Effects of Sleep Hygiene Education on Subjective Sleep Quality and Academic Performance

Uyku Hijyen Eğitiminin Subjektif Uyku Kalitesi ve Akademik Performansı Üzerine Etkileri

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Özet

Amaç: Uyku problemleri öğrenciler arasında oldukça sık görülmekle birlikte üçte bir üniversite öğrencisi yetersiz uyuduğunu ifade etmektedir. Uyku kalitesi ve gündüz uykululuğun akademik performansta düşmeye neden olduğu bilinmektedir. Bu nedenle uyku hijyeni eğitiminin birinci sınıf tıp fakültesi öğrencilerinin uyku kalitesi ve akademik performansı üzerine etkisini araştırmak amaçlanmıştır. Gereç ve Yöntem: Çalışmada 131 birinci sınıf tıp öğrencisinin kendileri tarafından bildirilen uyku verileri ve akademik performans bilgileri alındı. Çalışmaya alınan bütün öğrencilere uyku kalitesi değerlendirmesinde Pittsburg Uyku Kalitesi Ölçeği ile gündüz uykululuk halini değerlendirmede Epworth Uykululuk Ölçeği uygulandı. Öğrenciler iki gruba ayrıldı ve müdahele grubuna 30 dakikalık yapılandırılmış uyku hijyeni eğitimi verildi. Genel akademik performansları yıl sonundaki not ortalamaları ile değerlendirildi. Bulgular: Öğrencilerin ortalama Pittsburgh uyku kalitesi indeksi puanı 7.9 ± 3.5 ve 106 (% 82.8) ile ≥5 puandı. Müdahele sonrasında kötü uyku kalitesi olanlarda uyku hijyeni eğitiminin uyku kalitesi ve akademik performansa daha etkili olduğu gözlendi. Tartışma: Uyku hijyeni eğitimi tıp fakültesi öğrencilerinin subjektif uyku kalitesi ve akademik performansını arttırabilmektedir.

Anahtar Kelimeler

Uyku Kalitesi; Uyku Hijyeni; Eğitim; Tıp Fakültesi Öğrencisi; Akademik Performans

Abstract

Aim: Sleep problems are common in students with one third of university students reporting insufficient sleep. It is known that sleep quality and daytime sleepiness cause decrasing academic performans. For this reason we aimed to investigate the effects of a sleep hygiene education on sleep quality and academic performance of first year medical students. Material and Method: Self-reported sleep data and academic performance of 131 first grade medical students were collected. To all students enrolled Pittsburg Sleep Quality Scale in the assessment of sleep quality and Epworth Sleepiness Scale for assessment of daytime sleepiness in the evaluation.The students were divided into two subgroups and the intervention group received a 30 minute structured sleep hygiene education. Global academic performance was assessed by grade point average at the end of the year. Results: Mean Pittsburgh sleep quality index score of the students was 7.9±3.5 and 106 (82.8%) of then had a score ≥5.After intervention, .the worse the initial sleep quality, the more improvement by the sleep hygiene education on sleep quality and academic performance. Discussion: An education on sleep hygiene might improve subjective sleep quality and academic performance of medical students.

Keywords

Sleep Quality; Sleep Hygiene; Education; Medical Student; Academic Performance

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Introduction

Sleep problems are common in both school-age children and young adult university students, with almost half of secondary school students reporting poor sleep quality especially on Sunday nights [1] and one third of university students reporting insufficient sleep [2]. Examination anxiety, late-night studying, social activities, computer-based applications, part-time jobs, and internet overuse might be among the potential causes of irregular sleep-wake patterns or inadequate sleep in university students. Irregular sleep-wake cycles have been shown to be characterized by great phase delays on weekends and short sleep duration on weekdays [3-4].

Sleep is of particular interest among medical students, as they encounter increased academic pressures and stress levels. Exam anxiety, environment and irregular schedules may contribute to poor sleep quality [5], which in turn may have negative impact on academic performance [6]. Also medical students' health habits have an impact on their academic performances, emotional adjustment, and future functioning as physicians.

