

Status of fatigue and sleep quality in clinical medical students

Tıp fakültesi klinik dönem öğrencilerinde yorgunluk ve uyku kalitesinin durumu

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ABSTRACT

Objective: To determine the relationship between fatigue and sleep quality in medical students.

Materials and Methods: We applied a sociodemographic characteristics questionnaire, Pittsburgh Sleep Quality Index (PSQI) and Piper Fatigue Scale (PFS) to 4th, 5th and 6th year medical students.

Results: Thirty seven percent (n=290) of 4th, 5th and 6th year medical students were included in the study. Mean age was 23.47±1.33 years, 53.8% were male. Alcohol use was determined at a level of 40.3% (n=117), nutrition-drug usage at 40.7% (n=118), and smoking at 19% (n=55). Additionally, 86.2% of the participants (n=250) preferred to sleep in the dark, 37.9% (n=110) thought that drinks they used before going to bed partially affected their sleep quality. PSQI score was 10.56±2.54 (min:5-max:19), 98.6% of the participants had poor sleep quality. There was no significant relationship between the students' academic years and sleep quality. PFS was 2.85±0.83(min:1-max:5), and 79%(n=229) had mild fatigue. A statistically significant relationship was determined between PSQI and PFS scores (p<0.05).

Conclusion: Although a large proportion of participants had bad sleep quality, level of fatigue was mild. We determined a significant relationship between levels of fatigue and sleep quality. Arrangements should be made to improve poor sleep quality which affects students' quality of life. Fatigue levels that affect sleep quality should also be reduced.

Keywords: Fatigue, Sleep, Clinical training

ÖZ

Amaç: Tıp fakültesi klinik dönem öğrencilerinde görülen yorgunluk ve uyku kalitesi arasındaki ilişkiyi belirlemektir.

Gereç ve Yöntem: Kesitsel tipteki araştırmamızda üniversitemiz tıp fakültesi 4., 5., ve 6. sınıf öğrencilerine sosyodemografik özellikler anketi, uyku kalitesini değerlendirmeye yönelik Pittsburg Uyku Kalite İndeksi (PUKİ), yorgunluk derecesini belirlemede Piper Yorgunluk Ölçeği (PYÖ) uygulanmıştır.

Bulgular: Dönem 4,5 ve 6. sınıf tıp öğrencilerinin %37'si (n=290) çalışmaya dahil edilmiştir. Katılımcıların yaş ortalaması 23,47±1,33 olup %53,8'i erkekti. Sigara kullanımı %19 (n=55), alkol kullanımı %40,3 (n=117), uyanık kalmak için ilaç-besin takviye kullanımı %40,7 (n=118) bulundu. Katılımcıların %86,2'si(n=250) karanlıkta uyumayı tercih ederken %37,9'u (n=110) yatmadan önce tüketilen içeceklerin uyku kalitesini kısmen etkilediğini düşünüyordu. Çalışmamızda toplam PUKİ ortalaması 10,56±2,54 (min:5-maks:19) bulundu. Tüm katılımcılar içerisinde uyku kalitesi kötü olanlar %98,6 idi. Öğrencilerin bulunduğu sınıflar arasında uyku kalitesi yönünden istatistiksel olarak anlamlı fark yoktur (p>0,05). Araştırmamızda PYÖ puan ortalaması 2,85±0,83(min:1-maks:5) olup katılımcıların %79'unda (n=229) hafif düzeyde yorgunluk bulunmuştur. Katılımcıların yorgunluk ölçeği puanı ortalamalarıyla, PUKİ puanı arasında istatistiksel olarak anlamlı fark bulunmuştur (p<0,05).

Sonuç: Katılımcıların büyük bir oranı kötü uyku kalitesine sahip olmakla birlikte yorgunluk seviyeleri hafif düzeyde bulunmuştur. Çalışmamızda yorgunluk düzeyi ve uyku kalitesi arasındaki ilişki anlamlıdır. Öğrencilerin yaşam kalitesini etkileyen kötü uyku kalitesini düzeltmeye yönelik düzenlemeler yapılmalı, uyku kalitesine yüksek oranda katkısı bulunan yorgunluk düzeyleri azaltılmaya çalışılmalıdır.

Anahtar kelimeler: Yorgunluk, Uyku, Klinik eğitim dönemi

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Submitted/Gönderme: 26.07.2016 Accepted/Kabul: 03.09.2016

Introduction

Sleep is an instinctive, reversible physiological process. Maslow describes sleep as a basic physiological requirement for survival. Our improved ability to examine brain activities

in recent years has clearly shown that sleep is not simply a passive state of rest when metabolism slows down, but a very complex and organized physiological state affected by several internal and external factors [1-3].

