



## Daytime sleepiness and related factors in nursing students



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### ABSTRACT

**Background:** Evaluation of the frequency and causes of daytime sleepiness in nursing students because it is an important factor in improving the health status of the students, controlling sleep problems, improving students' academic achievements, and maintaining a healthy lifestyle.

**Aim:** The aim of this study was to determine the prevalence of daytime sleepiness in nursing students and the factors associated with it.

**Design:** A cross-sectional research design was used in this study.

**Participants:** Nursing students ( $n = 382$ ).

**Method:** Data were collected using a questionnaire prepared by the authors to assess socio-demographic characteristics, sleep habits, and problems of nursing students and the Epworth Sleepiness Scale (ESS), which assesses daytime sleepiness. Descriptive statistics included numbers, percentages, mean, median, and standard deviation. Mann–Whitney U test (Z) and Kruskal–Wallis (KW) analysis of variance were used for evaluating the relationship between ESS scores and independent variables.

**Results:** The prevalence of daytime sleepiness in the students was found to be 10.5%. Those in the 2nd grade, who were married, who did not consume coffee or tea, lived alone, regarded their own academic achievement as poor, and used the Internet during morning hours experienced increased daytime sleepiness. Moreover, students who talk in their sleep, grind their teeth, feel restless before sleep, experience problems in falling asleep, and wake up at night were found to experience increased daytime sleepiness.

**Conclusions:** Daytime sleepiness is a considerably common health problem in nursing students. This study found that daytime sleepiness is associated with individual characteristics, lifestyle and consumption habits, and sleep habits.

### 1. Introduction

Sleep is extremely important for adolescents to properly maintain their physical growth, emotional stability, behavioral balance, and cognitive functions (Beebe, 2011). However, students experience problems with sleep, and the prevalence of daytime sleepiness is particularly high in adolescence. The prevalence of daytime sleepiness among students varies from study to study and differs by the study areas (by country). The prevalence of daytime sleepiness ranged from 9% to 32.5% in the studies conducted in Turkey (Altıntaş et al., 2006; Kocoglu and Arslan, 2011; Senol et al., 2012) whereas it ranged from 12.7% to 68.5% in studies conducted abroad (De Souza Vilela et al., 2016; Ford et al., 2015; Gaina et al., 2007; Mirghani et al., 2015).

### 2. Background

Studies found that there are several risk factors that affect daytime sleepiness in students: sexual maturity, age, gender, obesity, school

hours, use of medicines, caffeine intake, use of energy drinks, perceiving poor economic status, feeling uncertain about the future, smoking, alcohol use, using the Internet to play games, use of the computer, going to bed late (after 22:00), waking up early (before 08:00), having problems in falling asleep, talking in sleep at night, grinding their teeth, and feeling restless before sleeping (Calamaro et al., 2009; Calamaro et al., 2012; Kocoglu and Arslan, 2011).

Daytime sleepiness is an important public health issue that may cause serious problems. It negatively affects the performance, cognitive functions, and mental condition of school children and causes them to have difficulties in concentrating; to suffer from fatigue; and to experience irritability, anxiety, and depression (Fernández-Mendoza et al., 2009; Millman, 2005). Furthermore, insufficient sleep is related to an increase in the risk of motor vehicle accidents, sports injuries, and work accidents. Wheaton et al. (2016) found that students who sleep for < 7 h on school nights show higher levels of risky behavior (infrequent seatbelt use, riding with a drunk driver, and drinking and driving). Sleep problems are also associated with behavioral problems

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(Neu et al., 2011). Inadequate sleep (< 7 h/night) has also been associated with negative eating habits, poor internal regulation of food, and binge-eating behaviors (Quick et al., 2016). The prevalence of daytime sleepiness and factors affecting it should be thoroughly examined to approach a solution for these sleep problems among students.

