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Sleep quality and academic progression among students of Tabriz University of Medical Sciences, Northwest of Iran

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Abstract

Background: Sleep deprivation and drowsiness are very common among university students. The aim of this study was to examine the sleep quality and academic achievement among university students across all medical disciplines in Northwest of Iran.

Methods: This study was based on data from a longitudinal study, the "Health and Lifestyle of University Students" (HeLiS). The Pittsburgh Sleep Quality Index (PSQI), a self-administered questionnaire consisting of general information about sleep quality, was completed by students during the first eight weeks of the first semester and academic achievement was assessed via grade point average (GPA) in the two semesters following the administration of the PSQI.

Results: The mean age of students was 19.16 ± 1.04 and the majority were female (64%). The mean overall score on the PSQI was 6.87 ± 2.25 ; the majority of students (70%) had a global PSQI score greater than 5, indicating they were poor sleepers. Only 28% reported getting over 7 hours of sleep. Female students had higher scores than male students in subjective sleep quality, which was statistically significant (2.15 vs. 1.95 respectively, $P=0.01$); however, there was no difference between males and females on other component scores or on the global score. Results of a multiple regression model showed that PSQI score was a predictor of academic achievement ($\beta = -0.07$, $P=0.035$), which implies that GPA will be lower among students whose quality of sleep is lower.

Conclusion: Based on our sleep quality should be considered and assessed, and sleep hygiene should be promoted among medical university students in order to improve academic achievement.

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Introduction

Sleep is a critical component of human health and wellbeing.¹ The recommended number of sleep for adults is 7 or more hours per night on a regular basis in order to maintain and improve health.² Previous research has indicated that insufficient sleep has a negative impact on health and can increase the risk of various health conditions such as diabetes, obesity, cardiovascular disease.³⁻⁵

Sleep deprivation and drowsiness are very common among college students.^{6,7} University life brings new challenges, such as a new social and competitive academic environment that can have both positive and negative impacts on student health, stress due to academic

achievement factors, social pressures, separation from family, and financial concerns.⁸⁻¹⁰

Sleep deprivation has negative impacts on learning, memory and performance as well as mental, and physiological health.⁷ Studies show that sleep deprivation (less than six to seven hours per day) can lead to a serious decline in cognitive performance and psychomotor functions (reduction of concentration, memory and thinking strategies), daytime dysfunction, increased incidence of driving crashes^{11,12} and diminished academic performance, often resulting in poor grades.^{13,14}

Results of the current study indicated a significant positive correlation between amount of sleep per night with increased grade point averages (GPA), and a significant

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negative correlation between average number of days per week that students obtained less than 5 hours of sleep and lower GPAs.¹⁵

Published literature regarding students' sleep and academic performance in all medical disciplines (from medicine to health sciences) is scarce, especially longitudinally. Previous research mostly included only one group of students, for example, medical or pharmacy or nursing.^{14,16-18} The current study aimed at examining the sleep quality as it related to the academic achievement of university students using the information from the first baseline data collection of the "Health and Lifestyle of University Students" (HeLiS), the first longitudinal study among medical university students in Iran, conducted in Tabriz, Iran.

Materials and Methods

In order to examine the association between sleep quality and academic achievement, in this study data related to demographic characteristics and sleep quality was extracted from baseline information found in the HeLiS. The Pittsburgh Sleep Quality Index (PSQI), a self-administered questionnaire consisting of general information about sleep quality, was completed by students during the first eight weeks of their first semester and academic achievement was assessed via GPA in the two semesters following the administration of the PSQI.

Study population

The HeLiS is the first longitudinal study among university students in Iran. This study aims to examine changes in health status and lifestyle behavior over time and also the influence of these on academic achievement among students of different medical disciplines. All first-year students of all disciplines from eight schools within the university who enrolled in September 2014 were invited to participate in this study. The inclusion criteria were: age under 25, enrolled students, enrolled in a bachelor degree program, medical, dentistry and pharmacy, willingness to participate and take a part in the follow-up study. At the baseline, participants were asked to answer a self-report questionnaire with minimal instruction that took about 40 minutes to complete.