Sleep is essential for a healthy life. It is essential from birth for growth, development, learning, resting and good health. More than half of the adult population sleeps 7-8 hours a night [4]. The quality of sleep, an indispensable part of life, is as important as its duration for rest and a healthy life. There has been considerable focus on sleep quality in clinical practice and research into sleep, but the concept is difficult to define and measure objectively [5]. Complaints about poor quality of sleep are important as potentially indicating several medical diseases. Studies have shown that 15-35% of adults have disorders concerning sleep quality, such as difficulty falling or remaining asleep [6].

Various factors affect sleep quality. It is affected by environmental factors such as life style, work and social life, economic status, general health and stress. One of the most important factors is fatigue. Fatigued individuals experience problems with sleep onset latency and duration of restful sleep. Fatigue is a state that affects daily life and that can be experienced by anyone at any time. Action should be taken to control the the factors causing fatigue as it will affect the individual's day-to-day activities and quality of life [7]. It may be present alone with no disease components, or may be observed as the basis of accompanying various conditions, from cancer to infectious diseases and from metabolic diseases to psychiatric disorders [8,9].

Fatigue is a widely seen condition. It can appear in healthy individuals, not only those with acute or chronic disease. Fatigue is more common in women than in men, but can affect all age, sex, racial and socioeconomic groups [10,11]. University students comprise one group of people who experience severe problems throughout their educational lives due to fatigue and lack of sleep. Fatigue levels in university students have been reported to be equivalent to those in heavy manual laborers [12]. Medical students, who comprise a large percentage of all university students, experience some of the most severe fatigue and sleep problems [13]. Due to the intensive theoretical and practical nature of medical training, the amount of time spent sleeping decreases, and stress and tension are known to reduce sleep quality [14-16].

Medical education is intensive and tiring, particularly in the years of clinical training, so medical students inevitably sacrifice sleep [17]. Attention deficit and physical fatigue

may occur in individuals who are unable to sleep enough. This may have an adverse impact on their own health and that of those around them [15, 18]. Regular sleep is also affected by age, gender, living conditions, exercise and workload [19].

Medical students study on an intensive basis for many years before qualifying as physicians. It is therefore important to know whether they have a sleep problem, the extent of the problem, and also whether their sleep disturbance has any effect on academic performance or quality of life.

The Accreditation Council for Graduate Medical Education (ACGME) attempted to address the problem of fatigue in residents by issuing work limitation standards in 2003 [20].

We think that good quality sleep and adequate amount of sleep are important as sleep disorders can cause fatigue and result in a poor cognitive performance, affect lifestyles and interpersonal relationships.

The purpose of this study was therefore to determine the relation between sleep quality and fatigue among clinical medical students.

Materials and Methods

Ethical approval for this cross-sectional study was granted by the Dokuz Eylül University Non-Interventional Research Ethical Committee in October 2014. Ninety-nine medical students in the 4th year, 91 in the 5th year and 100 in the 6th year at the time when the study was performed were included in the study. These represented 37% of existing 4th, 5th and 6th year medical students. Exclusion criteria were conditions known to affect sleep quality, such as depression, anxiety, sleep apnea syndrome, and restless leg syndrome. Participants were administered a demographic characteristics questionnaire, the Pittsburgh Sleep Quality Index (PSQI) and the Piper Fatigue Scale (PFS) to determine fatigue. The PSQI was developed by Buysse *et al.* and validity and reliability studies for Turkey were performed by PAğargün *et al.* Nineteen of the 24 questions in the PSQI are self-reported, the remaining five being answered by a partner or room-mate. Only those questions answered by the respondent are used to evaluate sleep quality. Questions answered by a partner/room-mate (loud snoring, long pauses between breaths, disorientation, legs twitching, other restlessness) are not included in the evaluation and are disregarded during scoring [5, 6].

The PFS was developed by Piper *et al.* The validity and reliability of the Turkish-language version was analyzed

by Can *et al.* The PFS has a 5-point Likert-type structure and consists of 22 items. The scale assesses four subjective dimensions of fatigue. Behavioral, affect, sensory and cognition subdimensions are evaluated [21, 22].

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) 15 software. The chi square test was used to compare proportions at analysis between dependent and independent variables, while the Studens' t test was used to compare mean values. Statistical significance was set at $p < 0.05$.