University students in general have an irregular sleep pattern. The fact that education programs conducted for healthcare professions, such as nursing, are intensive and tiring and that nursing students in Turkey take theoretic and applied courses simultaneously forces them to sacrifice their sleep hours. There are 178 universities that provide nursing education in Turkey, and only six of these universities offer both regular and evening courses. The Health College of Nursing in the university in which we conducted the present study offer regular and evening courses. The courses in daytime education start at 8:15 in the morning and end at 16:45. The courses in night education start at 17:00 and end at 22:45. In addition, both daytime and night education students perform their clinical work duties between 08:00 and 16:00. Freshman nursing students perform clinical practice 1 day in a week; sophomore and junior nursing students perform clinical practice 1 and a half days in a week; and senior nursing students perform clinical practice 2 days in a week. The night education nursing students may sacrifice their sleeping hours to a greater degree because they take practical courses during the day and they receive theoretical education at night; therefore, they may often suffer from daytime sleepiness. Accordingly, the aim of this study was to determine the prevalence of daytime sleepiness as an important sleep problem among night education nursing students and its associated the factors.

### 3. Methods

#### 3.1. Design and Sample

In Turkey, an academic year in higher education is divided into two terms (fall and spring). This research was conducted during the fall term. This cross-sectional study was conducted among night education nursing students at the Vocational School of Health Sciences at a university in the 2016–2017 academic year. The research population comprised 390 students attending 1st, 2nd, 3rd, and 4th grade evening courses at the Health College of Nursing. The questionnaire was administered to a total of 382 students (98%) as eight students did not want to participate in the study or they were unavailable at the time of the study. In conclusion, we reached the whole research population, and almost all of the students in the original sample participated in the study.

#### 3.2. Data Collection Methods and Tools

##### 3.2.1. Questionnaire

A questionnaire prepared by the researchers to assess certain individual characteristics, sleep habits, and problems of the students was used for data collection. Within the scope of individual characteristics and habits, age, gender, grade, body mass index (BMI), marital status, working status, way of working, income level, smoking and its duration, alcohol intake and its duration, coffee and tea intake, being on regular medication, residence, and academic achievements of the students were assessed. Sleep habits and problems were assessed as walking, talking, and grinding teeth while asleep, feeling restless before sleeping, having problem in falling asleep, waking up at night, time for bed and waking hour on weekdays

Daytime sleepiness of the students was evaluated using Epworth Sleepiness Scale (ESS). Students with an ESS score of  $\geq 10$  are considered to have excessive daytime sleepiness (İzci et al., 2008). In the present study, students with an ESS score of  $\geq 10$  points were considered to suffer from excessive daytime sleepiness, whereas students with an ESS score of  $\leq 9$  points were considered to have no problem of daytime sleepiness.

##### 3.2.2. ESS

This 8-item scale is based on self-report, is of proven validity and reliability, and is easy to apply and understand for assessing the general daytime sleepiness level in adults. It aims to assess the chance of falling asleep or dozing off during eight different daily life situations. Each question is answered choosing points ranging from 0 to 3. This questionnaire examines study participants chance of falling asleep in certain situations in an ordinary day when they are not extremely tired. The method of scoring is identical in all questions. The patient gives the score of 0 to 3 for each situation where there is no chance, slight chance, moderate chance, and high chance of falling asleep, respectively. The highest possible score obtained from the scale is 24, and the lowest score is 0. Obtaining high scores from ESS indicates that the level of daytime sleepiness is high (İzci et al., 2008)

Before the researchers proceeded to implement the study, a preliminary test of the questionnaire form was performed with 10 midwifery students who were not included in the study. This preliminary testing showed that data collection tools were completed in 10–15 min, that the questions included in them were understandable, and that data obtained were adequate to collect the intended data in the study. During the implementation of the study, data were collected in class settings based on self-reports from the students.

#### 3.3. Data Analysis

Statistical Package of Social Sciences (SPSS 20.0) software was used in the statistical analysis. Kolmogorov–Smirnov test, histograms, and Q-Q plots were used to test normality of the variables. As the variables were non-normally distributed, non-parametric tests were used in the analysis. Descriptive statistics included numbers, percentages, mean, median, and standard deviation. Mann–Whitney U test (Z) and Kruskal–Wallis (KW) analysis of variance were used for evaluating the relationship between ESS scores and independent variables. A value of  $p < 0.05$  was considered to be statistically significant.

