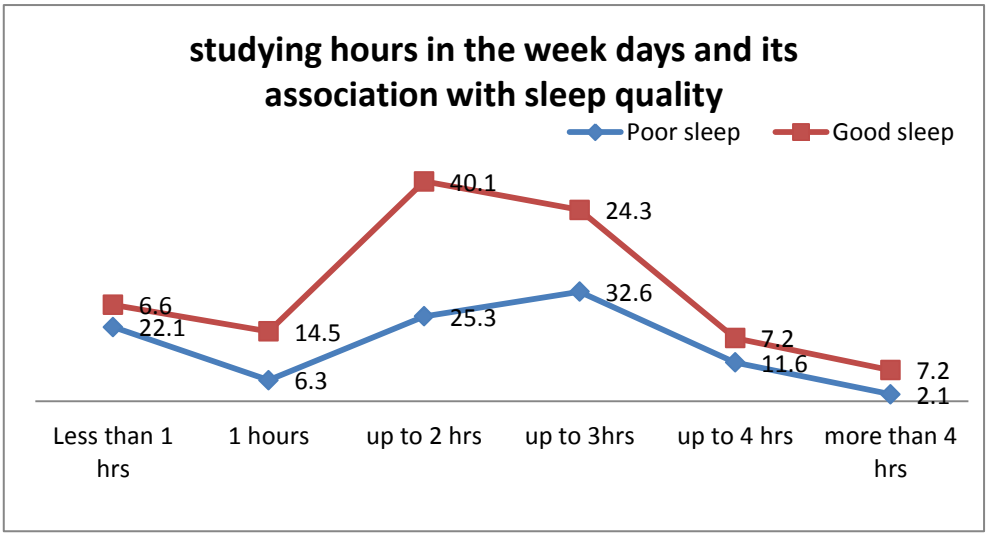

Figure 2: studying hours in the week days and its association with sleep quality

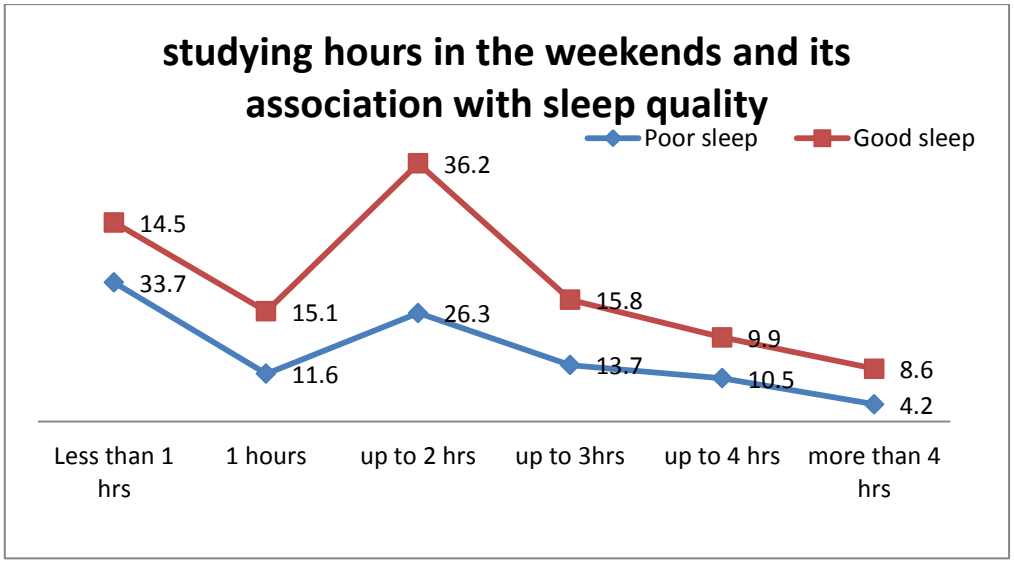

Figure 3: studying hours in the weekends and its association with sleep quality

Sleep quality and academic performance: Out of 356 included questionnaires, 278 (78.1 %) have declared their Grade point average (GPA). The mean of the GPAs were 3.82 ± 0.60 (mean ± SD). The study did not observe any correlation between sleep quality and GPA among the studied population.

