ORIGINAL ARTICLE

Sleep Quality and its Effect on Academic Performance Among Fourth Year Medical Students at Zagazig University.

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ABSTRACT

Background: Sleep is a physiological process that ensures normal functioning for human beings. Deprivation and poor quality of sleep are most predominant among medical students because of the continuous stress and anxiety from the condensed medical curricula, multiple evaluations, and fear of failure. This study aims to promote academic performance among medical students at Zagazig University. This aim was achieved through the following objectives: assessing the prevalence of sleep disorders among clinical years medical students and assessing the relationship between sleep disorders and academic performance.

Methods: A cross-sectional study was performed at the faculty of medicine, Zagazig University using an Arabic translated Pittsburgh Sleep Quality Index (PSQ) questionnaire, academic performance was assessed with a self-reported grade point average (GPA) in the last year.

Results: A total of 278 fourth-year medical students were interviewed and had comprehensive data on demography, lifestyle, academic performance, and sleep quality. Poor sleep prevalence was 25.5%. There was a statistically significant difference among the poor sleepers' group and good sleepers' group regarding physical activity and GPA.

Conclusion: Poor sleep quality may adversely affect GPA as well, inducing a vicious cycle. Moreover, the sleep disturbances rate among medical students must be a reason for intervention.

Keywords: sleep deprivation, medical students' performance, physical activity, GPA

INTRODUCTION

For the normal functioning of all human beings, adequate and sufficient sleep is essential. Both sleep habits and sleep disturbances are affected by physical, mental, social, and environmental influences, including age, sex, occupation, lifestyle, stress, and noise. It is necessary for adults to sleep each night for about seven and nine hours. Sleep quantity and quality are crucial for the proper psychological and physical well-being of individuals. Throughout sleep, the brain conducts memory consolidation and integration; concentration problems are eliminated by sufficient and good quality sleep [1].

Deprived of adequate sleep, judgments, mood, and learning skills and recall information have deteriorated. Sleep problems disturb approximately one-third of adults. In comparison with the general population, students, particularly university students, have much less adequate sleep and are more susceptible to increasing sleep demands due to academic stress [2].

Many studies that used the Pittsburgh Sleep Quality Index (PSQI) reported that three-quarters (70–76%) of medical students were poor sleepers [3], one of them stated that the prevalence of disturbed and poor sleep quality among clinical years of medical students was 69.5% [4].

Sleep deprivation may lead to mental and psychological problems. Aiming to improve their academic grades, students with poor academic performance intended to sleep inadequately at night to read. Accordingly, this induces a vicious circle that is related not only to a harmful impact on sleep quality but also on mental health [5]. Lifestyle factors, e.g., dietary habits (heavy meals, tyramine/tryptophan-rich foods), alcohol, caffeine, medications, and exercise, may play a role in sleep disturbances [6].

Prior to becoming specialists, medical students experienced extended and exhaustive academic

years. Besides, they face difficulties in their lives involving family and relationships, which negatively affect their psychological and mental health. It is well known that psychological stress can trigger insomnia and has a bidirectional relation with poor sleep quality. However, only a paucity of data is recorded concerning sleep behaviors and their impact on students [6].

Sleep problems are linked to significant social problems prevalence, besides several somatic and/ or psychiatric diseases. Chronic sleep deprivation of medical students leads to poor sleep quality and may disturb their cognitive and psychomotor performance [2].

Poor sleep quality is accompanied by an increased risk of tension, the use of psychoactive agents, anxiety, and depression. In fact, before medical students' exam time, the acquired sleep hours could predict the exam scores; similarly, extended daytime sleepiness before exams is suggested to have a negative correlation with academic achievement. For instance, many studies concluded that proper sleep preserves memories from interference, enhance performance, and restores memory traces such that innovation and re-memorization are encouraged [7].

This study aimed to promote the academic performance among medical students at Zagazig University, that achieved through evaluation of sleep disorders prevalence among fourth year medical students (one of the clinical years) and identifying the relationship between sleep disorders and academic performance.

