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THE PREVALENCE OF EXCESSIVE DAYTIME SLEEPINESS AMONG ACADEMIC PHYSICIANS AND ITS IMPACT ON THE QUALITY OF LIFE AND OCCUPATIONAL PERFORMANCE

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Abstract
Objectives: Sleep disorders can affect health and occupational performance of physicians as well as outcomes in patients. The purpose of this study was to assess the prevalence of excessive daytime sleepiness (EDS) measured by the Epworth Sleepiness Scale (ESS) among academic physicians at a tertiary academic medical center in an urban area in the northwest region of Turkey, and to establish a relationship between the self-perceived sleepiness and the quality of life using the EuroQol-5 dimensions (EQ-5D). **Material and Methods:** A questionnaire prepared by the researchers after scanning the literature on the subject was e-mailed to the academic physicians of a tertiary academic medical center in Istanbul. The ESS and the EQ-5D were also included in the survey. The e-mail database of the institution directory was used to compile a list of active academic physicians who practiced clinical medicine. Paired and independent t tests were used for the data analysis at a significance level of $p < 0.05$. **Results:** Three hundred and ninety six academic physicians were e-mailed and a total of 252 subjects replied resulting in a 63.6% response rate. There were 84 (33.3%) female and 168 (66.7%) male academic physicians participating in the study. One hundred and eight out of 252 (42.8%) academic physicians were taking night calls ($p < 0.001$). Ninety study subjects (35.7%) felt they had enough sleep and 84 (33.3%) reported napping daily ($p < 0.001$). In our sample, 28.6% ($N = 72$) of the physicians felt sleepy during the day (ESS score > 10) ($p < 0.001$). In the case of the EQ-5D index and visual analogue scale of the EQ-5D questionnaire (EQ-5D VAS), the status of sleepiness of academic physicians was associated with a poorer quality of life ($p < 0.001$). **Conclusions:** More than a 1/4 of the academic physicians suffered from sleepiness. There was an association between the poor quality of life and daytime sleepiness. There was also a positive relationship between habitual napping and being sleepy during the day.

Key words:
Academician physician, Epworth, EQ-5D, Habitual napping, Sleepiness, Sleep disorders

INTRODUCTION

Excessive daytime sleepiness (EDS) can be defined as a difficulty in maintaining a desired level of wakefulness, often accompanied by the symptoms such as psychomotor slowing and closing eyelids for a longer time than for the purpose of blinking [1,2]. In addition to interfering with daily functioning and affecting behaviors, and job performance, excessive daytime sleepiness is more likely to cause malpractices

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related to human error [3]. As overwork and sleep deprivation in physicians can directly result in medical incidents, it is essential to investigate the actual situation concerning this issue and take appropriate measures towards ensuring medical safety [4]. Daytime sleepiness may be directly associated with lower academic performance [5].

It has been reported that long working hours and sleep deprivation affect both mental state and physical function, causing excessive daytime sleepiness and a decline in cognitive functions [6–11]. Excessive daytime sleepiness (EDS) is a major clinical and public health concern affecting 10–25% of the general population, mainly adolescents, older people and shift workers [12]. Shift work is common in medical professions and is necessary for 24-h hospital coverage. Shift work poses difficulties not only because of the loss of actual sleep hours, but also because it can affect other factors related to the lifestyle, such as food intake, physical activity level, and, therefore, metabolic patterns [13].

The causes of EDS are multifactorial, with possible risk factors previously identified as intrinsic sleep disorders, such as narcolepsy, obstructive sleep apnea; circadian rhythm disorders such as shift-work disorder; extrinsic sleep disorders such as poor sleep hygiene and insufficient sleep [14]; and other contributory lifestyle and health factors [15]. In a previous study, it has been demonstrated that after-hours on-call has a generally negative impact on paediatricians' spouses and families [16]. Caffeine is one of the most widely consumed psychoactive substances and it has profound effects on sleep and wake functions. Laboratory studies have documented its sleep-disruptive effects. It clearly enhances alertness and performance at work with explicit sleep deprivation, restriction or circadian sleep schedule reversals [17]. Majority of the previous studies about EDS among physicians have been performed mainly among medical residents, and only rarely in academics [18–20]. However, since the problem of daily performance and sleep among physicians is not limited to medical residents, it should be addressed by investigating also the population of academic physicians.