The study questionnaire consisted of demographic and socioeconomic status, lifestyle, mental health, nutritional habits, oral health, and anthropometric measures. Sleep quality was assessed using the PSQI, which is a valid questionnaire.¹⁹

The PSQI measures sleep quality over the last 30 days (1 month); it is a self-rated instrument consisting of 19 items combined for 7 component scores, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The responses are scored on a 3-point scale, ranging from 0 (no difficulty) to 3 (severe difficulty). The overall score is a combination of the 7 component scores, which ranges from 0 to 21. Students were classified into two groups according to their score on

the PSQI: poor-sleeper group (PSQI > 5) and good-sleeper group (PSQI ≤ 5). The validity of the Persian version of PSQI was evaluated by Farrahi Moghaddam et al in 2012.²⁰ In order to access the academic profile of student participants, linking to the students' records were done in accordance with the privacy regulations of the university. Academic achievement was assessed using GPA in the two semesters following the initial assessment. In Iran the maximum GPA is 20 (<http://www.aut.ac.ir/academics/bsc/p6.htm>); less than 10 is regarded being in danger of failing the course.

Statistical analysis

Data was summarized using means (\pm standard deviation) for continuous variables and counts and percentages for categorical variables. Distribution of sleep quality as poor-sleeper group (PSQI > 5) and good-sleeper group (PSQI ≤ 5) across different discipline (medicine, pharmacy, dentistry, rehabilitation, nutrition, health sciences, management, nursing and paramedicine) was also described as number and percentage. Chi-square tests and student's *t* tests were used to determine bivariate differences for categorical and continuous variables, respectively. Multiple linear regression was used to identify the association between PSQI score and GPA after controlling for selected variables such as age, sex, local residence (e.g., student housing), and discipline. The β coefficient, the standard error and the *P* value were reported with the multiple regression model. All statistical assumptions were checked and fulfilled before running the model. Analysis was performed using SPSS 21 software. A *P* value of less than 0.05 indicated statistical significance.

Results

A total of 645 students enrolled in the first semester were eligible for the baseline phase of the HeLiS, of whom 471 completed a sleep quality questionnaire for a participation rate of 80%. Data from the 471 students were included in this analysis. The mean age of students was 19.16 ± 1.04 ; the majority were female (64%). For living arrangements, 40% were living in dormitory or shared home. The average GPA was 15.74 ± 1.58 , with a minimum of 10.85 and a maximum of 19.11.

Just under a quarter of students (24%) had GPAs ranging from 17-20, 63% had GPAs ranging from 14-16.99, and about 13% had GPAs under 14. GPAs were not available for 10 students. There was a significant association between GPA and gender and discipline. Female students had higher GPAs compared to male students ($P=0.001$). Students from dentistry, pharmacy and management schools had higher GPAs compared to other students ($P=0.001$). In contrast, nursing students had the lowest GPAs.

Mean overall score on the PSQI was 6.87 ± 2.25 ; the majority of students had a global PSQI score greater than 5; about 70% of students were poor sleepers. Only 28% reported getting more than seven hours sleep per night. Students from all schools had a global PSQI score of over

5 (Table 1).

Mean component and global PSQI scores based on gender are shown in Table 2; female students had higher scores than male in subjective sleep quality, which was statistically significant (2.15 vs. 1.95 respectively, $P=0.01$). However, there was no difference between males and females on other component scores or on the global score ($P=0.02$). Students who had GPAs of less than 14 had higher component scores in sleep latency, sleep duration, sleep efficiency, and tended to consume more sleep medication. However, the difference was not statistically significant. When GPA was categorized into <12, 12-15.99 and 16 and above, there were only eight students who had GPAs less than 12. The global PSQI score was higher among these students compared to other GPA categories, and they had significantly higher scores in sleep latency, sleep duration, sleep efficiency and sleep disturbance. There was a correlation between sleep quality and academic achievement; the total PSQI score increased as GPA decreased ($r=-0.102$, $P=0.028$) (Figure 1).

A linear regression was conducted to test a predictive model for academic achievement (GPA) with sleep quality while controlling for other variables (age, gender, living in dormitory/shared home, discipline). The overall model was significant ($R^2=0.14$, $F [11, 406] = 6.04$, $P<0.0001$) and the sleep quality score inversely predicted academic achievement ($\beta = -0.07$, $P=0.035$).

Discussion

The aim of this study was to assess the association between sleep quality and academic achievement among medical

university students. Results showed that 70% of students suffer from poor sleep quality. The results were higher than other studies, such as a study among pharmacy students that showed a prevalence of 55% suffering from poor sleep¹⁶ increasing to 59% in the pre-examination period,²¹ and Adeosun et al²² showing 63% in habitual night readers, and much greater than that found by Kang and Chen²³ (34%) and Medeiros et al²⁴ (39%) or Surani et al (39.5% in medical students).²⁵

The mean global score of the PSQI was 6.87 ± 2.25 , which was similar to other studies which reported 6.2 (Marshall), 6.3 in a pre-examination period in a study by Ahrberg et al,²¹ and 6.4 in habitual night readers in Adeosun et al²² but was higher than that seen in a study by Kang and Chen (4.9).²³ We compared mean component scores to those found by Cates et al¹⁶; our participants showed poor subjective sleep quality and poor sleep efficiency but consumed less sleep medication, had less daytime dysfunction, and less sleep disturbance. However, the study of Cates et al study included only pharmacy students; in contrast, this study included students from all schools. It might also be explained by cultural differences in sleeping habits.