METHODS

The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Before starting our study, an official permission was obtained from the institutional review board (IRB) of Zagazig University (ZU-IRB#6450/2-1-2020), informed consent was taken from all the participants after describing the aim of the study and ensuring that the study group will not be exposed to any harm or risk and ensuring confidentiality too.

The study was designed to be cross-sectional conducted at the medical school campus of Zagazig University during the period from January 2020 to April 2020, on clinical years (fourth, fifth and sixth years) medical students, particularly fourth year students that selected randomly. Sample size calculated using open EPI to be 278 students, assuming that the total number of the fourth-year medical students at Zagazig University is 1300 and the prevalence of sleep disorders among medical students was 63.2% at CI 95% [8].

The sample selected on two stages by multi-stage sample technique, first select fourth year medical students by random sample method out of the three clinical years of medical students at Zagazig University (fourth, fifth and sixth years), then systematic random technique using students list and computerized random tables to choose a random sample from the list of all fourth-year medical students at Zagazig University who were our inclusions and exclude students who refuse to participate in the field study or suffered from a chronic medical disease that affects general health which were our exclusion criteria.

The studied sample surveyed using the Arabic translated Pittsburgh Sleep Quality Index (PSQ) questionnaire, self-rated questionnaire which assesses sleep quality and disturbances over last month, a 19-item scale producing a global sleep quality index score based on seven component scores: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction [9]. Each question weighted equally on a 0-3 scale. The sum of scores for these seven components yields an overall score ranging from 0 to 21. A score of 5 or more was indicative of poor sleep quality, whereas a score of less than 5 was indicative of good sleep quality. The PSQI has yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% (kappa = 0.75, p < 0.001) in distinguishing good and poor sleepers.

Academic performance was assessed with a self-reported grade point average (GPA) in the last year. GPA is a well-established method to assess academic performance in research [10]. At our faculty we divide student grades into categories of excellent, very good, good, fair, or failed. Additionally, students were asked about a number of socio-demographic variables: age, sex, smoking, living condition either alone, with other students or with family, physical activity and exercise, attendance at faculty either regular or not and if the student prefer to share his colleagues acting in teamwork or not. The reliability of the scale was measured using Cronbach`s alpha. The coefficients were estimated, considering the results above 0.70 as acceptable [11]. To analyze the construct validity, the convergent validity of the scale was used, with the aim of verifying the correlations among items and total [12]. The external consistency of the scale was analyzed during pilot study by test-retest validity to assess language and terms of the questionnaire, the participants were asked to fill the scale two times with two weeks interval and correlation between answers in first and second times were calculated [13].

STATISTICAL ANALYSIS

Data collected and outcome measures were coded, entered, and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 25.0) software for analysis. According to the type of data, qualitative data represented as number and percentage, continuous quantitative data represented by mean ± SD, the following tests were used to test significant differences and association. Differences between quantitative independent groups by t-test. Chi-Square testX^2 was used to test the association variables for categorical data.

RESULTS

This study was carried out on 278 students, 147 males (52.9%) and 131 females (47.1%) with a mean age of 21.6 years that ranged from 18 years up to 24 years, the PSQI score ranged from 3 to 20 (mean = 15.7, SD = 3.2); 74.5% were good sleepers (Figure 1).

In table 1 there was no statistically significant difference between poor sleepers' group and good sleepers' group as regard sex distribution, smoking, and living conditions either alone, with family, or with other students, while there was a statistically significant difference regarding daytime physical activity level. Also, there was a significant difference between the poor sleepers' group and the good sleepers' group as regard time of going to bed, time of getting up, and hours of sleeping (Table 2).

There was a significant statistical difference between poor and good sleepers' groups regarding waking up at night or early morning only as a problem occurred during sleep assessed among studied group (Table 3), but There was no significant statistical difference between both good and poor sleepers' groups regarding subjective evaluation of sleep quality (Table 4).