Reduced sleep quantity or quality either in the form of sleep deprivation or sleep restriction, has negative effects on the temporal balance between the circadian pacemaker and homeostatic sleep drive, inducing sleepiness and decrease in neurobehavioral performance with energy loss, fatigue, difficulty in concentrating, and memory lapses [7]. Manber et al. have studied the consequences of irregular sleep patterns and found that students who slept at least 7.5 hour per night but kept an irregular sleep schedule reported higher levels of daytime sleepiness than students who slept the same amount of time and kept a relatively regular sleep schedule [8]. Medeiros et al. have reported that irregularity of the sleep-wake cycle as well as deprivation of sleep influenced the academic performance of medical students [9]. Furthermore, they suggested that it is necessary to rethink the school schedules and to guide the students' sleeping habits with the goal of reducing the negative effects on their learning. In fact, sleep problems among university students are associated with poor sleep hygiene and guiding information on healthy sleep and sleep hygiene might improve self-awareness of individual sleep health. Thus, academic performance of students might be affected positively by improving sleep hygiene.

In most studies insufficient sleep and irregular sleep–wake patterns had been extensively documented in younger adolescents, and also close relationships between sleep quality and physical and mental health have been shown. It has been suggested that intervention programs for sleep disturbance in this population should be considered [10] but there are not many interventions in higher education regarding the formation of a positive study environment and capacity to reach information aimed at increasing academic success of the students.

The aim of this study was to investigate the prevalence of sleep quality problems, detect the relation of sleep quality and academic performances and investigate the effects of a standardized sleep hygiene education and to compare pre- and post-intervention examination performances of first grade medical students.

Material and Method

Study population and initial assessments

The study subjects were 131 first year medical students of Trakya University Faculty of Medicine consisting of 61 males and 70 females. All participants attended the same school schedules, with classes beginning at 08.30 on weekdays. Prior to participation each student filled out an identification form with personal information, including their daily activities, sleep characteristics, and homework schedules. The participants also filled out Pittsburgh sleep quality index (PSQI) to determine subjective sleep quality and Epworth sleepiness scale (ESS) to quantify the level of daytime sleepiness. Scores of the final exams of the fall semester were used as markers of academic performance. During the fall semester all participants maintained their sleeping habits without any intervention. By the end of the first semester, the student list was put to an order according to PSQI scores and students were assigned to intervention and control groups in turn. Any student who did not accept to attend to the intervention let to be in control group and the next student was attened to the intervention group. The groups were confirmed to be equivalent in terms of age, gender, academic performance, and scores of PSQI and ESS.

The structured sleep hygiene education was given to intervention group in the beginning of spring semester. Scores of the final exams of the spring semester were again collected. Two students who did not attend spring final exams were dropped out of the study. Effects of the intervention, i.e. sleep hygiene education, on sleep quality and academic performance were analyzed. The study was approved by Ethics Committee of Trakya University and the Directory of Medical School.

Sleep hygiene intervention

The intervention group consisting 56 students were taken to round-table meetings of sleep hygiene education in small groups consisting of 5-10 students. The same investigator (LO) provided a structured 20-minute seminar on sleep hygiene including topics of sleep duration, sleep continuity, importance of regular sleep-wake schedules, naps, and several factors that might affect sleep health such as coffee, alcohol, exercise, and drugs. Then, students had the opportunity to ask questions on sleep during the remaining 10 minutes. Each session lasted 30-minutes. Instructor was blinded to the academic performance and sleep status of the intervention group. Control group consisted of the remaining students that had no education on sleep hygiene. Initial sleep characteristics of the two groups are given in Table 1. The intervention and the control groups were similar in terms of global academic performance, PSQI score, ESS score, and the number of failed lessons.

Table 1. General baseline characteristics of the study groups (n=131)*.