In this study only 28% reported getting over seven hours of sleep per night, which was similar to other studies.²⁶

The sleep quality of females was not poorer than male in terms of the PSQI global score, or in component scores except for subjective sleep quality, which was poorer among females than males. The result was similar to other studies such as study by Cates et al.¹⁶

There was a correlation between global PSQI and academic achievement. These results were similar to other

Table 1. Mean overall score of PSQI by school

Faculty	Total number	Mean score of the global PSQI	No. of good sleepers (%) (score ≤ 5)	No. of poor sleepers (%) (score > 5)
Medicine	80	6.72	22 (27.5)	58 (72.5)
Health	69	6.86	20 (29)	49 (71)
Rehabilitation	56	6.28	22 (39.3)	34 (60.7)
Paramedical	51	7.21	14 (27.5)	37 (72.5)
Nursing	65	7.15	18 (27.7)	47 (72.3)
Pharmacy	43	6.62	14 (32.6)	29 (67.4)
Dentistry	45	6.86	14 (31.1)	31 (68.9)
Management	37	7.32	10 (27)	27 (73)
Nutrition	27	7.00	8 (29.6)	19 (70.4)

Table 2. Mean component and global PSQI scores by gender

	All students	Male	Female	P value
Subjective sleep quality	2.07	1.95	2.15	0.01
Sleep latency	0.99	1.06	0.95	0.22
Sleep duration	1.01	1.08	0.97	0.22
Sleep efficiency	1.20	1.26	1.17	0.21
Sleep disturbances	0.81	0.76	0.82	0.23
Use of sleeping medication	0.04	0.05	0.03	0.48
Daytime dysfunction	0.73	0.65	0.77	0.13
Total PSQI	6.87	6.83	6.88	0.82

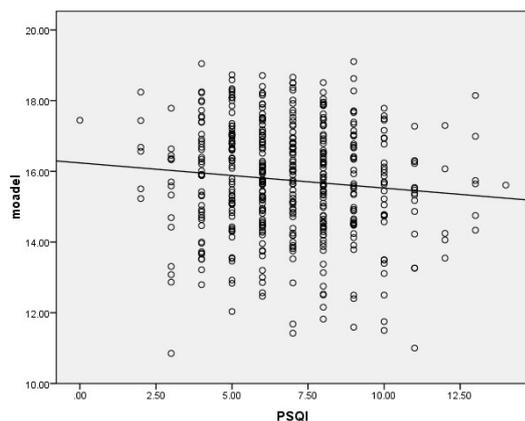


Figure 1. Correlation between sleep quality and academic achievement.

studies, which showed that the global PSQI score was higher (indicating poorer sleep) among those with lower GPAs and are consistent with findings from other studies on undergraduate college students, medical students, and nursing students.^{14,16,17}

This study included the following strengths and limitations. This is one of the largest studies to include students from different medical disciplines and with satisfactory participation rate, and assessed sleep quality components. GPAs were assessed through a linkage process to minimize information bias; however one limitation is the self-report sleep quality assessment at the beginning of the study, which might change over time and could affect GPA. Data on second year sleep quality was not available at the time of this study. Information about family life, caffeine use before sleeping and work hours was not available. However, with current information, it could be shown that sleep quality has a negative impact on GPA and poor sleep quality has been observed in all medical science disciplines, which make this study useful. Many other studies included only one school, whereas this study is one of a small number that was done in all schools of a university of medical sciences.

Based on our findings there is a need to consider sleep quality assessment and to promote sleep hygiene among university students in order to improve academic achievement.

Conclusion

Poor sleep quality was reported in all medical sciences schools in a university of medical science in the northwest of Iran and was associated with academic achievement. Sleep quality assessment is useful and even necessary in medical schools as well as all other schools.

Ethical approval

This project has received an ethics approval from the Tabriz University of Medical Science (ethics number: IR.TBZMED.RCE.1395.1069). The research team in each classroom first verbally explained study aims and then

the data collection distributed the questionnaire. Students who accepted to complete the anonymous questionnaire receive a project code and the final list remained secure with the main investigators for the purpose of the follow up.

Competing interests

The authors declare that there is no conflict of interest.

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