Health related quality of life (HRQoL) assessment is an increasingly important aspect of the current medical practice. To the best of our knowledge, no publications concerning the relationship between the self-perceived sleepiness and the quality of life of academic physicians are available, including no publications concerning sleepiness in Turkish academics.

Therefore, the purpose of this study was to assess the prevalence of excessive daytime sleepiness (EDS) measured by the Epworth Sleepiness Scale (ESS) among academic physicians at a tertiary academic medical center in an urban area in the northwest region of Turkey, and to establish the relationship between the self-perceived sleepiness and the quality of life using the EuroQol-5 dimensions (EQ-5D).

MATERIAL AND METHODS

A questionnaire prepared by the researchers investigating socio-demographic, sleep and job characteristics was e-mailed to attending academic physicians of a tertiary academic medical center in Istanbul. The Epworth Sleepiness Scale (ESS) and the EuroQol-5 dimensions (EQ-5D) were also included in the survey. The e-mail database of the institution's directory was used to compile a list of active academic physicians who practiced clinical medicine. Those involved entirely in basic science departments were excluded from the study. Two additional reminder e-mails in about 2-week intervals were sent to increase the response. The data were collected from April 2014 to May 2014 in an anonymous manner and participation in the study was voluntary. Personal identity numbers were requested prior to filling in the survey to prevent the study participants from responding more than once. Hence, the questionnaire submission system did not let the same person to respond more than 1 time.

Bezmialem Vakif University Hospital is a tertiary care hospital. It is one of the largest hospitals in Istanbul with 396 academic physicians. The participants filled in the questionnaire online and completed information concerning

socio-demographic, general and sleep characteristics. Socio-demographic data included: age (in years), gender (male, female), marital status (married, unmarried, divorced), weight (in kg) and height (in cm) expressed by the respondents and information if they had children (the number of children in the household). General characteristics included: an academic physicians' seniority (in years); working hours (per week); caffeine intake (the number of drinks); tobacco (frequency). Sleep characteristics were described by obtaining information on: the average sleep hours per night (< 6 h, 6–7 h, 7–8 h, > 8 h), taking night calls (yes, no), regular sleep aid use such as sleeping pills taken orally (yes, no) and the self-perceived sleepiness.

Academic physicians were asked to complete 2 instruments: the Epworth Sleepiness Scale (ESS), which assessed the self-perceived sleepiness, and the EQ-5D scale, which assessed the general quality of life based on experiences over the previous month.

A validated Turkish version of the ESS was used to assess sleepiness [21]. The ESS is a standardized validated questionnaire that assesses the likelihood that the subject will fall asleep during certain activities. The ESS is the most widely used subjective scale for assessing daytime sleepiness because it is able to distinguish between people with and without sleepiness.

The ESS consists of 8 questions that describe everyday situations that can induce sleepiness. Each question is graded from 0 ("not at all likely to fall asleep") to 3 ("very likely to fall asleep"). The ESS ranges from 0 to 24, and can be used to categorize respondents as normal (ESS ≤ 10) and as suffering from excessive daytime sleepiness (ESS > 10) [22]. The ESS is a simple, self-administered questionnaire, which is shown to provide a measurement of the subject's general level of daytime sleepiness. Cronbach's α coefficients for the Turkish version of the ESS indicated excellent internal consistency. The internal consistency level (Chronbach's α coefficients) of the Turkish version of the ESS was 0.87.

The 1st part of the EQ-5D contains a description of the health state in 5 dimensions or items: Mobility, Self-care, Usual activities, Pain/Discomfort and Anxiety/Depression. Levels of severity for each item might be expressed as 1 ("No problems"), 2 ("Some problems") and 3 ("Unable to do / Extreme problems"). For each item, a respondent must indicate the level of severity that best describes his/her personal health state at the time of giving the answers. A subject's global health state is finally defined as a combination of the level of problems described for each of the 5 dimensions contained in the EQ-5D. Therefore, it classifies a respondent's health status into 1 of 243 ($3^5 = 243$) health states. Each health state can be assigned a weighted utility score based on different scoring systems.