Variable	Intervention group (n=56)	Control group (n=75)
Age. yr	18.5	18.1
Gender. M/F	24/32	37/38
PSQI score	8.3±3.6	7.5±3.4
ESS score	7.4±3.8	8.1±4.4
GAP. %	73.6±6.7	73.1±11.1
NFL. n	0.8±1.3	1.1±2.2

PSQI: Pittsburgh sleep quality index; ESS: Epworth Sleepiness Scale; GAP: Global academic performance; NFL: The number of failed lessons
* There are no significant differences in any of the parameters

Pittsburgh sleep quality index and Epworth sleepiness scale

Pittsburg Sleep Quality Index (PSQI) is a self-reported questionnaire that assesses sleep quality and sleep disturbance over a one-month period [11]. It comprises of 19 individual items generating seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The sum of scores for these seven components yields one global PSQI score. Persons with global PSQI score lower than 5 are considered as "good" sleepers; whereas, global scores higher than 5 indicate "poor" sleepers. A Turkish translation including the reliability and validity studies of this scale have been prepared and administered in a Turkish sample [12]. Epworth sleepiness scale is an 8-item questionnaire that quantifies daytime sleep propensity. Each item is scored between 0 = none, and 3 = high chance of doze. ESS score varies between 0 and 24. Higher ESS scores indicate higher tendency to sleep or increased daytime sleepiness.

Assessment of academic performance

All final examination scores of the fall semester were recorded as percent value of complete score. There were seven lessons in the fall semester including introduction to medical practice, deontology and history of medicine, chemistry, medical physics, medical biology, medical terminology, and computer. In the spring semester, all final examination scores of introduction to medical practice, psychology, histology and embryology, physiology, anatomy, biochemistry, and medical genetics were also recorded. All scores were averaged to obtain a global academic performance (GAP) score. For all lessons, a student must have at least 60 points over 100 to be successful in our education system. Thus, the number of failed lessons was used as another marker of academic performance.

Statistical analysis

All data were digitalized and analyzed. Descriptive statistics were expressed as means ± standard deviations (SD). Differences of the variables between two semesters were tested by repeated measures t test or Wilcoxon signed-rank test. Differences of the variables between intervention and control groups were tested by independent samples t test or Spearman Chi Square. Correlations among variables were tested by Pearson correlation analyses. A p value smaller than 0.05 was accepted as statistically significant.

Results

General baseline characteristics and initial sleep characteristics of the two groups are given in Table 1. The intervention and the control groups were similar in terms of global academic performance, PSQI score, ESS score, and the number of failed lessons. Fall semester mean global PSQI score of the students was 7.9±3.5; 106 (82.8%) of them obtained the score of 5 or more in PSQI representing poor sleep quality. Mean ESS score of the students was 7.8±4.2; 39 (29.8%) of them had an ESS score of 10 or more representing daytime sleepiness. Mean GAP score of the 119 students (90.8%) who attended the fall term finals of the 8 lessons was 73.3 ± 9.4 (29-90). There were 79 (59.8%) students who had been successful in all lessons. Twenty nine (22.0%) students failed one lesson, 15 students (18.2%) failed 2 or more lessons.

A significant correlation was determined between the fall semester GAP score and global PSQI scores of the students (Pearson correlation r=-0,214; p=0,020); however, no correlation was determined with the ESS score and GAP score. No significant difference was determined between the number of failed lessons or state of success in all lessons and PSQI or ESS scores.

Mean GAP scores (73.1 ± 7.6) of subjects who obtained the score of 5 or more in PSQI representing poor sleep quality was lower compared to subjects with normal sleep quality (78.3 ± 5.9) (t=2,865; p=0,005). The rate of being successful in all lessons was lower in subjects who obtained the limit score of 5 or more in PSQI representing poor sleep quality [57.5%] compared to subjects with normal sleep quality (81.8%) (x2=4,542; p=0,033). There was no difference in the mean GAP scores of subjects and the rate of success in all lessons according to the ESS scores.