Table 6: Sleep quality and association with school attendance

	total	Poor sleep quality N (%)	Good sleep quality N (%)	P value
Missed classes in the last month				
No	117	27 (23.1)	90 (76.9)	<0.001
Yes	131	68 (51.9)	63(48.1)	
Missed classes because of inadequate sleep				
No	125	30 (24.0)	95(76.0)	<0.001
Yes	122	65 (53.3)	57 (46.7)	

Logestic regression sleep quality with total SH score, and other significant variables: Regression model was first performed for the demographic characteristics, studying characteristics, and total sleep hygiene score, which appeared to be significantly associated with the sleep quality (table7). It included age, marital status, residence type; studying hours in the week days, studying hours in the weekends, history of missing classes in the last month, history of missing classes due to inadequate sleep, frequency of missing classes due to inadequate sleep and total SH score. The fitness of the model is significant ($p < .001$). The result of the regression revealed that 25.8% of the sleep quality was explained by the variables in the model.

Table 7: Logistic regression of sleep quality with total SH score and other socio-demographic and studying variables.

	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
						Lower	Upper
Age (years)	0.485	0.373	1.688	0.194	1.624	0.781	3.376
Marital status	1.412	0.770	3.363	0.067	4.103	0.907	18.552
Residence type	0.139	0.445	0.097	0.755	1.149	0.481	2.746
Studying hours in the week days	-0.086	0.143	0.361	0.548	0.918	0.694	1.214
Studying hours in the weekends	0.199	0.127	2.454	0.117	1.220	0.951	1.565
History of missing classes in the last month	-0.522	0.698	0.559	0.454	0.593	0.151	2.330
History of missing classes due to inadequate sleep	-1.175	0.786	2.237	0.135	0.309	0.066	1.440
Frequency of missing classes due to inadequate sleep.	0.348	0.224	2.416	0.120	1.417	0.913	2.198
Total SH score.	-0.056	0.016	13.221	0.000	0.945	0.917	0.974
Constant	1.198	0.961	1.555	0.212	3.314		

- Nagelkerke R Square .258

Logistic Regression of sleep quality with sleep hygiene categories and other significant variables:

Regression model was performed for the sleep hygiene categories, the demographic characteristics and studying characteristics, which appeared to be significantly associated with the sleep quality (table 14), which included marital status, residence type, Studying hours in the week days, Studying hours in the weekends, History of missing classes in the

last month, History of missing classes due to inadequate sleep, Frequency of missing classes due to inadequate sleep and the 5 sleep hygiene categories. The fitness of the model is significant (p =0.001).

IV. DISCUSSION

Sleep is one of the important needs; a need that plays a significant role in human's life quality and their activities when they are awake. It is a major factor associated with the physical and mental health of individuals.The present study aims to determine the prevalence of inadequate sleep and poor sleep quality and to examine the relationships of different domains of sleep hygiene with sleep quality and academic performance among medical students. Additionally, socioeconomic status was examined for differences in Sleep hygiene, and sleep quality.The sample for the current study consisted of primarily single males, Saudi nationals, in their early 20's who are attending school full-time and some of whom (14.2%) had a part-time occupation.**Response Rate**:The overall response rate in this study was 78.5%; it consisted of students from all academic levels as follow: 52 (94.6 %), 61 (83.6%), 50 (64.1%), 59 (68.6%), 64 (71.1%), 60 (87.0%); from first to sixth year respectively. This figure yet acceptable, is relatively low. This might be due to comparatively low interest in the subject by the medical students. Also, complexity of medical college schedule, various groups, high absence rate and no identification data further compromise response rate. Yet, almost all groups of students were reached out more than twice to ensure maximum response rate.**Total sleep time:**Brown et al. have stated that the average college student sleeps less than seven hours per night [4]. Medical students are no exception, this study reported total sleep duration of 6.45 ±1.26 hours (mean ± SD). It is about 25 minutes longer than that measured on 410 medical students in Riyadh [8]. However, the measured sleep duration was less than a sample of 2,316 U.S. medical students who reported 6 hours and 48 min of sleep per night [7, 10]. As far the authors know there is no community based Saudi national data for comparison.

