The Interaction between Sleep Quality and Academic Performance among The Medical Students in Taif University

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ABSTRACT
Background: Sleep quality has significant effects on cognitive performance and physical power and is influenced by multiple factors such as stress. Contrary to the ideal, medical students suffer from sleep deprivation and stress at times when they should achieve the greatest amount of learning. However, poor sleep quality may negatively impact test performance as well, creating a vicious circle. **Aim of the study:** this study aimed to assess the relationship between sleep quality and academic performance among medical students in Taif University. **Methods:** this descriptive**,** cross-sectional analytic study was conducted on 299 of Saudi male and female medical students in Taif University, Saudi Arabia, who completed a self- administered survey by using the Pittsburgh Sleep Quality Index (PSQI) and academic grades to collect data. Data were collected from 5-Feb-2017 to 28-May-2017.The analysis was performed using IBM SPSS statistics (v. 23). **Results:** a total of 299 medical students were included in this study and surveyed to check for any association between the quality of sleep and their academic scores. Almost 56% of the participants were females. The highest percentage of the participants were from 3rd year (30.4%) and the least were from the fifth year who represented only 9.4%. the highest percentage of the participant had academic score between 3-3.5 and represent 36.5% , while those who scored between 3.5 and 4 represented 34.8% of the group. The least were those who scored 2 or less they were only 5 students (1.7%). The average sleep score for all the participants was 14.17(SD±2.7). There was a significant difference in the sleep score between males and females (p value =0.04). The Females scored higher (14.46±2.7) than the males (13.82±2.7) which means that the fames had slightly better sleep quality. There was no significant difference in sleep quality between student from different academic years (p value = 0.97) and between students of different academic achievement (p value=0.99). There is no significant correlation between the score representing the Quality of sleep and the academic score (p value =0.935).
Conclusions and recommendation: the sleep quality was negatively associated with academic performance in medical students. Health education is recommended to improve quality of sleep and promoting lifestyles of the students.
Keywords: sleep quality, academic performance , medical students in Taif university.

INTRODUCTION

Sleep quality has significant effects on cognitive performance and physical power and is influenced by multiple factors such as stress. Contrary to the ideal, medical students suffer from sleep deprivation and stress at times when they should achieve the greatest amount of learning. However, poor sleep quality may negatively impact test performance as well, creating a vicious circle [1]. There is increasing awareness about the association of sleep quality and academic achievement among university students. However, the relationship between sleep quality and academic performance has been examined in Saudi before, but not in Taif city, this study assessed the relationship between sleep quality and academic performance among medical students at Taif University. A study was conducted in 2012, 59% of all participants exhibited clinically relevant sleep disturbances during exam preparation compared to 29% during the semester and 8% post-exam [1],In another study in Spanish it wasfound that about 49.8% of students had Excessive Daytime sleepiness criteria, and 79.3% were poor sleepers while 43.3% had poor academic performance during the last semester. Sleep efficiency < 65% was statistically associated with poor academic performance (P=.024; OR = 4.23; 95% CI, 1.12-15.42) in the multivariate analysis [2].

In Saudi Arabia

Study in Saudi Arabia showed that about (78.8 %) of students agreed that sleep deprivation negatively affects academic performance and (78.4 %) mood . Around 62.2 and 73.7 % of students agreed that the demanding medical curriculum and stress of final exams lead to sleep deprivation, respectively. While 36.7 % of students voiced the need for incorporation of curricular separate courses about healthy sleep patterns into medical curriculum, a much greater proportion of students (45.9 %) expressed interest in extracurricular activities about healthy sleep patterns. Interestingly, only 13.5 % of students affirmed that they were counselled about sleep patterns and academic performance by their academic advisors [3].

A study was conducted between December 2009 and January 2010 at the College of Medicine, King Saud University and included a systematic random sample of healthy medical students and found that 28% of students had "excellent" performance, and 72% of students had "average" performance. The "average" group had a higher ESS score and a higher percentage of students who felt sleepy during class. In contrast, the "excellent" group had an earlier bedtime and increased TST during weekdays [4].