Spring semester students mean global PSQI score was 7.6±3.5; and mean ESS score was 7.4±3.7. Mean GAP score of 129 (98.4%) students who entered spring term finals of 7 lessons was 75.6 ± 9.4 (35-93). A total of 91 (70.5%) students passed all lessons. Seventeen (13.2%) students failed one lesson, 21 students (16.3%) failed 2 or more lessons. There was no difference between the study and control groups in the parameters of mean GAP scores, rate of success in all lessons, global PSQI and ESS scores of the spring term. Data of the groups according to the semester are documented in Table 2.

Table 2. Sleep and academic performance scores of the groups by semesters

	Intervention Group		Control Group	
Variable	Fall semester	Spring semester	Fall semester	Spring semester
PSQI score	8.3±3.6	7.6±3.6	7.5±3.4	7.5±3.4
ESS score	7.4±3.8	7.8±3.9	8.1±4.4	7.2±3.6
GAP %	73.6±6.7	74.9±8.8*	73.1±11.1	76.1±10.0*
NFL. n	0.8±1.3	0.3±1.1	1.1±2.2	0.9±1.8*

PSQI: Pittsburgh sleep quality index; ESS: Epworth Sleepiness Scale; GAP: Global academic performance score;
NFL: The number of failed lessons;
*p<0.05

Mean GAP scores of the fall and spring semesters were different in the intervention group (Wilcoxon Z=-2,723; p=0,006); whereas, global PSQI and ESS scores did not differ. Significant difference was determined in the mean GAP scores of the fall and spring terms of the control group (Wilcoxon Z=-3,892; p<0,001); whereas no difference was determined in global PSQI and ESS scores.

The difference in the global PSQI scores of the two semesters had a significant negative correlation with the baseline global PSQI score (Pearson correlation r=-0.581; p<0.001). Although it did not reach statistical significance, this correlation was more marked in the intervention group compared to the control group (Figure 1). Although the related rates of correlation were not statistically significant, the rates of decrease in global PSQI score and increase in GAP score were slightly higher in the study group compared to the control group (Figure 2).

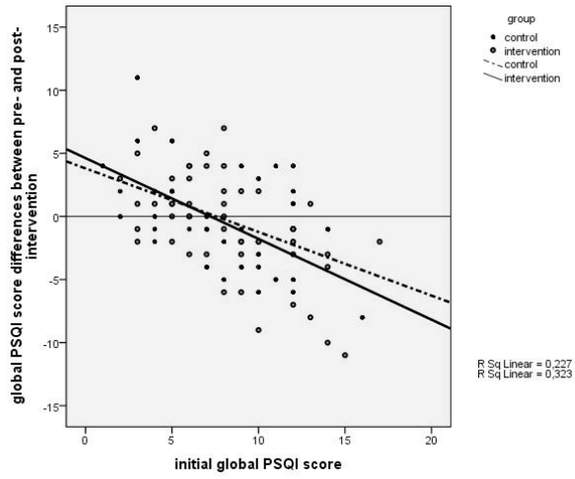


Figure 1. The scatter graphic shows baseline global PSQI scores (x axis) versus global PSQI score differences between pre- and post-intervention (y axis). The worse baseline sleep quality the more improvement by intervention; and the intragroup difference in intervention group was higher than in the control group.

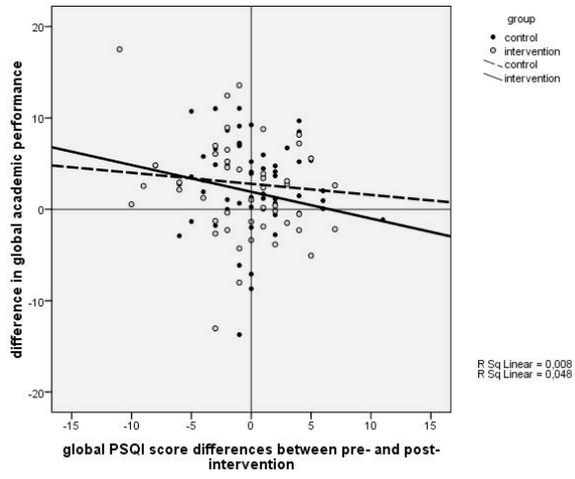


Figure 2. The scatter graphic shows the global PSQI score differences between pre- and post-intervention (x axis) versus the difference in percent global academic performance scores (y axis). The greater the decrease in PSQI score, the greater the increase in academic performance. The slope of continuous line indicates that performance increase in the intervention group is more prominent.