The rule for unweighted scoring was based solely on the answers provided by the subjects to the descriptive system. The values range from −0.59 (the lowest level on each dimension) to 1 (the highest level on each dimension). Negative values indicate unfavorable health states like living loss of consciousness or being bedridden. The 2nd part of the EQ-5D questionnaire is a visual analogue scale (EQ-VAS). The EQ-VAS is a vertical, graduated (0–100 points) 20 cm "thermometer," with 100 representing "the best imaginable health state" and 0 representing "the worst imaginable health state." Each respondent rated his/her health on the day of the survey using both the self-classifier system and the VAS. The Turkish version of the EQ-5D is a valid and reliable generic HRQoL instrument [23].

ETHICS

Ethical approval was obtained from the institutional review board prior to the commencement of the study.

STATISTICS

The data obtained in the study were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 16 (SPSS, Inc., Chicago, IL, USA). Continuous variables are expressed as means ± standard

deviation (M±SD) and compared using the Spearman's correlation and Chi^2 tests. For categorical variables, the percentages of patients in each category were calculated. The T test was used to compare independent groups. P value smaller than 0.05 ($p < 0.05$) was considered as statistically significant.

RESULTS

Three hundred and ninety six academic physicians were e-mailed and a total of 252 subjects responded resulting in a 63.6% response rate. The mean age of the study population was 39.90±9.99 years (M±SD). When compared, the age of the males and females in the group was significantly different ($p < 0.05$). The mean seniority of the overall group was 14.98±10.22 years. The mean body mass index (BMI) in the entire group was 26.69±3.08.

One hundred and eight out of 252 (42.8%) academics were taking night calls. However, 60 (83.3%) academics among the ESS score ≥ 10 group were taking night calls and a statistically significant difference was found when compared with the ESS score < 10 group ($p < 0.05$). Only a small number of the academics (N = 18, 7.1%) said that they used sleep aids regularly in a form of alprazolam or benzodiazepine tablets taken orally. Ninety subjects (35.7%) felt they had enough sleep and 84 (33.3%) reported napping daily ($p < 0.05$). In our sample, 28.6% (N = 72) of the study subjects were sleepy during the day (ESS score > 10) and the mean ESS score was 8.38±5.41. Demographic and substance use results are shown in Table 1.

Concerning some other characteristics; the status of sleepiness was associated with: taking night calls (no sleepiness – 48 subjects (44.4%), with sleepiness – 60 subjects (55.6%), $p < 0.05$); habitual napping (no sleepiness – 30 subjects (35.7%), with sleepiness – 54 subjects (64.3%), $p < 0.05$). The results concerning variables that affected the quality of life (EQ-5D index) are summarized in Table 2. With regard to the EQ-5D index, the status of sleepiness of academic physicians was associated with a poorer quality of life (0.87±0.15 in ESS ≤ 10 group and 0.54±0.19 in ESS > 10 group, $p < 0.001$) (Figure 1). In terms of the EQ-5D VAS, the status of sleepiness of academic physicians was associated with a poorer quality of life (90.90±6.36 in ESS ≤ 10 group and 51.92±13.05 ESS > 10 group, $p < 0.001$) (Figure 2). Sleep characteristics in all the academic physicians depending on the status of sleepiness are presented in Table 3.

Among the study group, smoking prevalence was found statistically higher in males (N = 60, 35.7%) when compared to the females (N = 18, 21.4%) ($p < 0.001$).

