

Studying habits, subjectively rated sleep quality and academic achievements among medical students

Medicinos studentų studijavimo įpročiai, subjektyviai vertinta miego kokybė ir mokymosi rezultatai

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SUMMARY

Background. Medical students are the subgroup of young adults who experience stress due to hard studying. It influences their lifestyle, sleep patterns and quality. The aim of the study was to establish medical students' studying and sleeping habits and determine their relations with academic achievements.

Methods. In total, 131 medical students completed a self-administered questionnaire, which included demographic indicators, lifestyle factors, sleeping habits and subjectively rated sleep quality.

Results. The biggest part of the day medical students spend studying, 15.2% of them – more than 8 hours/day; 74% – considered studies as intensive and 42.7% – reported no opportunities to relax; 22.9% – rated the subjective overall sleep quality as bad; 74.1% – were going to bed after 23:00; 61.1% – reported sleep duration of <7 hours; 9.2% – were taking sleep medication, and all respondents pointed out some problems in day time functioning. The subjectively poor quality of sleep was related with average grade <8 (OR=3.21, 95%CI [1.02–10.04], p=0.045); inability to fall asleep within 30 minutes (OR=2.97, 95%CI [1.04–8.47], p=0.041); wake-ups in the night or early morning (OR=3.15; 95%CI [1.10–9.06], p=0.033), and sleep medication use (OR=14.90 ; 95%CI [1.02–216.75], p=0.048).

Conclusions. Two-thirds of medical student reported less than 7 hours of actual sleep and every third student rated subjectively sleep quality as poor; it was associated with lower level of academic achievements.

Keywords: Medical students, sleep habits, subjective sleep quality, lifestyle, sleep efficacy

SANTRAUKA

Įvadas. Studentai medikai yra jaunų suaugusiųjų asmenų grupė patirianti stresą dėl įtemptų bei sunkių studijų, kas turi įtakos jų gyvenimo būdui, miego įpročiams ir kokybei. Tyrimo tikslas buvo nustatyti studentų medikų studijavimo bei miego įpročius ir nustatyti sąsajas su akademiniais pasiekimais.

Metodika. Apklaustas 131 medicinos studentas, naudojant autorių sudarytą klausimyną apie socio-demografinius veiksnius, gyvenimo būdo ypatumus, miego įpročius ir subjektyviai vertinamą miego kokybę.

Rezultatai. Studentai medikai didžiąją dienos dalį praleidžia studijuodami, 15,2 proc. – daugiau nei 8 valandas per dieną. Net 74 proc. respondentų studijas vertino kaip sunkias; 42,7 proc. pažymėjo neturintis laiko atsipalaidavimui; 22,9 proc. miego kokybę vertino blogai; 74,1 proc. ėjo miegoti po 23 val.; 61,1 proc. nurodė miegantys trumpiau nei 7 val.; 9,2 proc. vartojo vaistus padedančius užmigti, visi respondentai nurodė turintys sunkumų išlikti budriais kasdieninėje veikloje. Tyrimu nustatytos subjektyviai vertinamos blogos miego kokybės sąsajos su pažymių vidurkiu mažesniu nei 8 (ŠS=3,21; 95%PI [1.02–10.04], p=0,045), negalėjimu užmigti per 30 min. nuo atsigulimo (ŠS=2,97; 95%PI [1.04–8.47], p=0,041), pabudimais nakties metu ar ankstyvas pabudimais ryte (ŠS=3,15; 95%PI [1.10–9.06], p=0,033) beipadedančių užmigti vaistų vartojimu (ŠS=14,90; 95%PI [1.02–216.75], p=0,048).

Išvados. Du trečdaliai respondentų nurodė miegantys mažiau nei 7 val. per parą, kas trečias studentas miego kokybę vertino kaip blogą, tai buvo siejama su žemesniu akademinį pasiekimų lygiu.