Discussion

The structure of medical education itself is likely to contribute to disruptions in students' health habits. Although sleep deprivation is a common occurrence during the later clinical years and residency, changes in sleep habits may occur as early as the first year as students adjust their sleep schedules in favor of studying [13]. High prevalence of daytime sleepiness, poor sleep quality and psychological distress has been documented among medical students and it has been suggested that by awareness of the high prevalence and possible impact of excessive daytime sleepiness on the medical students will help to the teaching staffs to manage sleep education and sleep hygiene especially to those who were identified as potential individuals [14].

Zailinawati et al. investigated the daytime sleepiness and sleep quality among Malaysian medical students and found high prevalence of excessive daytime sleepiness, 35.5% compared to 14.8 of the Malaysian general population [14] and their result was slightly lower than (42.4%) those experienced by the Brazilian medical students [6] and they also reported significant association between daytime sleepiness and adverse academic performance. Brick et al. found that over one half of their sample (50.9%) met the clinical cutoff of the PSQI for poor sleep quality [15]. Similarly in our study, students have higher averages of daytime sleepness and poor sleep quality.

Veldi et.al investigated the sleep problems among medical students and found that sleep quality was associated with academic progress, leisure activity and living conditions and also sleep quality was not associated with students' daily or nightly workload [16]. While daytime sleepiness posed a significant problem for students and was associated both with sleep disorders and work while studying [16]. Chronic partial sleep loss has negative effects on neurocognitive performance, mood, and health. Sleep deprivation among adolescents causes an increase in inattentive behavior and daytime sleepiness may affect mood, behavior, and academic performance [17].

As known sleep hygiene refers to a list of behaviors, environmental conditions, and other sleep-related factors that can be adjusted as a stand-alone treatment or component of multimodal treatment for patients with insomnia. Sleep hygiene refers to a list of rules defining behaviours and environmental conditions that improve sleep quality. These sleep-related factors can be adjusted to get better sleep. There are plenty of versions with additions to and/or deletions from original list [18]. In brief, all sleep hygiene recommendations include regular bedtime/waketime, avoidance from alcohol and caffeine, conditions of sleeping enviroment [bed comfort, temperature, noise, darkness , and exercise timing. Inadequate sleep hygiene recruited from ICSD definition [19] included daytime napping, extended amounts of time spent in bed, scheduling exercise too close to bedtime, frequent use of the bed for non-sleep-related activities [reading, snacking, watching television, etc], alcohol, tobacco or caffeine consumption just before the bedtime.

Similar to the literature, our study results demonstrated the relationship between sleep quality and academic success. The seminar program provided in our study to increase the quality of sleep of students proved success in decreasing the global PSQI scores of the students representing an improvement in sleep qualities in students with prominently impaired sleep quality at baseline. The size of the impairment in sleep quality determines the size of the benefit to be obtained. The slight positive changes observed in quality of sleep were somewhat reflected to the academic success. Any improvements in daytime sleepiness were less in the study group than in the control group and again not statistically significant. This result suggests that the sleep hygiene education did not target daytime sleepiness and daytime sleepiness does not related to academic performance. Our small sample size has prevented some of the results gaining statistical significance and the results should be confirmed in other studies with grater sample sizes using PSQI score rather than daytime sleepness as a marker of academic performance.

In conclusion, sleep quality is important for academic performance among medical students. In general, subjective sleep quality measured by PSQI of medical students is above the cut off value for poor sleep quality. Any intervention aimed to increase academic performance should target sleep quality but

not daytime sleepness. This study for the first time give some clues that a sleep hygiene education may improve subjective sleep quality and thus academic performance of medical students.

Competing interests

The authors declare that they have no competing interests.

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