Table 1. Demographic and substance use results

Variable	Respondents (N = 252)
Age [years] (M±SD)	39.90±9.99
Body mass index (M±SD)	26.69±3.08
Gender [n (%)]	
female	84 (33.3)
male	168 (66.7)
Marital status: married [n (%)]	186 (73.8)
Work [n (%)]	
< 40 h/week	24 (9.5)
40–60 h/week	180 (71.4)
> 60 h/week	48 (19.0)
Seniority [years] (M±SD)	14.98±10.22
Average sleep [n (%)]	
< 6 h/night	72 (28.6)
6–7 h/night	114 (45.2)
7–8 h/night	60 (23.8)
> 8 h/night	6 (2.4)
Taking night calls [n (%)]	108 (42.8)
Children in the household [n] (M±SD)	1.24±1.32
Regular sleep aid use [n (%)]	18 (7.1)
Caffeinated drinks [n (%)]	
< 1 cups/day	78 (30.9)
1–2 cups/day	132 (52.4)
3–4 cups/day	30 (11.9)
> 4 cups/day	12 (4.8)

M – mean; SD – standard deviation.

Table 2. The EuroQol-5 dimensions (EQ-5D) scores among the study subjects

Variable	Answers [n (%)]		
	no problem	some problem	extreme problem
Mobility	222 (88.1)	30 (11.9)	0 (0.0)
Self-care	252 (100.0)	0 (0.0)	0 (0.0)
Usual activities	234 (92.9)	18 (7.1)	0 (0.0)
Pain/Discomfort	174 (69.0)	78 (31.0)	0 (0.0)
Anxiety/Depression	120 (47.6)	114 (45.2)	18 (7.1)

Table 3. Some features of the study group according to daytime sleepiness

Variable	Respondents		p	Chi^2
	ESS score < 10 (N = 180)	ESS score ≥ 10 (N = 72)		
Age [years] (M±SD)	39.67±9.30	40.50±11.29	0.547	0.603
Gender [n (%)]			0.076	3.15
female	66 (36.7)	18 (25.0)		
male	114 (63.3)	54 (75.0)		
Marital status [n (%)]			< 0.05	6.93
single	36 (20.0)	24 (33.3)		
married	138 (76.7)	48 (66.7)		
widow/divorced	6 (3.3)	0 (0.0)		
Tobacco usage [n (%)]			< 0.01	14.53
no	132 (73.3)	42 (58.3)		
rarely	6 (3.3)	12 (16.7)		
every day	42 (23.3)	18 (25.0)		
Caffeine drinks [n (%)]			< 0.001	20.98
< 1 cup/day	60 (33.3)	18 (25.0)		
1–2 cups/day	84 (46.7)	48 (66.7)		
3–4 cups/day	30 (16.7)	0 (0.0)		
> 4 cups/day	6 (3.3)	6 (8.3)		
Work [n (%)]			< 0.001	28.07
< 40 h/week	6 (3.35)	18 (25.0)		
40–60 h/week	138 (76.7)	42 (58.3)		
> 60 h/week	36 (20.0)	12 (16.7)		
Average sleep [n (%)]			< 0.05	8.83
< 6 h/night	54 (30.0)	18 (25.0)		
6–7 h/night	72 (40.0)	42 (58.3)		
7–8 h/night	48 (26.7)	12 (16.7)		
> 8 h/night	6 (3.3)	0 (0.0)		

Table 3. Some features of the study group according to daytime sleepiness – cont.

Variable	Respondents		p	Chi^2
	ESS score < 10 (N = 180)	ESS score ≥ 10 (N = 72)		
Habitual napping [n (%)]			< 0.001	78.75
yes	30 (16.7)	54 (75.0)		
no	150 (83.3)	18 (25.0)		
Taking night calls [n (%)]			< 0.001	67.43
yes	48 (26.7)	60 (83.3)		
no	132 (73.3)	12 (16.7)		
General quality of life (M±SD)				
EQ-5D index	0.87±0.15	0.54±0.19	< 0.001	154.46
EQ-VAS	90.90±6.36	51.92±13.05	< 0.001	252.00
Subjective sense of not getting enough sleep [n (%)]			< 0.001	15.92
yes	78 (43.3)	12 (16.7)		
no	102 (56.7)	60 (83.3)		

EES – Epworth Sleepiness Scale; EQ-5D – EuroQol-5 dimensions; EQ-VAS – visual analogue scale of the EQ questionnaire; Chi^2 – Chi-square test. Other abbreviations as in Table 1.