Raktažodžiai: medicinos studentai, miego įpročiai, subjektyviai vertinama miego kokybė, gyvenimo stilius, miego efektyvumas

INTRODUCTION

Sleep is an essential part of human existence, necessary for good health and well-being. A number of harmful effects of not sleeping well were established: people could feel tired, irritable, have poor concentration, memory and impaired everyday functioning at work or studies [1, 2]. Sleep deprivation or poor sleep quality could cause either physical [3] or mental health problems [4, 5]. Most importantly, sleep has been identified as a state that influences higher cognitive functions and optimizes the consolidation of newly acquired information in memory [6]. Sleep disturbances could be associated not only with circadian rhythms, but also with brain neuroplasticity changes [7, 8]; and may play a role in the development of cognitive impairment [9]. Functional metabolic-neurophysiological studies demonstrate the individual susceptibility to sleep deprivation [10]. Even one night of sleep deprivation could impair hippocampal function and influence the ability to commit new experiences to memory [11].

A meeting on sleep and health [12] organized by the World Health Organization concluded that disturbed sleep among children, pregnant, peri-menopausal women and elderly may have more deleterious health effects than on other subjects of the general population. However, it is known that many young adults, especially university students are not sleeping enough due to lifestyle factors, including long hours of study, work or social activities [13-16]. Some findings underlined the significant role of students' cognitive variables as predictors of insomnia symptoms [17]. Therefore the students could be identified as the vulnerable part of adult population.

Medical students are very specific subgroup of young adult students' population that experience various stresses studying hard; studies influence their lifestyle, mental state, sleep patterns and are associated with the sleep quality [18-21]. The evaluation of Lithuanian medical students of the first and fourth years of studies showed that they had worse quality of sleep and worse impact of poor sleep on quality of life compared with students of law and economics [22]. In spite of different studies performed, the risk factors for the medical students' poor sleep are not fully identified. Therefore, the aim of the study was to establish university medical students' studying and sleeping habits and determine their relations with academic achievements.

MATERIAL AND METHODS

Study population

Medical students of the fourth year of the Lithuanian University of Health Sciences (LUHS) were invited to participate in this study during one academic year period (from the 1st of September 2012 till 30th of June 2013). The study and its consent form were approved by the Bioethics Committee of LUHS, Lithuania. Students were invited to participate in this study during the studies of the module of Psychiatry. The study investigator (AS) described the study and its objective to the students. Those who agreed to participate signed a written informed consent form, after that, a questionnaire was handed out and it took about 10–15 minutes to complete it.

Methods

One hundred and thirty one medical student participated in this cross-sectional study (the overall response rate was 89%). The development of the self-administered questionnaire was based on literature review and questions from "Pittsburg sleep quality index" [4, 16, 23-26]. The questionnaire included questions on socio-demographic characteristics (9 items), lifestyle factors (11 items), learning/studying habits (10 items), and sleeping habits/sleep quality (10 items). The socio-demographic characteristics comprised age, gender, marital status, a number of children, working hours and working at night time, income and expenses per month. The questions of lifestyle factors evaluated usual social activities (physical excising, having other hobbies), sexual activity, eating/ drinking habits (eating healthy food, drinking alcohol too much/too often), smoking, using drugs, physical or mental health problems and use of medications, and self-estimated satisfaction of social situation during the last one year period before the study. The questions of medical students' learning/ studying habits during the last one year period evaluated the amount of time spent at university, time studying at home, time spending to prepare for the exams, time for the rest during preparation for exam and during studying/working time, the average grade in the studies, student's self-rated intensity of individual studies and possibility to relax in their free time. In the part of the questionnaire about sleeping habits and sleep quality during the past month, the first three questions were addressed to the habitual sleep efficiency and sleep duration (usual bedtime, usual rising time and how many hours of actual sleep are obtained per night). Using those parameters we calculated habitual sleep efficiency: the amount of total sleeping time/ time spending in bed x 100%. One question evaluated sleep latency (how often had trouble sleeping because of inability to fall asleep within 30 minutes), next three questions quantified sleep disturbances (how often had trouble sleeping because waking during the night, having bad dreams or woke up confused or talking); one question-how often he or she used sleeping medications; one question about day time dysfunction (how often had trouble staying awake while driving, eating meals, or being engaged in social activity): these six questions were asked on a four-point scale from "not during the past month" to "three or more times a week"). One question was about subjective evaluation of sleep quality (ranging on a four-point scale from "very good" to "very bad").