METHODS

This a descriptive, cross-sectional analytic study was conducted on 299 of Saudi male and female medical students in Taif University, Saudi Arabia, who completed a self- administered survey using the Pittsburgh Sleep Quality Index (PSQI) and academic grades to collect data. Data were collected from 5-Feb-2017 to 28-May-2017. Descriptive statistics were used to describe the answers of the participants in the study using numbers and percentages for categorical variables while mean and standard deviation are used for continuous variables. The difference between groups is tested using independent T test and One-Way ANOVA for the continuous variables. Spearman's correlation is used to test for correlation between the sleep score and the academic score. Statistical significance was set at p < 0.05 and analysis was performed using IBM SPSS statistics, version 23 (IBM, Armonk, NY, USA). **The study was done after approval of ethical board of Taif university**.

RESULT

A total of 299 medical students were included in this study and surveyed to check for any association between the quality of sleep and their academic scores. The Quality of sleep scores were calculated based of the sum of the scores given to the answers related to the quality of sleep. A higher score indicated better quality of sleep.

Summary of answers to all the questions is presented in **table 1**. Almost 56% of the participants are females. The highest percentage of the participants are from 3rd year (30.4%) and the least were from the fifth year who represented only 9.4%. the highest percentage of the participant had academic score between 3-3.5 and represent 36.5%, while those who scored between 3.5 and 4 represented 34.8% of the group. The least are those who scored 2 or less they were only 5 students (1.7%). All other answers regarding the sleep habits are presented in **table 1.**

The average sleep score for all the participants was 14.17(SD±2.7). The maximum possible score was 24 and the minimal possible score was 5. The scores of the students ranged between 7 and 22 as shown in **graph 1.**

In order to detect difference in the sleep score in different groups, statistical analysis was done using independent t-test and ANOVA as in **table 2**. There was a significant difference in the score between males and females (p value =0.04). The Females scored higher (14.46±2.7) than the males (13.82±2.7) which means that the fames has slightly better sleep quality as illustrated in **graph 3.** There was no significant difference in sleep quality between student from different academic years (p value = 0.97) and between students of different academic achievement (p value=0.99) as Shown in **table 2** and **graphs 2 & 4**.

Correlation between the score representing quality of sleep and the academic score was testes using Spearman's correlation, but there was no significant correlation between them (p value =0.935) as shown in **table 3.**
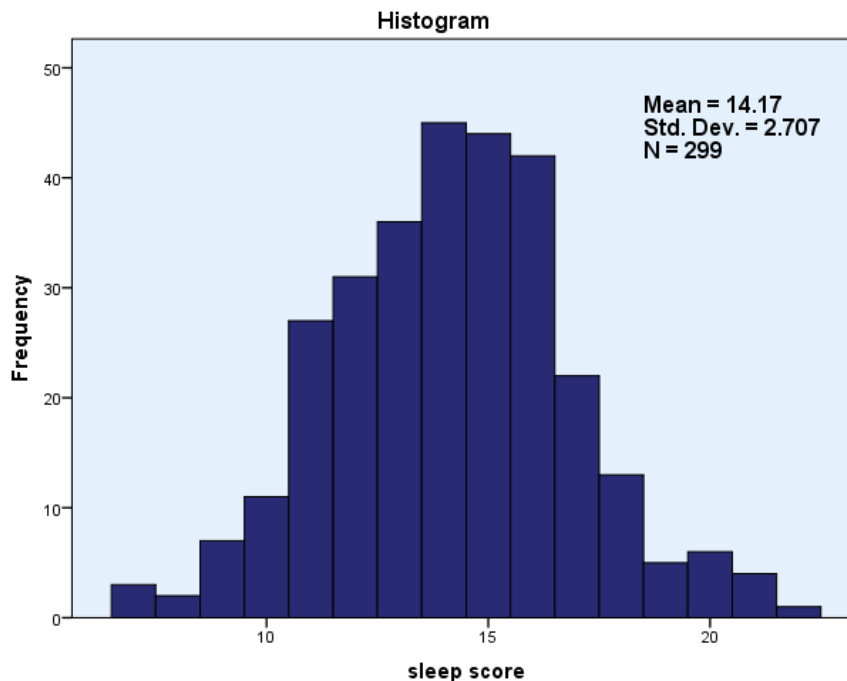
Table 1: summary of responses to all questions in numbers and percentage