There was a statistically significant difference among the poor sleepers' group and good sleepers' group as regard GPA (Table 5)

Table 1: General characters of the studied group

Variable	Total N=278 N (%)	Poor sleepers' N=71 N	%	Good sleepers' N=207 N	%	χ 2	P-value
Sex:							
-Male	147 (52.9%)	40	56.3	107	51.7	0.46	0.5
-Female	131 (47.1%)	31	43.7	100	48.3		NS
Smoking:							
-smoker	132 (47.5%)	30	42.3	102	49.3	1.05	0.31
-non-smoker	146 (52.5%)	41	57.7	105	50.7		NS
Living condition:							
-with family	126 (45.3%)	30	42.3	96	46.4		
-alone	63 (22.7%)	15	21.1	48	23.2	0.93	0.63
-with other students	89 (32%)	26	36.6	63	30.4		NS
Prefer to work in teamwork:							
Regularly or sometimes	129 (46.4%)	30	42.3	99	47.8		
When forced	62 (22.3%)	16	22.5	46	22.2	2.45	0.49
Never	87 (31.3%)	25	35.2	62	30		NS
Attendance:							
Regular	231 (83.1%)	61	86	170	82.1		0.462
Irregular	47 (16.9%)	10	14	37	17.9	0.54	NS
Daytime physical activity:							
Active	205 (73.7%)	38	53.5	167	80.7	20.1	**<0.001**
Inactive	73 (26.3%)	33	46.5	40	19.3		**HS**

NS: P-value>0.05 is not significant

Table 2: Sleep habits in the last month among the studied group

Variable	Total N=278	Poor sleepers' N=71	Good sleepers' N=207	t-test	P-value
Time of going to bed (hours):					
Mean ± SD	10.6 ±3.23	9.5 ± 1.12	7.6 ± 2.4	7.78	**<0.001 HS**
Time of getting up(hours):					
Mean ± SD	6.55 ± 1.71	5.9 ± 1.9	7.4 ± 2.5	**4.62**	**<0.001 HS**
Duration of sleeping (h.):					
Mean ± SD	7.1 ± 0.78	4.7± 1.5	7.9± 2.2	**11.4**	**<0.001 HS**

HS: P-value<0.001 is high significant   SD: standard deviation

Table 3: The common sleep problems among the studied groups

Variable	Total N=278	Poor sleepers' N=71		Good sleepers' N=207		χ 2	P-value
	N (%)	N	%	N	%		
a) Cannot get to sleep within 30 min							0.95
-never	74 (26.6%)	18	25.4	56	27.1		NS
-less than once a week	71 (25.5%)	17	23.9	54	26.1	0.33	
-once or more a week	133 (47.8%)	36	50.7	97	46.9		
b) Wake up in night or early morning							
- never							**<0.001**
- less than once a week	67 (24.1%)	22	31	45	21.7		**HS**
- once or more a week	74 (26.6%)	4	5.6	70	33.8	**61.1**	
	137 (49.3%)	45	63.4	92	44.4		
c) Have to get up to use bathroom							
- never	79 (28.4%)	20	28.2	59	28.5		0.78
- less than once a week	77 (27.7%)	18	25.4	59	28.5		NS
- once or more a week.	122 (43.9%)	33	46.5	89	43	1.07	
d) Cannot breathe comfortably							
- never	147 (52.9%)	35	49.3	112	54.1		0.09
- less than once a week	81 (29.1%)	22	31	59	28.5	6.5	NS
- once or more a week	50 (18%)	14	19.7	36	17.4		
e) Cough or snore loudly							
- never	210 (75.5%)	54	76.1	156	75.4		0.999
- less than once a week or /frequent	68 (24.5%)	17	23.9	51	24.6	0.02	NS
f) Feel too cold							
- never	109 (39.2%)	28	39.4	81	39.1	1.03	0.76
- less than once a week or/ frequent	169 (60.8%)	43	60.6	126	15.9		NS
g) Feel too hot							
- never	152 (54.7%)	40	56.3	112	54.1	0.6	0.9
- less than once a week or /frequent	126 (45.3%)	31	43.7	95	45.9		NS
h) Had bad dreams							
- never	92 (33.1%)	22	31	70	33.8		
- less than once a week or/ frequent	179 (66.9%)	49	69	137	66.2		0.97
i) Felt pain						1.5	
- never	201 (72.3%)	50	70.4	151	72.9		0.68
- less than once a week or /frequent	77 (27.7%)	21	29.6	56	27.1		NS