A pilot version of the questionnaire was distributed to 20 medical students in order to establish the internal consistency of the questionnaire. The internal consistency (Cronbach's alpha) of the questionnaire was 0.82.

Statistical analysis

Statistical data analysis was performed using "IBM SPSS Statistics version 20" software. The descriptive analysis was conducted with calculation of means \pm standard deviation (SD) and percentages (for categorical variables distributions). Associations between indicators were assessed using chi squared test and analysis of variance (ANOVA). The Spearman correlation was calculated to evaluate the associations among

medical students sleeping habits. The analysis of related factors was based on univariate and multivariate logistic regression analysis. The variables considered to fit for multivariate analysis were set at $p < 0.20$. The multivariate logistic regression was performed to analyse the associations between the multiple factors and subjectively rated poor sleep quality. Statistical significance level was set at 5% ($p < 0.05$).

RESULTS

In total, one hundred and thirty one medical student, 30 males (22.9 %) and 101 females (77.1%) participated in the study and completed the questionnaire. The mean age of study participants was 25.4 ± 6.78 years (ranging between 21 and 42 years). Eighty two (62.6%) subjects were single; 49 (37.4%) - lived with a partner; 19 (14.5%) – reported having children. Forty four (33.6%) study participants were working while studying: 30 (22.9%) – more than 20 hours per week; 22 (16.8%) – were even working at night. More than half of students – 50.5% reported their income below 200 Euros per month.

The data about medical students' lifestyle habits within last 12 months revealed a low level of physical or occupational activity: 68.7% of respondents did not have physical activity or had it less than 2 hours per week; 15.3% of students did not have any hobbies; inability to lead a healthy lifestyle: 55.7% reported not consuming healthy food, 7.6% reported having intake of alcohol too much or too often and 13.7% reported having ever used illicit drugs. Every tenth of the study sample (11.5%) reported having health problems that required medication; and 78 (59.5%) reported stressful life event during study years that influenced their mental health or sleep quality. Overall, only 91 (69.5%) study participants reported general satisfaction with their social situation.

The analysis of learning/studying habits among medical

Table 1. Learning/studying habits among medical students (n=131)

Factors*		n	%
Time spending at university, hours per day	<8	111	84.8
	≥8	20	15.2
Studying at home, hours per day	Do not study at home	53	40.5
	<3	38	29.0
	≥3	40	30.5
Time spending to prepare for exam, days	≤5	74	56.6
	>5	57	43.5
Time spending to prepare for the exam, hours per day	<12	100	76.3
	≥12	31	23.7
Student's self- rated intensity of individual studies	Moderate	34	26.0
	Intensive/very intensive	97	74.0
Have time for the rest during preparation for exam	Yes	25	19.1
Average grade in the courses	≤8.0	37	28.2
	8.1– 10.0	94	71.8
Time for the rest from studies/working, hours per day	<3	57	43.5
	≥3	74	56.5
Having possibility to relax in free time	No	56	42.7

*during the last one year period

students (Table 1) revealed that the biggest part of the day they spent at university, 15.2% of them- more than 8 hours per day. After classes, 30.5% also studied at home more than 3 hours per day. The amount of time for the rest from studying/working was less than 3 hours per day for 43.5% of students. Five days for preparing for an exam was pointed out by 43.5% of students and 23.7% – spent on it 12 and more hours per day. In total, 42.7% of participants reported not having the possibility to relax in free time. The majority of students (74.0%) reported the intensity of their studies as intensive or very intensive, however, 71.8% of them had average grade in the fourth year courses (using ten points scale from 1 to 10) - from good (8.1 points) to excellent (10.0 points).

Sleeping habits and sleep quality rating among medical students during the past month is shown in Table 2. The subjective overall sleep quality was rated as “very good” only by 12.2% of students; the biggest part – 64.9% reported as “fairly good” sleep; 21.4% reported “fairly bad” and 1.5% reported as “very bad” sleep quality. For further logistic regression analyses the subjects were dichotomized as subjective reported good sleep (original reports of “very good” and “fairly good”, 77.1% in total) or subjective reported bad sleep (“fairly bad” and “very bad”, 22.9% in total).