		Frequency	Percent
Gender	male	132	44.1
	female	167	55.9
Academic year	2nd year	35	11.7
	3rd year	91	30.4
	4th year	71	23.7
	5th year	28	9.4
	6th year	74	24.7
Academic score	4 - 3.50	104	34.8
	3.50 - 3.00	109	36.5
	3.00 - 2.50	54	18.1
	2.50 - 2.00	27	9.0
	Less than 2.00	5	1.7
1. When do you go to bed in weekdays?	Before 8 PM	3	1.0

		Frequency	Percent
	Between (8-11) PM	38	12.7
	Between (11-12) AM	106	35.5
	After 1 AM	152	50.8
5. When do you go to bed in weekends?	Before 12 AM	37	12.4
	Between (12-2) AM	103	34.4
	Between (2-4) AM	115	38.5
	After 4 AM	44	14.7
How much time you require to fall asleep?	15 minutes	91	30.4
	30 minutes	111	37.1
	45 minutes	46	15.4
	1 hours	51	17.1
How many sleep hours did you get at night	(2 - 4 hours)	69	23.1
	(5-6 hours)	146	48.8
	(7-8 hours)	64	21.4
	(10 hours)	20	6.7
How would you rate the quality of your sleep?	Very good	32	10.7
	good	163	54.5
	bad	88	29.4
	very bad	16	5.4
If you take daytime (a nap), how long are they?	10- 15 minutes	20	6.7
	20- 30 minutes	34	11.4
	1-2 hours	116	38.8
	2-3 hours	85	28.4
	4 hours	44	14.7
Do you think it is important to keep a daily routine for going to bed?	yes	242	80.9
	no	57	19.1
Do you use technology to help you arranging your bed time?	yes	93	31.1
	no	206	68.9
Did you take a medicine to help you to sleep?	yes	46	15.4
	no	253	84.6
13. How often have you had trouble concentrating in daily activity or academic activity?	Never	66	22.1
	at least once a week	233	77.9
14. During final exam days, how many sleeping hours you need?	(30 mins - 1 hours)	28	9.4
	(2-3 hours)	87	29.1
	(4-5 hours)	123	41.1
	(6-8 hours)	61	20.4
15. During final examination days, do you sleep before or after your exam?	yes	223	74.6
	no	76	25.4
16. What is the right time to sleep during exam days?	8-10 PM	64	21.4
	11- 12 AM	124	41.5
	1-3 AM	79	26.4
	After 3 AM	32	10.7
17. Did you take a day nap during final exam days?	yes	140	46.8
	no	159	53.2
If you sleep well, how do you think you will perform in your exam?	Very good	108	36.1
	Good	141	47.2
	The same	41	13.7
	Bad	7	2.3
	Very bad	2	.7
19. If you didn't sleep well, how do you think you will perform in your exam	Very good	14	4.7
	Good	58	19.4
	The same	74	24.7

|		Frequency	Percent
	Bad	137	45.8
	Very bad	16	5.4
you feel sleepy during preparation for your exam, what you will do?	Keep lights in your room switched on	48	16.1
	Don't lie in bed and study	70	23.4
	Take a hot water bath	20	6.7
	Adjust intake of Caffeine	127	42.5
	Study loudly	34	11.4
1. How do you rate sleep importance in productivity?	Very important	205	68.6
	Slightly important	79	26.4
	NOT important	15	5.0
22. Do you think too much about your exams before you sleep?	yes	234	78.3
	no	65	21.7
23. Have you attended exam without getting enough sleep	yes	228	76.3
	no	71	23.7
If yes, how was your performance in that exam ?	Better	35	11.7
	the Same	125	41.8
	worse	68	22.7