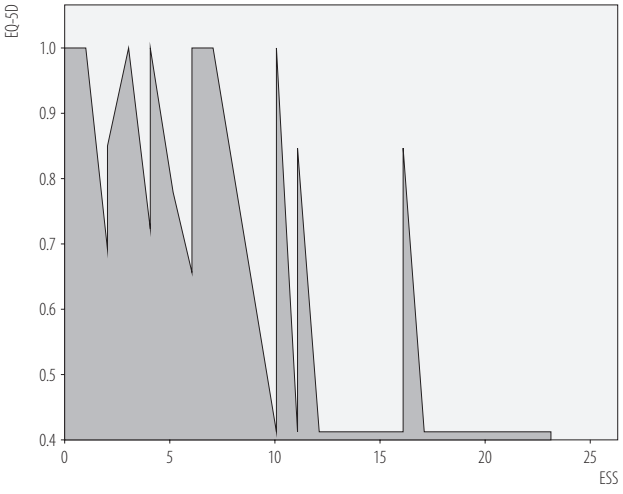

Fig. 1. Comparison of the Epworth Sleepiness Scale scores and the EuroQol-5 dimensions index

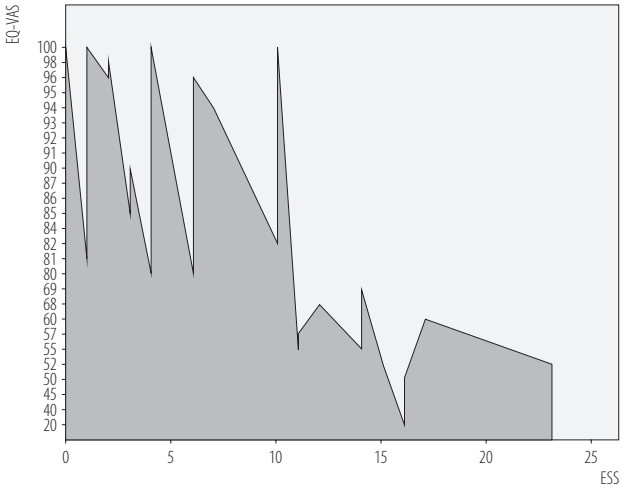

Fig. 2. Comparison of the Epworth Sleepiness Scale scores and the visual analogue scale of the EuroQol questionnaire

The mean daily sleeping hours of the males amounted to 5.82±0.71. When compared, daily sleeping hours of the males and females in the group were statistically different ($p < 0.001$). Gender differences among the study group are presented in Table 4.

Correlation of some group characteristics with the ESS score showed that the subjects with EDS were having habitual naps and were taking night calls statistically more frequently when compared to the subjects without EDS ($p < 0.001$) (Table 5).

Table 4. Gender differences among the study group

Variable	Respondents		p
	female (N = 84)	male (N = 168)	
Age [years] (M±SD)	33.50±8.24	43.11±9.08	< 0.001
ESS score ≥ 10 [n (%)]	18 (21.4)	54 (32.1)	0.0790
Smoking prevalence [n (%)]	18 (21.4)	60 (35.7)	< 0.001
Working [h/week] (M±SD)	50.00±5.37	51.43±5.16	< 0.050
Sleeping [h/day] (M±SD)	6.43±0.98	5.82±0.71	< 0.001
Naps [n (%)]	12 (14.2)	72 (42.8)	< 0.001
Taking night calls [n (%)]	24 (28.6)	84 (50.0)	< 0.050
Night shift [n (%)]	24 (40.0)	36 (60.0)	0.214
EQ-5D index (M±SD)	0.77±0.22	0.77±0.21	0.941
EQ-VAS (M±SD)	82.64±19.49	78.32±19.55	0.099

Abbreviations as in Table 1 and 3.

Table 5. Correlation of some group characteristics with the Epworth Sleepiness Scale (ESS) score

Variable	ESS score (M±SD)	p	t
Gender		0.426	0.79
female	8.00±5.47		
male	8.57±5.31		
Habitual napping		< 0.001	11.32
yes	12.78±4.35		
no	6.17±4.37		
Taking night calls		< 0.001	7.40
yes	11.00±5.60		
no	6.41±4.22		

Abbreviations as in Table 1 and 3.