Due to studying reasons the majority of students reported their usual time of going to bed after 23:00 (74.1%), getting up before 7:00 (62.5%); and their actual sleep time was less than 7 hours per night (61.1%). Within the last 30 days, 55.7% of students reported trouble sleeping due to different reasons once or more times a week: 34.4% – were unable to fall asleep within 30 minutes; 40.4% – woke up in the middle of the night or early morning; 14.5% – had bad dreams, 7.6% – woke up confused or talking. The use of medicine for sleep during the past month was reported by 9.2% of participants, while 3.9% reported taking medicine once or more times a week. All

Research reports

Table 2. Sleeping habits and sleep quality rating among medical students (n=131)

Factors*		n	%
When do you usually go to bed?	21.00–22.00	10	7.6
	22.00–23.00	24	18.3
	23.00–24.00	55	42.0
	after 24.00	42	32.1
When do you usually get up?	before 6.00	26	19.8
	6.00–7.00	56	42.7
	after 7.00	49	37.4
How many hours do you usually sleep?	<7 hrs	80	61.1
	≥7 hrs	51	38.9
During the past month, how often have you had trouble sleeping because you cannot fall asleep within 30 minutes?	Not during the past month	35	26.7
	Less than once a week	51	38.9
	Once or twice a week	25	19.1
	Three or more times a week	20	15.3
During the past month, how often have you had trouble sleeping because you wake up in the middle of the night or early morning?	Not during the past month	27	20.6
	Less than once a week	51	39.0
	Once or twice a week	26	19.8
	Three or more times a week	27	20.6
During the past month, how often have you had trouble sleeping because you had bad dreams?	Not during the past month	66	50.4
	Less than once a week	46	35.1
	Once or twice a week	12	9.2
	Three or more times a week	7	5.3
During the past month, how often have you had trouble sleeping because you woke up confused or talking?	Not during the past month	99	75.6
	Less than once a week	22	16.8
	Once or twice a week	8	6.1
	Three or more times a week	2	1.5
During the past month, how often have you taken medicine to help you sleep (prescribed or over-the-counter)?	Not during the past month	119	90.8
	Less than once a week	7	5.4
	Once or twice a week	1	0.8
	Three or more times a week	4	3.1
During the past month, how often have you had trouble staying awake while driving, having meals, or being engaged in social activity?	Less than once a week	83	63.4
	Once or twice a week	48	36.6
During the past month, how would you rate your sleep quality overall?	Very good	16	12.2
	Fairly good	85	64.9
	Fairly bad	28	21.4
	Very bad	2	1.5

studied medical students reported some problems in day time functioning within last 30 days, and 36.6% of them had it once or more times a week.

Correlation analysis revealed that students' reported later time going to bed negatively correlated with their actual sleep time ($r = -0.384$; $p < 0.001$). Inability to fall asleep within 30 minutes positively correlated with wake-ups frequency in the middle of the night or early morning ($r = 0.321$; $p < 0.001$) and taking medicine for sleep ($r = 0.280$; $p = 0.001$).

In order to establish the relations between socio-demographic characteristics, lifestyle factors, learning/studying habits, and overall subjective quality of sleep, the logistic regression modelling was conducted. As shown in Table 3, only four factors in multivariate analysis were

related with subjectively poor sleep quality: average grade in the studies below 8.0 points (OR=3.21, 95%CI 1.02–10.04, $p = 0.045$); trouble sleeping because of inability to fall asleep within 30 minutes once or more times per week (OR=2.97, 95%CI 1.04–8.47), $p = 0.041$); trouble sleeping because of wake-ups in the middle of night or early morning once or more times per week (OR=3.15 (95%CI [1.10–9.06]), $p = 0.033$), and the use of medicine for sleep once or more times per week (OR=14.90 (95%CI 1.02–216.75, $p = 0.048$)). Actual sleep duration and having troubles staying awake while driving, eating meals, or being engaged in social activity were associated with subjective poor quality of sleep but these factors failed to show association in multivariate regression analysis. All other characteristics of lifestyle, studying habits