#### 3.4. Ethical Considerations

Written approval was received from the Rectorate of the University and the relevant directorates, and approval was also obtained from the ethics committee of Ahi Evran University (2016-11/03) to conduct this study. The aim of this study was explained to the students who participated and their verbal and written consent was received.

### 4. Results

It was observed that the prevalence of daytime sleepiness among students was 10.5%. The students' mean time for going to bed on weekdays was  $8.42 \pm 4.40$  p.m., whereas their waking hour was  $8.09 \pm 2.36$  a.m., their mean time for going to bed on weekends was  $6.36 \pm 4.67$  p.m. and their mean waking hour was  $9.23 \pm 2.91$  a.m. This means that the students sleep approximately 12 h on weekdays, but they sleep approximately 14 h on weekends (Table 1). The students used the internet for  $4.41 \pm 3.42$  h on an average and watched TV for

**Table 1**  
Sleepiness of the students in terms of distribution of ESS scores and their average sleeping hour ( $n = 382$ ).

Scale score and its assessment	n	(%)	$\bar{x} \pm ss$
10 and lower score (not sleepy)	342	89.5	
11 and higher score (sleepy)	40	10.5	
Total	382	100	
Sleeping hour on the weekdays			$8.42 \pm 4.40$
Waking hour on the weekdays			$8.09 \pm 2.36$
Sleeping hour on the weekend			$6.36 \pm 4.67$
Waking hour on the weekend			$9.23 \pm 2.91$

1.15 ± 1.61 h a day.

In total, 64.4% of the students who participated in the study were females and almost all of them were single (95%), with most of them ≥ 19 years. Of these students, 36.4% were 4th graders; evaluation of their BMI demonstrated that 18.8% of them were underweight, 66.2% had normal weight, and 15% were overweight. More than half of the students (59.7%) reported a moderate income level; 7.9% reported they were employed, and 36.7% of the employed were working on a full-time basis whereas 36.7% were working on a part-time basis and 26.6% were seasonally employed. In terms of the habits of the students, 16.5% were smokers, most students (69.9%) were smoking for ≥ 5 years, whereas 3.1% were former smokers. Of the students, 7.3% were current alcohol users and 67.9% of them were consuming alcohol for > 1 year. More than half of the students (57.9%) reported consuming coffee, most students were consuming tea (83.8%) and 12.3% were on regular medication; 39.3% of the students were living in state dormitories and 41.1% reported their academic level as moderate. The students reported that they postponed night sleep to use the Internet (40.1%) or watch television (18.8%); 66.8% mostly used the Internet at night or late night hours and 70.4% used the Internet for chatting and communication purposes (Table 2). Of the students, 23% reported on talking in their sleep, 3.4% were sleepwalkers, 16% reported on grinding their teeth in their sleep, 31.4% reported to suffer from uneasiness before sleeping, 47.1% reported difficulty in falling asleep, and 50.5% reported waking up at night (Table 3).

The relationship between daytime sleepiness in students and independent variables were evaluated using non-parametric tests. According to the results of the analysis, students who were in the 2nd grade, married, coffee or tea consumers, those living alone, those reporting poor academic success, those using the Internet during morning hours, those who talk in their sleep, those who grind their teeth, those suffering from uneasiness before sleeping, those experiencing difficulty in falling asleep, and those waking up at night suffered from excessive daytime sleepiness compared with other groups, and the difference was statistically significant ( $p < 0.05$ ) (Tables 2, 3).