Results

Mean age of the participants (n=290) was 23.4 ± 1.3 years, and 53.8% (n=156) were males. In terms of classes, 34.5% of students were in the 6th year, 34.1% in the 4th (n=99) and 31.4% (n=91) in the 5th year. Fifty percent (n=145) had an income level of 500-999 Turkish lira (TL), 86.2% (n=250) were living at home and 76.6% were living with 2-4 other students. Nineteen percent (n=55) were smokers and 40.3% (n=117) used alcohol. The use of nutritional drugs in order to stay awake was 40.7% (n=118) and the shifts were not worked by the 60.7% (n=176) of the participants. Two hundred and fifty (86.2%) medical students preferred to sleep in the dark, and the majority of participants were affected by noise during sleep. Two hundred and twenty eight (85.5%) participants were affected by light during sleep, while 76.2% (n=221) were affected by environmental temperature. Additionally, 37.9% (n=110) of the students reported that the consumption of drinks containing caffeine before going to sleep affected sleep quality to some degree, and 44.5% (n=129) of participants assessed their daily consumption of caffeine containing drinks as moderate (Table I). No statistically significant association was determined between sleep quality and gender ($p=0.87$), smoking ($p=0.33$), alcohol use ($p=0.15$), number of shifts worked ($p=0.58$), level of light in the sleeping area ($p=0.72$), quantity of caffeine containing drinks consumed before sleeping ($p=0.73$), daily consumption of caffeine containing drinks ($p=0.67$), or nutritional drug use ($p=0.09$). Mild fatigue was present in 79% (n=229) of the participants based on PFS scores, while 98.6% had poor sleep quality according to their PSQI scores.

Mean total PSQI score was 10.5 ± 2.5 (min:5-max:19), and mean PFI score was 2.8 ± 0.8 (min:1-max:5). Mean scores for PSQI subscales and PFI subscales are shown in Table II. A statistically significant association was determined between participants' mean fatigue scale scores and PSQI

scores. Sleep quality was poor in students with high fatigue levels ($p < 0.001$).

Table I. Socio-demographic characteristics and factors affecting the quality of sleep

		n	%	Mean + SD
Age				23.4 ± 1.3
Gender	Female	134	46.2	
	Male	156	53.8	
Class	4 th	99	34.1	
	5 th	91	31.4	
	6 th	100	34.5	
Income	250-499 TL	46	15.9	
	500-999 TL	145	50	
	1000 TL and over	99	34.1	
Residence	Dorm	40	13.8	
	Home	250	86.2	
Number of people in household	Living alone	55	19	
	2-4	222	76.6	
	5 or more	13	4.5	
Smoking	Yes	55	19	
	No	235	81	
Alcohol use	Yes	117	40.3	
	No	173	59.7	
Medication / supplement use	Yes	118	40.7	
	No	172	59.3	
Number of shifts per month	None	176	60.7	
	1-4	33	11.4	
	5-8	43	14.8	
	9 and over	38	13.1	
Ambient light level in sleep environment	Light	12	4.1	
	Half-light	28	9.7	
	Dark	250	86.2	
Affected by noise during sleep	Yes	252	86.9	
	No	38	13.1	
Affected by light during sleep	Yes	248	85.5	
	No	42	14.5	
Affected by ambient temperature during sleep	Yes	221	76.2	
	No	69	23.8	
Caffeinated beverages affect the quality of sleep before going to sleep	Yes	93	32.1	
	Partially	110	37.9	
	No	87	30	
Daily consumption of caffeinated beverages	None	9	3.1	
	Low	63	21.7	
	Moderate	129	44.5	
	High	89	34.7	

n: number of participants SD: Standard Deviation

Table II. Pittsburgh Sleep Quality Index and Piper Fatigue Scale Scores

Scales	Subscales	Minimum	Maximum	Mean + SD
Pittsburgh Sleep Quality Index	Sleep duration	0	3	0.7±0.9
	Sleep disturbances	1	3	2.1±0.5
	Sleep latency	1	3	1.5±0.6
	Daytime dysfunction	1	3	2.1±0.8
	Habitual sleep efficiency	0	3	0.5±1.0
	Subjective sleep quality	1	3	2.2±0.5
	Use of sleeping medication	1	4	1.1±0.5
	Total score	5	19	10.5±2.5
Piper Fatigue Scale	Behavioral/severity	1	5	2.6±0.9
	Affective meaning	1	5	3±0.9
	Sensory	1	5	2.8±0.9
	Cognitive/mood	1	5	2.8±0.9
		Total score	1	5

SD: Standard Deviation

Discussion

Mild fatigue was determined in this study involving 4th-6th year medical students, and a significant relation was determined between sleep quality scale and fatigue scale scores.