Table 6. Correlation of the EuroQol-5 dimensions (EQ-5D) variables with the Epworth Sleepiness Scale (ESS)

Variable	EQ-5D/ESS correlation	
	p	Spearman's rho
Mobility	0.208	0.080
Self-care	0.384	–0.055
Usual activities	0.466	0.046
Pain/Discomfort	0.542	0.039
Anxiety/Depression	< 0.001	0.517

Abbreviations as in Table 3.

The correlation of the EQ-5D variables with the ESS is presented in Table 6. Anxiety/depression subscore of the EQ-5D was found to be higher among the participants with EDS ($p < 0.001$).

DISCUSSION

To the best of our knowledge, this study is the first one that has established the relationship between the self-perceived sleepiness using the valid Turkish version of the ESS and the general quality of life using the valid Turkish version of the EQ-5D among academic physicians from Turkey. In our sample, 28.6% of the study subjects (N = 72) were sleepy during the day (ESS score > 10) and the mean ESS score was 8.38±5.41. This prevalence was similar to the results of some studies with the rates ranging 6.3–22.6% among the general population or non-shift workers [24–27], and 5.9–44.8% in shift workers [28,29]. In a previous study performed among both academic and private practice physicians, the mean ESS of 7.8 and the prevalence of EDS of 23% have been reported, which is slightly lower than in the case of our population [30].

Excessive daytime sleepiness among academic physicians correlated positively and significantly with habitual napping, with the subjective sense of not getting enough sleep and with actual hours of work per week as well as with the number of hours slept per night. This is slightly different from the results from the 2 previous studies [30,31]. In those studies, it has been found that EDS negatively correlated with hours slept at night and positively with habitual napping, but not with hours of work per week. This means those with greater EDS slept on average fewer hours per night. The difference in our study could be due to the ability of the physicians to handle their own symptoms despite longer hours of work per week. This may also suggest that habitual napping may be as good an indicator of EDS as of ESS in our population.

Habitual napping may explain why there was no correlation between the subjective sleepiness and the hours of sleep per night. The subjects in our sample who slept fewer hours per night may have been napping during the day to restore their sleep deprivation; therefore, although the number of hours at night was smaller, this did not correlate with EDS. A short nap has been associated with improved performance, alertness and a reduced risk of an accident [32]. It could also be that physicians in our sample were more forbearing to sleep deprivation and, therefore, did not feel the influence of it in a form of excessive daytime sleepiness. A nap is typically a masculine way of coping with sleepiness during the day. We think that the female participants responded to sleep deprivation and tried to overcome sleepiness by increasing daily sleeping hours (6.43±0.98 h in females and 5.82±0.71 h in males) ($p < 0.001$). However, we do not know if they practiced habitual napping because their quality of life was decreased or because they had excessive daytime sleepiness. This issue is one of the limitations of the study.

We found a significant relationship between taking night calls and EDS ($p < 0.05$). This might be concluded from the sleep interruptions caused by night calls during sleep hours. Furthermore, in this study the amount of caffeine consumption did have a significant correlation with EDS ($p < 0.001$). This result is in line with a previous study [17], however in the literature there are studies which are not consistent with our result [31,33].

In our study, it was found that more than 1/4 (28.5%) of all the participants suffered from sleepiness. Thus, the study demonstrates a clear association between the poor quality of life and daytime sleepiness in academic physicians ($p < 0.001$). In a previous study, it has been reported that the quality of life decreased along with decreasing functional status [34].

One of the strengths of our study is the highest response rate of the few published studies targeting academic physicians. Another advantage is the fact that the ESS and

the EQ-5D – the 2 well validated scales – were used in the study. Despite several important advantages of the present study, a relatively small sample size and non-response rate (36.4%) are considered as its limitations.

CONCLUSIONS

In conclusion, we hope that this study will arouse or increase awareness of sleep deprivation among academic physicians. The relationship between sleep disorders and patients' safety remains to be explored. Further studies are needed to clarify this relationship.

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