## 5. Discussion

Students show a high prevalence of sleep problems and they have difficulties in this period; studies conducted elsewhere found that the prevalence of daytime sleepiness in students was 12.7%–68.5% (De Souza Vilela et al., 2016; Ford et al., 2015; Gaina et al., 2007; Mirghani et al., 2015). However, examination of studies conducted in Turkey showed that the number of studies conducted on daytime sleepiness is limited. A study conducted by Altıntaş et al. (2006) examined sleep disorders and sleepiness in senior students at a faculty of medicine, and of these students, 54.4% had sleep problems and 32.5% suffered from insomnia. A study conducted by Senol et al. (2012) on 300 adolescents found that 9% of the adolescents complained about excessive sleepiness, and a study conducted by Kocoglu and Arslan (2011) found that the prevalence of daytime sleepiness in high school students is 28.7%. Having aimed at determining the prevalence of daytime sleepiness in night education nursing students and the factors associated with it, the present study found that the prevalence of daytime sleepiness among the students was 10.5%. The findings of the studies conducted both in Turkey and abroad show considerable differences, which may result because these studies are being conducted on students of different cultures receiving education in different departments. It was also reported in the literature that the prevalence of daytime sleepiness among students was high and that daytime sleepiness is one of the most common sleep problems in students.

Age, gender, BMI, smoking, and alcohol intake are among the factors that may affect daytime sleepiness in individuals (Gaina et al., 2007; De Souza Vilela et al., 2016; Kocoglu and Arslan, 2011; Pallos et al., 2007; Kaneita et al., 2010; Tremaine et al., 2010). The present study found that age, gender, BMI, and smoking and alcohol intake did

not affect daytime sleepiness. It is presumed that the reason age did not affect the sleep quality in the present study may be because students included in the study were in a similar age group. Because BMIs of most of the student was at normal (18.5–24.9) levels and few (16.5%) smoked, and consumed alcohol (7.3%), these factors did not seem to be the cause of daytime sleepiness among the present study population.

Caffeine, which has a stimulating effect on the central nervous system, is a natural component of some beverages, such as tea and coffee. The effect of caffeine on sleep differs, and it impairs the duration and quality of sleep when consumed late at night (Hancı et al., 2013). In support of this observation, another study found that the sleep quality is significantly lower in individuals who consume a large amount of tea and coffee (66%) (Senol et al., 2012). A study conducted by Aysan et al. (2014) found that students' intake of caffeinated beverages affect their sleep quality, and the sleep quality of students who consume caffeinated beverages, particularly after 6.00 p.m., is poorer than that of students who did not consume caffeinated beverages. Also, caffeinated beverages, such as tea and coffee, make it more difficult to fall asleep and cause interruptions in sleep (Shcao et al., 2010). However, daytime sleepiness level of students who do not consume coffee and tea was found to be higher in the present study. This result does not support the findings that caffeinated beverages may cause daytime sleepiness by negatively affecting the sleep quality at night. It is thought that this result was obtained because caffeine has an effect that relieves tiredness and increases alertness.

Another factor that negatively affects sleep habits is that students do not have their own rooms and/or they share the same room. In a study conducted by Li et al. (2008), it was argued that sharing a room and bed has negative effects on sleep quality and hygiene. It was also observed that daytime sleepiness of students who were married was also higher in this study. It can be thought that individuals who are married may have difficulty in falling asleep depending on external factors (light and noise) and they cannot ensure sleep hygiene, which is necessary for a healthy sleep. However, the present study also found that daytime sleepiness was higher also in the students who were living alone at home. It is possible that students in dormitories live in more crowded and noisy rooms and accordingly their sleep qualities are poorer than other students; this result may be inconsistent with the literature because environmental factors play an important role among the factors affecting sleep. As a matter of fact, it was found that the sleep quality is poorer among students staying in a room for four people (Yavuz Sari et al., 2015). However, it is more likely that students who live alone at home tend to an unhealthy lifestyle and their sleep quality may become poorer, and accordingly they may experience more daytime sleepiness. These results indicate that daytime sleepiness is affected by bed sharing much more than by environmental conditions.

The present study found that daytime sleepiness of students in their 2nd grade was higher. The education period of undergraduate nursing programs in Turkey lasts for at least 4 years and this period includes 4600-h theoretical and practical education (Council of Higher Education, 2008). A standard curriculum is followed in the department of nursing where the present study was conducted. Because second year courses of nursing education program are more intensive and the clinical practice hours of students increase compared with those of students in the 1st grade, it could be possible that these students have more difficulty in keeping up with their curriculum and sacrifice their sleep hours to study. In addition to the difficulties that nursing students face within the scope of a university, they face problems with respect to patients, educators, and the hospital environment during their clinical practice. All these factors may cause students to experience more daytime sleepiness.