Graph 1: a histogram showing the sleep score of the participants, the mean and SD

**Table 2: showing the difference in the mean score of sleep in different groups**

	Groups	N	Mean	Std. Deviation	test used	P value
Gender	male	132	13.82	2.701	independent T test	0.04
	female	167	14.46	2.686		
Academic year	2nd year	35	14.31	2.435	ANOVA	0.97
	3rd year	91	14.16	2.841		
	4th year	71	14.24	2.654		
	5th year	28	14.32	2.945		
	6th year	74	14.00	2.679		
Academic score	4 - 3.50	104	14.25	2.538	ANOVA	0.99
	3.50 - 3.00	109	14.15	2.687		
	3.00 - 2.50	54	14.04	2.747		
	2.50 - 2.00	27	14.26	3.058		
	Less than 2.00	5	14.20	4.868		

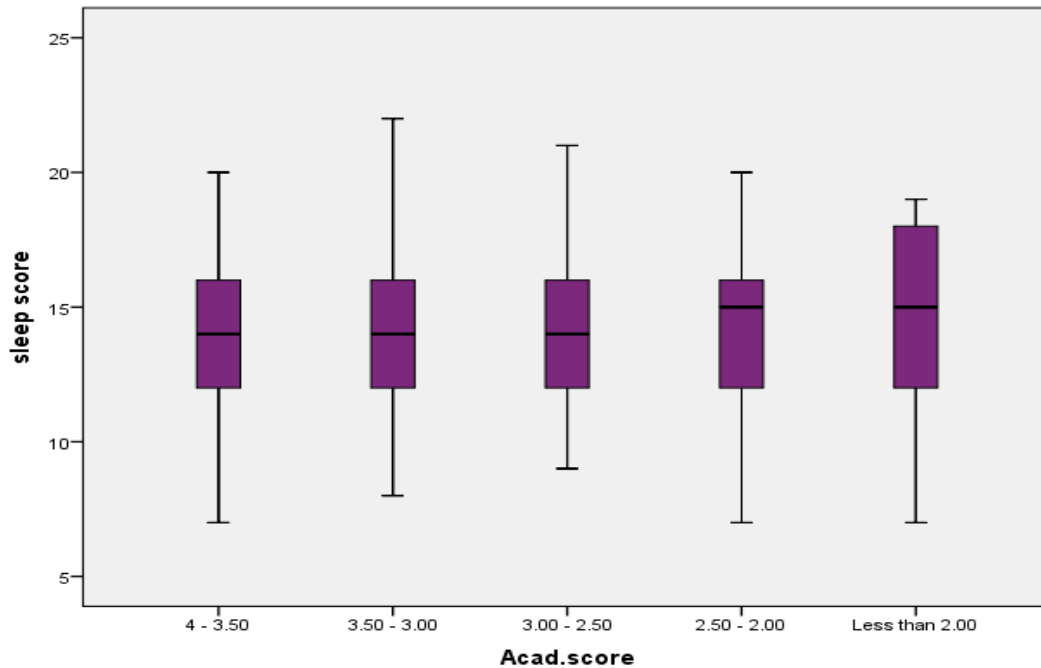**Table 3: showing the correlation coefficient between the sleep score and the academic score**