Several factors can affect sleep quality. Gender is one of the factors, but no significant relationship was observed between gender and sleep quality in this study. The findings of studies investigating the interaction between gender and sleep are inconsistent. While some have reported that women experience more sleep problems than men (Keshavarz *et al.*, Orzech *et al.*), Liu *et al.*, have reported poorer sleep quality in males than in females [23-25].

Smoking and alcohol are significant factors affecting the sleep/wake cycle. Cigarettes have a stimulating effect due to the nicotine they contain, while alcohol affects the sleep-wake cycle and the length of time spent sleeping [26].

Studies in the literature have suggested that smoking and alcohol use have an adverse effect on sleep quality. Vail-Smith *et al.*, reported a correlation between risky behavior such as smoking and alcohol use and mean sleep quality scores [27]. Sari *et al.*, in their study about students living in university campus accommodation, reported a higher incidence of poor sleep quality among a group using alcohol compared to a group that did not use alcohol [28]. No significant association was determined in our study between smoking or alcohol use and sleep quality. This may be due to the amount of daily cigarettes smoked or alcohol used by students not being known and to different levels of use among participants.

One of the underlying causes of fatigue, regarded as one of the basic factors affecting sleep quality, is an irregular and shift-based work pattern. The literature reports that a 1.5-hour decrease in nocturnal sleep reduces wakefulness the following day by 23% [29]. Studies involving nurses have reported that working night shifts has an adverse effect on sleep quality and that shift fatigue persists the following day [30]. No statistically significant association was observed between shift work and sleep quality in the present study. Mayda *et al.*, reported similar results in a study of the prevalence of sleep disturbance among 4th, 5th and 6th year medical students [31]. The absence of a significant association between work shift and sleep quality in our study may be attributed to a large proportion of students at the time of the study being in departments where shifts were not worked (60.7%) or to their living at home (86.2%).

No significant relations were also observed between sleep quality and the level of environmental light or the amount of caffeine containing drinks consumed before going to bed and during the day. The level of environmental light affects sleep onset latency and the nature of sleep. In Sari *et al.*'s study on students living in a university campus accommodation, students experiencing difficulties in falling asleep reported factors such as noise and light levels in their rooms as the most common cause of this problem [28]. The fact that the great majority of participants in our study preferred to sleep in the dark may have been responsible for the absence of a statistically significant difference. Although studies reporting that the consumption of caffeine containing drinks adversely affects sleep quality and causes interruptions in sleep are in the majority, there are also

publications reporting the opposite, that consumption of tea and coffee does not affect quality of sleep [32, 33]. In our study, too, no significant correlation was observed between consuming caffeine containing drinks and sleep quality.

While fatigue was mild in the great majority of students in this study, surprisingly the percentage of participants with poor sleep quality was high (98.6%). This may be due to students becoming used to the intensive and tiring tempo of medical education, particularly in the years of clinical training, means that students sacrifice sleep. The mean PSQI score in this study was 10.5 ± 2.5 (min:5-max:19) and the mean PFI score was 2.8 ± 0.8 . Similarly, in a study investigating fatigue and sleep quality in students at various departments in the fields of technical sciences, arts and sciences, social sciences and health, Saygılı *et al.* reported mean PSQI and PFI scores of 6.9 ± 2.4 and 4.3 ± 2.2 , respectively [34]. Mayda *et al.* investigated sleep disorder in 4th, 5th and 6th year medical students and reported a mean PSQI score of 5.2 ± 2.7 [31]. In their study investigating physical activity levels, sleep quality and depression levels among university students, Işık *et al.* reported a mean PSQI score of 8.5 ± 2.9 [35]. The higher mean PSQI score in our study may be due to the higher number of students living at home when compared to other researches. As with all university students working at an intensive and tiring tempo, poor sleep quality was also determined in medical faculty students. A good quality sleep is known to make an important contribution to individuals' physical, psychological and social development. Education-instruction programs therefore need to be arranged considering medical students' fatigue levels and heavy workload. Sleeping and waking hours being regular and high quality will enable students to feel fit and healthy in their daily lives and will increase their academic success, thus contributing to their emerging as good physicians in the future.

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