Sleep is fundamental for improving academic performance (Senol et al., 2012). A study conducted by Fernández-Mendoza et al. (2009) found that as a result of sleep deprivation, students have difficulties in concentrating. Dewald et al. (2010) reported that daytime sleepiness is an important factor that determines school performance, and a more

**Table 2**  
Sociodemographic characteristics of students and their distribution by ESS score ( $n = 382$ ).

Characteristics	n (%)	ESS score mean rank	Characteristics	n (%)	ESS score mean rank
Age			Gender		
18 years and younger	118 (30.9)	202.40	Female	246 (64.4)	196.75
19 years and older	264 (69.1)	186.63	Male	136 (35.6)	182.00
Significance test	$Z = 14,289.50$	$p = 0.195$		$Z = 15,436.0$	$p = 0.209$
Marital status			Working status		
Married	19 (5.0)	247.55	Yes	30 (7.9)	201.00
Single	363 (95.0)	188.57	No	352 (92.1)	190.69
Significance test	$Z = 2383.50$	$p = 0.023$		$Z = 4995.00$	$p = 0.622$
Year of study			Income level		
1	106 (27.7)	184.27	Very well	9 (2.4)	183.44
2	69 (18.1)	222.28	Well	89 (23.3)	190.35
3	68 (17.8)	202.15	Moderate	228 (59.7)	186.13
4	139 (36.4)	176.53	Poor	32 (8.4)	205.55
			Very poor	24 (6.2)	231.06
Significance test	$KW = 9.072$	$p = 0.028$		$KW = 4.228$	$p = 0.376$
Body mass index			Way of working		
Underweight (< 18.5)	72 (18.8)	182.87	Full-time	11 (36.7)	12.05
Normal (18.5–24.9)	253 (66.2)	199.40	Part-time	11(36.7)	18.05
Overweight (25–29.9)	57 (15.0)	167.32	Seasonal	8 (26.6)	16.75
Significance test	$KW = 4.503$	$p = 0.105$		$KW = 2.813$	$p = 0.245$
Smoking			Duration of smoking ( $n = 63$ )		
Yes	63 (16.5)	175.75	< 1 year	11 (17.4)	33.00
No	307 (80.4)	195.65	1–5 years	8 (12.7)	41.88
Quit	12 (3.1)	168.12	5 years and more	44 (69.9)	29.95
Significance test	$KW = 2.271$	$p = 0.321$		$KW = 2.931$	$p = 0.231$
Alcohol use			Duration of alcohol use ( $n = 28$ )		
Yes	28 (7.3)	166.64	< 1 year	9 (32.1)	11.89
No	347 (90.8)	193.39	1 years and longer	19 (67.9)	15.74
				$Z = 62.00$	$p = 0.263$
Quit	7 (1.8)	197.29	Drinking tea		
Significance Test	$KW = 1.552$	$p = 0.460$	Yes	320 (83.8)	183.82
Drinking coffee			No	62 (16.2)	231.15
Yes	221 (57.9)	179.16		$Z = 7461.50$	$p = 0.002$
No	161 (42.1)	208.44	Academic achievement		
Significance test	$Z = 15,062.50$	$p = 0.010$	Well	186 (48.7)	183.44
Being on regular medication			Moderate	157 (41.1)	189.02
Yes	47 (12.3)	212.26	Poor	39 (10.2)	239.91
No	335 (87.7)	188.59		$KW = 8.632$	$p = 0.013$
Significance test	$Z = 6897.00$	$p = 0.167$	Delaying night sleep for TV		
Delaying night sleep for internet			Yes	72 (18.8)	202.98
Yes	153 (40.1)	188.13	No	310 (81.2)	188.83
No	229 (59.9)	193.75		$Z = 10,333.50$	$p = 0.326$
Significance test	$Z = 17,002.50$	$p = 0.624$	Time of internet use		
Purpose of internet use			Morning	21 (5.5)	228.52
Research and obtaining information	69 (18.1)	179.82	Afternoon	41 (10.7)	211.34
Playing game	44 (11.5)	180.09	Evening	136 (35.6)	186.75
Communication and conversation	269 (70.4)	196.36	Night	119 (31.2)	169.24
Significance test	$KW = 1.777$	$p = 0.411$	Always	65 (17.0)	217.70
Residence			Significance Test	$KW = 12.527$	$p = 0.014$
State dormitory	150 (39.3)	198.45			
Private dormitory	54 (14.1)	213.24			
At home with friends	97 (25.4)	182.56			
At home with family/relatives	58 (15.2)	140.79			
At home alone	23 (6.0)	260.74			
Significance test	$KW = 24.790$	$p = 0.000$			