			sleep score
Spearman's rho	Academic score	Correlation Coefficient	-.005
		P value	.935
		N	299
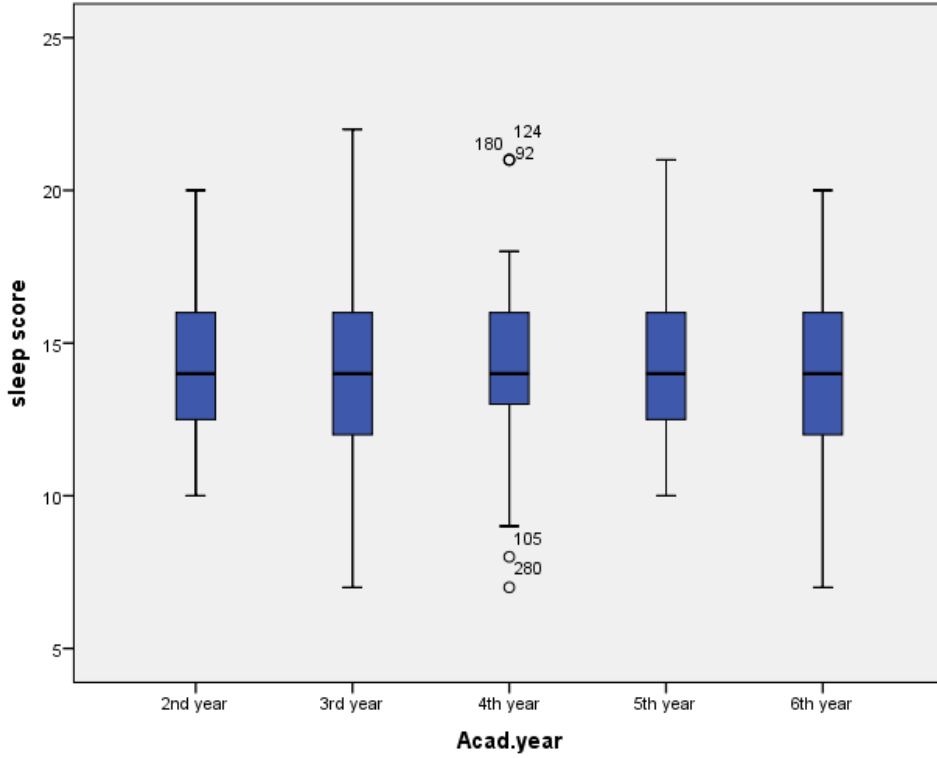
Graph 2: showing a comparison of the sleep score between different academic years
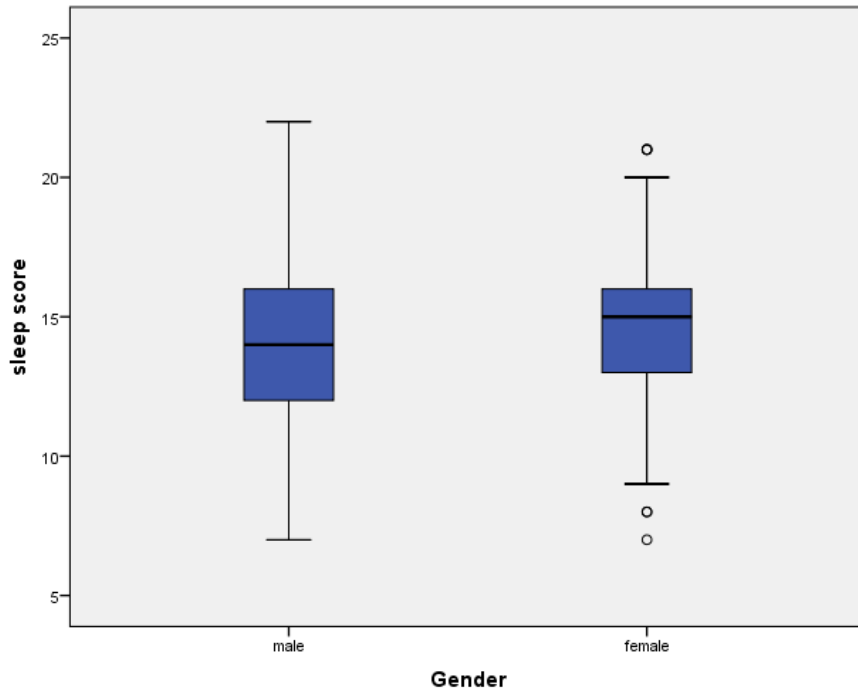
Graph 3: showing a comparison of the sleep score between males and females