NS: P-value >0.05 is not significant   HS: P-value<0.001 is high significant

Table 4: Subjective sleep quality information among the studied group

Variable	Total N=278	Poor sleepers' N=71		Good sleepers' N=207		χ 2	P-value
	N (%)	N	%	N	%		
1)Last month sleep quality							0.88
-very good or good	204 (73.4%)	54	76.1	150	72.5		NS
-bad or very bad	74 (26.6%)	17	23.9	57	27.5	0.65	
2)last month medications used to help your sleep						0.11	0.99
-never	237 (85.3%)	61	85.9	176	85		NS
-less than once a week or/ frequent	41 (14.7%)	10	14.1	31	15		
3)Last month time taken to sleep deeply							0.72
- less than 15 min or up to 30 min							NS
-more than 30 min up to 1 h or more	178 (64%)	44	62	134	64.7	1.35	
	100 (36%)	27	38	73	35.3		

NS: P-value>0.05 is not significant

Table 5: Association between sleep quality and academic performance among the studied group

Variable	Total N=278	Poor sleepers' N=71		Good sleepers' N=207		χ 2	P-value
	N (%)	N	%	N	%		
GPA:							**<0.001**
Excellent or very good	185	25	35.2	160	77.3		**HS**
Good or fair	(66.5%)	46	64.8	47	22.7	42.1	
	98 (33.5%)						

NS: P-value>0.05 is not significant   HS: P-value<0.001 is high significant   GPA: grade point average
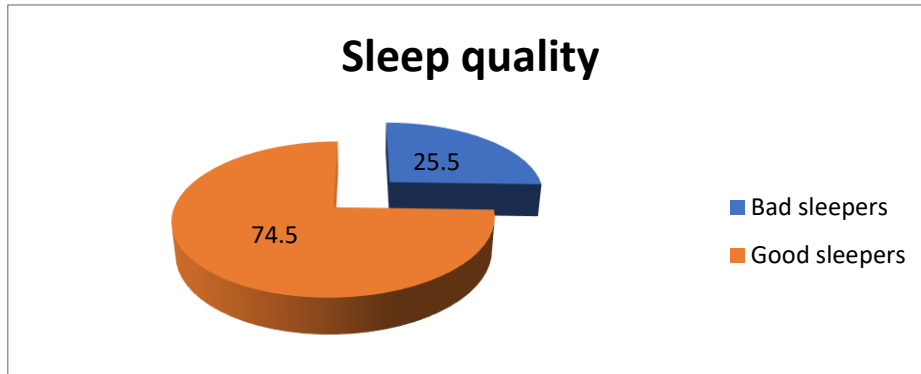
Figure 1: Prevalence of sleep quality among the studied group**.**

DISCUSSION

Indeed, sleep is essential to health and well-being. Concerning the appropriate sleep duration for adults from 46 to 60 years, it is recommended to be regular and about 7 hours or more per night, and for adults from 18 to 45 years, it is also recommended to be more than 9 hours regularly. Sleep has great effects on mental integrity, and consequently, influences performance. Insufficient sleep causes some sort of alertness dissociation, attention impairment as well as a delay of cognitive functions [14].

Poor sleep quality and sleep deprivation are prevalent among medical students because of continuous stress and anxiety from intensive medical syllabuses, repeated exams, and fear of failure [6]. Our study's main objectives were to evaluate the sleep disorders prevalence among medical students and assess the relationship between sleep disorders and academic performance.