Frequency of sleep hygiene practices: Overall, the results indicate that sleep hygiene practices were generally good among 4 out of the 5 categories of the sleep hygiene, namely, in the use of sleep-disturbing products, engaging in activating or arousing activities close to bedtime, the use of the bed for activities other than sleep, and maintaining a comfortable sleeping environment. This is consistence with a US study published in 2009 [9]. In the other hand, adherence to proper sleep scheduling was low. Notably, variable sleep schedule among university students is generally high, this finding has been shown in many studies [3] [5].

V. CONCLUSION

These data do tell us whether individuals are likely to practice a certain behavior and whether it is associated with poor sleep quality. It provides an estimate of the potential impact these behaviors may have in the student's community. This study have shown a similar total sleep time (6.45 hours) and comparable sleep latency (28.2 mins) to many studies done on college students all over the world.In general, this study shows that in the most part, adherence to proper sleep hygiene behavior is adequate in 4 out of 5 categories of sleep hygiene. Disturbed sleep scheduling behavior was noticeable in the study population. Activities that increase arousal at bedtime, and improper sleep environmental conditions particularly increased cognitive activity at bedtime, performing activities requiring high level of concentration near bedtime, use of uncomfortable mattress, poor room temperature control and increased noise at bedtime are associated with poor sleep quality. The data also shows the high prevalence of poor sleep quality among medical students, with 53.6 % (n=177) have met the clinical cut off of PSQI for poor sleep quality (PSQI ≥6) Yet, academic performance was not observed to be associated with sleep quality; there was a positive relationship between sleep quality and frequency of missing classes among study population.

REFERENCES

[1] Pilcher JJ, Ott ES. The relationships between sleep and measures of health and well-being in college students: A repeated measures approach. Behav Med. 1998;23:170–7.

[2] Tsui YY, Wing YK. A study on the sleep patterns and problems of university business students in Hong Kong. J Am Coll Health. 2009;58:1 67–76.

[3] Kang JH, Chen SC. Effects of an irregular bedtime schedule on sleep quality, daytime sleepiness, and fatigue among university students in Taiwan. BMC Public Health. 2009 Jul 19;9:248. doi: 10.1186/1471-2458-9-248.

[4] Brown FC, Buboltz WC Jr, Soper B. Development and evaluation of the Sleep Treatment and Education Program for Students (STEPS). J Am Coll Health. 2006 Jan-Feb;54(4):231-7.

[5] Brown FC, Buboltz WC, Jr, Soper B. Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. Behav Med. 2002;28:33–38. [PubMed]

[6] Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989 May;28(2):193-213.

[7] Cameron A. Brick, Darbi L. Seely, Tonya M. Palermo. Association Between Sleep Hygiene and Sleep Quality in Medical Students. Behav Sleep Med. Author manuscript; available in PMC 2013 February 13.

[8] Published in final edited form as: Behav Sleep Med. 2010; 8(2): 113–121. doi: 10.1080/15402001003622925.

[9] BAHAMMAM AS, ALASEEM AM, ALZAKRI AA, ALMENEESSIER AS , SHARIF MM .THE RELATIONSHIP BETWEEN SLEEP AND WAKE HABITS AND ACADEMIC PERFORMANCE IN MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY. BMC MED EDUC. 2012; 12: 61. PUBLISHED ONLINE 2012 AUGUST 1. DOI: 10.1186/1472-6920-12-61 PMCID: PMC3419622

[10] Gellis LA, Lichstein KL. Sleep hygiene practices of good and poor sleepers in the United States: an internet-based study. Behavior Therapy 2009 Mar;40(1):1-9. doi: 10.1016/j.beth.2008.02.001. Epub 2008 Jul 14.

[11] Frank E, Carrera JS, Elon L, Hertzberg VS. Basic demographics, health practices, and health status of U.S. medical students. American Journal of Preventative Medicine. 2006; 31:499–505.