$Z =$  Mann-Whitney U test,  $KW =$  Kruskal-Wallis test.

recent study reported that students whose sleep quality is poor and who wake up feeling unrested doze off in the class during the daytime (Aysan et al., 2014). The present study found that daytime sleepiness of students who regard their own academic achievement as poor was higher. Previous studies and the present study findings support the conclusion that having daytime sleepiness and other sleep problems may negatively affect academic achievement and motivation of students.

One of the factors that affect daytime sleepiness is using the Internet in morning hours. Playing computer games and using the Internet are related to sleep behaviors, and there are studies that define them as risk factors for sleep problems (Kocoglu and Arslan, 2011; Van den Bulck, 2004; Li et al., 2010). At present, using the Internet has become almost

inevitable and influences young people. Excessive use of the Internet and its duration of use could cause young people to suffer from many health problems, such as psychopathological symptoms, obesity, and sleep. It is very important to enable young people in acquiring health-promoting lifestyle behaviors before the above-mentioned health problems arise.

In the present study, students who talk in their sleep, grind their teeth, feel restless before sleeping, have difficulties in falling asleep, and wake up at night were also found to experience more daytime sleepiness. These results were also found as risk factors in the literature. For example, logistic regression analysis performed in a study conducted by Kocoglu and Arslan (2011) on high school students stated that risk factors for daytime sleepiness were difficulty in falling asleep,

**Table 3**The sleep characteristics of students and their distribution by ESS score ( $n = 382$ ).

Characteristics	n (%)	ESS score mean rank	Characteristics	n (%)	ESS score mean rank
Sleep talking			Sleepwalking		
Yes	88 (23.0)	224.28	Yes	13 (3.4)	193.46
No	294 (77.0)	181.69	No	369 (96.6)	191.43
Significance test	Z = 10,051.50	p = 0.001	Z = 2373.00		p = 0.948
Teeth grinding in sleep			Restlessness before sleep		
Yes	61 (16.0)	262.16	Yes	120 (31.4)	220.31
No	321(84.0)	178.07	No	262 (68.6)	178.31
Significance test	Z = 5480.00	p = 0.000	Z = 12,263.00		p = 0.001
Having difficulty falling asleep			Waking up at night		
Yes	180 (47.1)	205.39	Yes	193 (50.5)	209.97
No	202 (52.9)	179.13	No	189 (49.5)	172.64
Significance Test	Z = 15,680.50	p = 0.020	Z = 14,674.00		p = 0.001

Z = Mann-Whitney U test, KW = Kruskal-Wallis test.

talking during sleeping, grinding teeth, and feeling restless before sleeping. A study conducted by Yavuz Sari et al. (2015) reported that having difficulty in falling asleep increases the prevalence of poor sleep quality by 8.8 times, and this also increases the problem of daytime sleepiness.

## 6. Conclusion

This study found that daytime sleepiness is a very common health problem among night education nursing students, and students in the 2nd grade, who were married, who did not consume coffee or tea, lives alone at home, regard their own academic achievement as poor, and used the Internet at morning hours experienced more daytime sleepiness. Students who talk in their sleep, grind their teeth, and feel restless before sleeping, those who experience problems in falling asleep, and those who wake up at night were also found to experience more daytime sleepiness. Based on these results, strategies of intervention should be focused on decreasing factors that cause daytime sleepiness and eliminating these factors.

## Conflict of Interest

The authors declare no conflicts of interest.

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