Our results show that 74.5% of our studied group were good sleepers, and 25.5% of them were poor sleepers. The mean ±SD of their age was 21.8 ±6.8 years. This came in agreement with Priya et al [15], who reported close results of rate poor sleep quality as it was found in 32.53% in their study population. Contrary to our results study of Maheshwari & Shaukat [16], they reported that 512 (64.24%) students had poor sleep quality. Studies in Saudi Arabia conducted by Siddiqui et al [17] reported high percentages (70–76%) for poor sleeping among their studied students. This difference may be attributed to the fact that these

studies included medical students in last year of faculty who probably had more sleep problems.

Regarding the mean of age of the studied groups, no statistically significant effect on sleep quality scores was found. The same results were recorded by Grandner et al [18] and Ahmed Salama [19], the later reported age of good sleepers and bad sleepers were 20.41± 1.92 vs. 20.21 ±1.86 respectively with p= 0.209. On the other hand, Nojomi et al [20] described a significant positive correlation between the studied student's age and poor sleep quality.

Our study reported no significant relation between sex and sleep quality and the percentage of poor sleep quality among the two sexes was almost the same because they both had the same studying conditions and the same risk factors for poor sleep quality. In similarity with AL-Khani et al [8]. While in contrast to our results, Ahmed Salama [19] reported that most poor sleeper groups were female students (65%) than male students. Suen et al [21] and Loayza et al [22] found a higher significant association between poor sleep and the female gender than the male gender.

Regarding smoking, our results showed no significant difference in the quality of sleep, whether students were smoking or not, in agreement with Al-Khani et al [8] results. While Ahmed Salama [19] reported that about two-thirds of smokers (62.5%) had a good quality sleep. Or on the contrary, Brick et al [23] stated that smokers had a lower global SQI score than non-smokers.

The present study shows no statistically significant difference among the poor sleepers'

group and good sleepers' group regarding living circumstances. A study that found the same results was carried out by Al-Khani et al [8], while Ahmed Salama [19] study reported a significant association of poor sleep quality and roommate presence; p=0.002.

The current study shows a statistically significant difference among the poor sleepers' group and good sleepers' group regarding the time of sleeping, the time of getting up, and hours of sleep. There is a significant statistical difference between poor and good sleepers' groups regarding waking up at night or early morning. Our results are supported by the study of Abdulghani et al [24] as they reported a statistically significant difference among poor sleepers' and good sleepers' groups regarding the total time of sleep. Similarly, Frank et al [25], stated that the mean of sleeping hours was 6 hours and 48 minutes/night with no statistically significant difference in the same age group. While the mean of sleeping hours was (5.9 ± 1.6) in a study on medical students in KSA.

In our study, there was a highly significant difference regarding frequent waking up during the night or early morning between both studied groups p <0.001. Ahmed Salama [19] study, showed that more than half of good sleepers (52.3 %) were going to bed after midnight, and most of them were waking up before 7 a.m. to attend their morning classes, i.e., no effect of the sleep pattern on their sleep quality. In contrast, sleep patterns, such as late sleep and getting up early, have been found to affect the quality of sleep in other studies [24]. Nojomi et al [20] revealed that 71% of the studied group were going to bed before 12 a.m., and 93% of them were getting up early before 7 o'clock. This inconsistency could be clarified by different sleep type, whether rapid eye movement or slow eye movement, that is definitely not the same among students.

The current study found a statistically significant difference between the poor sleepers' group and the good sleepers' group regarding physical activity and GPA. Our results are supported with El Hangouche et al [7] study as they reported a significant statistical association between being a poor sleeper and poor academic performance. In contrast, a study conducted on non-medical students by Thacher [26] showed no relation between either sleep or insomnia and students' academic performance. The study of Abdulghani et al [24] found that academic performance is significantly related to sleep disturbance.

In contrast with our results, a study of Al-Khani et al [8] mentioned that more than half (60%) of the poor sleepers were great achievers. In comparison with low achievers, 42% of high achievers were highly susceptible to be poor sleepers.

CONCLUSION

Poor sleep quality negatively affects the academic performance and physical activity of the medical students.

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