Graph 4: showing a comparison of the sleep score between groups of different academic performance

DISCUSSION

A total of 299 medical students were included in this study and surveyed to check for any association between the quality of sleep and their academic scores. The Quality of sleep scores were calculated based of the sum of the scores given to the answers related to the quality of sleep. A higher score indicated better quality of sleep.

There was a significant difference in the score between males and females (p value =0.04). The Females scored higher value (14.46±2.7) than the males (13.82±2.7) which means that the fames had slightly better sleep quality. There was no significant difference in sleep quality between student from different academic years and between students of different academic achievement.

Correlation between the score representing the quality of sleep and the academic score was not significant correlation between them (p value =0.935).

The result reached in this study showed that there was no significant correlation between the sleep quality and the academic achievement is also reached by a study [5] that examined associations between measures of sleep propensity on the Epworth sleepiness scale, sleep quality on the Pittsburgh sleep quality Index and academic performance by GPA and grades in introductory psychology for 414 students. In the total sample, neither sleep propensity nor sleep quality correlated with GPA or introductory psychology grades.

Another study showed a significant association between quality of sleep and academic performance.

For example, a study [6] performed on students in the Faculty of Medicine, King Abdulaziz University (KAU), Jeddah, KSA showed that sleep deprivation, poor sleep quality, and EDS are common among clinical years medical students and high levels of stress and the pressure of maintaining grade point averages may be influencing their quality of sleep. Also, poorer academic performance and stress were associated with symptoms of insomnia. Other study [7] in the same university with analysis of the sleep pattern of male medical students revealed that this group was sleep deprived,

One other study, [8] in the College of Medicine, King Saud University, Riyadh, Saudi Arabia , showed that 36.6% of participants were considered to have abnormal sleep habits, with a statistically significant increase in female students and abnormal ESS scores were associated with lower academic achievement.Also, another study [9] in the same university, KSU compared the sleeping patterns of medical students to excellent academic performance with those with average performance. The "average" group had a higher ESS score and a higher percentage of students who felt sleepy during class. In contrast, the "excellent" group had an earlier bedtime and increased TST during weekdays.

A study took place at Alfaisal University, College of Medicine, Riyadh, Saudi Arabia; where an online, anonymous, cross-sectional, self-rating survey was administered to first-, third-year students and their academic advisors. The vast majority of students agreed that sleep deprivation negatively affects academic performance [10].

The same relationship between sleep quality and academic progress is found in a studyon 413 medical students of the University of Tartu, Estonia, and concluded that Sleep quality is associated with academic progress [11].

Moreover, poorer academic performance was related significantly to later times of waking up in the morning, particularly at weekends, and to subjectively poorer quality sleep[12]. This was also observed in another study [13] that poor sleep quality was significantly associated with lower grades, and (40.6%) of the participants had poor sleep quality. Again, in a sample of 200 students [14] living in on-campus residence halls at a large private university. Sleep habits, particularly wake-up times, accounted for the largest amount of variance in grade point averages. Later wake-up times were associated with lower average grades.

A study [15] performed on 144 medical students undertaking the pre-clinical board exam answered a survey regarding their subjective sleep quality (Pittsburgh sleep quality index, PSQI), grades and subjective stress for three different time points: semester, pre- and post-exam. The study showed that in medical students it is not the generally poor sleepers, who perform worse in the medical board exams. Instead students who will perform worse on their exams seem to be more stressed and suffer from poor sleep quality. However, poor sleep quality may negatively impact test performance as well, creating a vicious circle.