Table 3. The relations between possible factors and overall subjective poor quality of sleep: logistic regression models

Factors	Univariate regression model		Multivariate regression model	
	OR (95% CI)	p	OR (95% CI)	p
Spend ≥12 hours per day preparing for exam	<12	1.00	1.00	0.210
	≥12	2.35 (0.96–5.71)	0.056	2.10 (0.66–6.68)
Student's self-rated individual study intensity	moderate	1.00	1.00	
	Intensive/ very intensive	2.75 (0.88–8.55)	0.073	1.27 (0.33–4.81)
Average grade in the studies	≥8.0	1.00	1.00	
	<8.0	2.97 (1.26–6.99)	0.011	3.21 (1.02–10.04)
Usually go to bed, time	Before 23.00	1.00	1.00	
	After 23.00	3.99 (1.12–14.13)	0.023	3.88 (0.68–22.16)
Actual sleep, hours	>7	1.00	1.00	
	≤7	3.22 (1.21–8.55)	0.015	1.89 (0.58–6.87)
Had trouble sleeping because cannot fall asleep within 30 minutes, times per week	Less than once a week	1.00	1.00	
	Once or more times a week	6.08 (2.52–14.71)	< 0.001	2.97 (1.04–8.47)
Had trouble sleeping because wake up in the middle of the night or early morning, times per week	Less than once a week	1.00	1.00	
	Once or more times a week	3.40 (1.45–7.96)	0.004	3.15 (1.10–9.06)
Taken medicine to help for sleep (prescribed or over-the-counter), times per week	Less than once a week	1.00	1.00	
	Once or more times a week	15.23 (1.63–142.14)	0.002	14.90 (1.02–216.75)
Had troubles staying awake while driving, having meals, or being engaged in social activity, times per week	Less than once a week	1.00	1.00	
	Once or more times a week	2.95 (1.28–6.82)	0.010	1.99 (0.72–5.50)

among medical students were not associated with overall subjective sleep quality.

The calculated habitual sleep efficiency of medical students ranged from 71.4% to 100% (94.4±6.98, on average). The analysis of medical students' subgroups based on sleeping habits versus sleep efficiency revealed two significant factors – the usual time of getting up in the morning before 6.00 (F=4.22; p=0.017) and more than 7 hours of actual sleep (F=18.23; p<0.001), which both related to better habitual sleep efficiency.

DISCUSSION

Our study revealed that medical students are the subgroup of population with quite specific sleeping pattern. More than 70 percent reported going to sleep later than 23:00 and the need to wake up before 7:00, which leads to total sleep duration of less than 7 hours. According to the last sleep time duration recommendation [27] for this age adults, it is less than recommended optimal sleep duration; therefore it is not surprising that more than half of students in our sample reported troubles with falling asleep as well as sudden wake-ups at night and every tenth – reported taking medicines for sleep. Nevertheless, about three quarters of students still rated their own sleep quality as good. Such results in part correspond with the findings of other studies. For example, 23% of self-reported poor sleep quality between medical students in our study corresponded with findings of other studies, where 16–28% was poor sleepers [4, 24, 28]. Other authors reported a lower (8%) [16] or higher (51–64%) proportion of poor sleepers [15, 19, 29] among medical students. However, majority of studies showed the significant proportion of

medical students with self-reported poor sleep quality.

The analysis of sleep pattern showed that 74% of Lithuanian medical students went to bed after 23.00. It is three times higher than 24% of similar “late sleepers” between Brazil medical students [24]. Other studies reported that 26% of German medical students usually go to bed after 1.00 a.m. [16] and 17% of Norway students – even after 2.00 a.m. [25]. We found that 61% of students had actual sleep time less than 7 hours; similar results were reported from Nigerian students data [30]. Worse results were reported among Indian students; 16% of them had less than 6 hours of sleep [20]. Other authors presented that a bigger part of medical students had more than 7 hours of actual sleep [16, 22, 28]. Such results were found 5 years ago among Lithuanian medical students [22], but our study shows a trend to shortening of actual sleep time. This novel finding of sleep pattern in Lithuanian medical students presented a very threatening situation, since it is known that short actual sleep time may lead to worse daily functioning and even psychiatric disorders in young people [31].