CONCLUSION

Although we did not reach a significant correlation between the sleep quality and the academic performance, many other studies showed that there was a significant correlation. Sleep quality was related in many ways to the academic achievement.

REFERENCES

1- **Ahrberg K1, Dresler M, Niedermaier S, Steiger A, and Genzel L (2012):** The interaction between sleep quality and academic performance. J Psychiatr Res., 46(12):1618-22

2- **Machado-Duque ME1, Echeverri Chabur JE2, and Machado-Alba JE3 (2015):** Excessive Daytime Sleepiness, Poor Quality Sleep, and Low Academic Performance in Medical Students. Rev Colomb Psiquiatr., 44(3):137-42.

3- **Lama AlFakhri, Jumana Sarraj, Shouq Kherallah, Khulood Kuhail, Akef Obeidat, and Ahmed Abu-Zaid (2015):** Perceptions of pre-clerkship medical students and academic advisors about sleep deprivation and its relationship to academic performance: a cross-sectional perspective from Saudi Arabia. BMC Res Notes, 8: 740.

4- **Bahammam AS1, Alaseem AM, Alzakri AA, Almeneessier AS, and Sharif MM (2012):** The relationship between sleep and wake habits and academic performance in medical students: a cross-sectional study. BMC Med Educ., 1;12:61

5- **Andrew J. Howell et al (2004):** Sleep Quality, Sleep Propensity and Academic Performance. Perceptual and Motor Skills, 99;2:525 - 535

6- **Alsaggaf A, Wali, O, Merdad R , and Merdad A (2016):** Sleep quantity, quality, and insomnia symptoms of medical students during clinical years: Relationship with stress and academic performance. Saudi Medical Journal, 37(2), 173–182

7- **Bahammam AS, Al-Khairy OK, and Al-Taweel AA (2005):** Sleep habits and patterns among medical students. Neurosciences, 10(2) 159-162

8- **Hamza A, Norah A, Norah S, Nourah S, Alhan H, and Ali A (2012):** Sleep disorder among medical students: Relationship to their academic performance, Medical Teacher, 34:1

9- **Ahmed S, and BaHammam et al (2012):** The relationship between sleep and wake habits and academic performance in medical students: a cross-sectional study. Medical Education, 12:61

10- **AlFakhri et al (2015):** Perceptions of pre-clerkship medical students and academic advisors about sleep deprivation and its relationship to academic performance: a cross-sectional perspective from Saudi Arabi. BMC., 8:740

11- **Veldi, Marlit et al (2016):** Sleep quality and more common sleep-related problems in medical students. Sleep Medicine, 3:269 – 275

12- **Johns W, Dudley F, Masterton P (1976):** The sleep habits, personality and academic performance of medical students. Medical Education, 10: 158–162

13- **Ghoreishi A, and Aghajani H (2008):** Sleep quality in Zanjan university medical students. Tehran Univ Med J., 66 (1) :61-67

14- **Mickey T, Trockel S, Michael D, Barnes & Dennis L (2000):** Health-Related Variables and Academic Performance Among First-Year College Students: Implications for Sleep and Other Behaviors. Journal of American College Health, 49:3

15- **Ahrberg K et al (2012):** The interaction between sleep quality and academic performance. Journal of Psychiatric Research, 12:1618 – 1622

16- **Birch MP, Messenger JF and Messenger AG (2001):** Hair density, hair diameter and the prevalence of female pattern hair loss. Br. J. Dermatol., 144:297–304.

17- **Gan DC and Sinclair RD (2005):** Prevalence of male and female pattern hair loss in Maryborough. J. Investig. Dermatol. Symp. Proc., 10:184–189.

18- **Paik JH, Yoon JB, Sim WY, Kim BS and Kim NI (2001):** The prevalence and types of androgenetic alopecia in Korean men and women. Br. J. Dermatol., 145:95–99.