In our study the sleep was disturbed in 34% of students by the inability to fall asleep within more than 30 minutes and in 40% – by frequent wake-ups in the middle of the night, similarly to studies reported by other investigators [16, 24, 30]. Those factors were found to be predictors of overall bad subjective sleep quality among medical students.

The evaluation of medication use in our study showed that relatively high proportion of students (one in ten) used sleep medication that was reported by participants with subjective poor sleep quality. Some authors reported even a higher use of sleeping pills (10–17%) [4, 32], but more frequently the lower frequency (4–6%) is reported [22–26, 28]. Interestingly, one

Japanese study found that 3% of students used sleeping pills, though more often than those who reported perfect sleep [23].

The poor sleepers in our study were identified as students with lower academic achievement. Such relationships were reported in other studies [9, 33], where subjective feeling of obtaining sufficient sleep was a significant predictor of excellent study performance, while delayed sleep phase was associated with lower average of grades [25]. This consistency of findings could suggest that poor sleep pattern affects students' everyday activities and quality of functioning, which manifests in poorer academic performance. Nonetheless, the association between poor sleep and low academic performance can be causal in two opposite ways – low grades may be trigger poorer sleep quality, while poor sleep quality may affect the cognitive abilities necessary for studying.

More detailed analysis based on students' sleep self-ratings demonstrated that poor quality of sleep was independently associated with poorer academic performance, sleep medication use, troubles staying awake a day long as well as above-mentioned troubles with falling asleep and sudden wake-ups during the night sleep. Most likely, these factors are the outcomes rather than causal factors of poor or irregular sleep.

In general, the behaviour of medical students in majority of studies does not correspond to healthy lifestyle. Similarly, more than half of our studied students had low levels of physical or occupational activity, inability to lead a healthy lifestyle, every tenth reported consuming alcohol too much or too often, or ever using illicit drugs and a half of students did not have possibility to relax after the studying. Other studies presented similar results about medical students' lifestyle, for example, 37% reported no physical activity, 16% – smoked and 17% – used illicit drugs [34], 42–63% had psychological distress or emotional exhaustion [28, 35], 6–12% were overweight or obese [34].

However, contrary to our study, many researchers found the associations of lifestyle factors with poor sleep quality, e.g. higher insomnia scores were associated with female gender [15, 16, 23, 24], older age [23, 20], working full-time and lower physical activity [23, 16, 22, 29], higher body mass index, alcohol use, tobacco smoking [20, 14, 29], psychological problems, stress [14, 28], unhealthy eating habits [15]. In contrast, Giri et al., 2013 [20] showed opposite findings – sleep quality in females was better than males. However, our study did not reveal the associations between lifestyle and sleep quality, though such pattern of behaviour can really degrade the quality of sleep in the future. The current findings in our study could only suggest that medical students of the fourth year, despite difficult studying and lifestyle habits are sufficiently resistant to life stressors, have a good adaptability and for these reasons their sleep efficiency was high enough.

Our study has a few limitations. Firstly, we evaluated only a part of medical student population – the fourth year students. They have finished the most intensive period of the first three years of studies, and thus proved the ability to study hard. In general, our sample may be regarded as “stronger survivors” during the long process of medical studies. However, the study results cannot be applied to all medical students, especially to

younger ages. As was written before, we evaluated only the use of sleeping pills, but did not measure medical students' anxiety and severity of depression symptoms, thus we were not able to evaluate other mental symptoms in relation to poor sleep quality.

CONCLUSION

The study concluded about two-thirds of medical students with self-reported poor sleep quality and shorter duration of their actual sleep time. Poor sleep quality is associated with lower level of academic achievements. The shortening of everyday studying hours and adjustment of study modules may be required in order to reduce the incidence of sleep problems among medical students.

Competing interests

None of the authors have any competing interests.

Authors' contributions

Authors VS and VA designed the study and wrote the protocol. KS and AS performed the literature searches and carried out the statistical analysis. AS accomplished the evaluations of the study subjects. VS and KS wrote the first draft of the manuscript. VA critically revised the manuscript. All authors approved the final version of the manuscript.

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