



# Sleep Hygiene Practices and Their Relation to Sleep Quality in Medical Students of Qazvin University of Medical Sciences

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## ABSTRACT

**Introduction:** Poor quality of sleep is a distressing and worrying condition that can disturb academic performance of medical students. Sleep hygiene practices are one of the important variables that affect sleep quality. The objective of this study was to assess association between sleep hygiene practices and sleep quality of medical students in Qazvin University of Medical Sciences.

**Methods:** In this descriptive-correlational study, a total of 285 medical students completed a self-administered questionnaire. Demographic data, sleep-wake schedule in weekday and weekend, and sleep duration were collected. Students' sleep quality was assessed by Pittsburg Sleep Quality Index (PSQI). Data were analyzed by SPSS Ver 13.

**Results:** Overall, 164 (57.5) of students had poor sleep quality. Mean global PSQI score and average score of four subscales were significantly higher in male than female. Regression analysis showed that male students ( $\beta=-0.85$ ,  $P<0.05$ ), students at senior level ( $\beta=-0.81$ ,  $P<0.05$ ), married students ( $\beta=-0.45$ ,  $P<0.05$ ), and those with improper sleep hygiene practices slept worse.

**Conclusion:** The findings of this study showed that the prevalence of poor sleep quality in medical students is high. Improper sleep hygiene behaviors might be a reason for poor quality of sleep in medical students.

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## Introduction

Adequate amount and good quality of sleep are basic human needs. Sleep- wake circadian rhythms are regulated by a pacemaker in brain and controlled by some external factors including light, temperature, and social interaction.<sup>1,2</sup> In addition, pattern of sleep and wakefulness have many variations in different subjects in terms of age, physiologic and psychological characteristics, somatic and psychiatric disorders, and demands of occupation. Furthermore these patterns are affected by social requirements of modern life in recent decades.<sup>3,4</sup>

Sleep specialists recommend that healthy people generally need about seven hours of sleep per day. But recent surveys in different

countries have indicated that the average of sleep duration is very less than this amount.<sup>5-7</sup> Prior studies performed all over the world have showed that different sleep disorders are associated with psychiatric and/or somatic problems as well as social life disorders.<sup>2-6</sup> Sleep deprivation in leads to impaired mood, judgment, ability to learn and maintain information.<sup>1,2</sup> Moreover, it is related to different health problems including cardiovascular disease, obesity, diabetes, metabolic syndrome, and increased mortality.<sup>8,9</sup>

University students are one of the high risk groups for developing sleep disorders, with a high vulnerability especially in medical students.<sup>1,2</sup> The prevalence of sleep disturbances have been reported high in

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medical students.<sup>10</sup> The prevalence of poor sleep quality has been estimated about 20 to 60 percent in medical students. In these studies, sleep quality was associated with sex, years of education, perceived adequate amount of sleep, stress and concern about university tasks, and irregular sleep-work hours.<sup>11,12</sup>

Many causes have been suggested for this issue. Some of them include high daily and nightly workload, inadequate time for leisure activities, living conditions, and high level of stress due to intensive curriculum schedule.<sup>8-10</sup> Also, many students live away from their family in dorms. These students are more likely to have improper sleep-wake schedule that is harmful in many cases.<sup>13,14</sup>

Poor academic performance has been reported in medical students who suffer from sleep disorders.<sup>10</sup> Moreover, studies have shown that sleep deprivation increases the risk of medical errors in health care workers.<sup>15,16</sup>

Sleep hygiene practices is one of the important variables that affects sleep quality.<sup>17</sup> inappropriate sleep behaviors are harmful for sleep. These behaviors, which were introduced firstly by Peter Hauri are based on physiology of sleep.<sup>18</sup> Many activities are considered as proper sleep hygiene that promotes good sleep. Some of them include the followings: 1) avoiding caffeine, nicotine, and alcohol near the bed time, 2) avoiding napping as an occasional pattern, 3) maintaining a regular sleep and wake time, 4) keeping bed room comfortable and quiet, and 5) avoiding highly demanding activities in bedroom.<sup>19</sup>

Unfortunately, knowledge of medical students is insufficient about sleep hygiene practices.<sup>20</sup> Also, they are often unaware how poor quality of sleep deteriorates their academic performance and cognitive function.<sup>19,20</sup>

In a survey, knowledge and practice of more than 900 medical students on sleep hygiene practices were assessed. Only 50% of participants answered correct response. Also, students' knowledge on sleep hygiene was positively related to sleep hygiene practices.<sup>21</sup> According to issues mentioned above, the objective of this study was to assess the

association between sleep hygiene practices and sleep quality of medical students in Qazvin University of medical sciences, Qazvin, Iran.

## Materials and methods

This descriptive-correlational study was conducted in Qazvin University of medical sciences from March to September, 2012. All medical students were included in the study. None of them had any history of sleep or medical problems. Purpose and methods of the study was clearly explained to students and informed consent was obtained from them. The demographic characteristics of students including age, sex, body mass index (BMI), type of accommodation (living in dormitory, renting houses, and parent-owned houses) and marriage status were assessed by self-administered questionnaire. All students were also asked about their routine sleep patterns. Information about sleep included total sleep duration, total time in bed, sleep latency, number of awakenings during the night, and naptime during the day. This information was collected on week days and weekends.

To assess the prevalence of good sleep hygiene practices in students, we asked 10 questions. Some questions were as follow: "During the past month, have you taken a nap during daytime occasionally?", "During the past month, have you smoked during two hours before bedtime?", and "Within the past month, have you eaten heavy night meals near the bedtime?" All the questions about sleep hygiene practices of students are presented. Students answered these questions with yes or no response.

Sleep hygiene questionnaire was designed based on expert's opinion in the field of sleep medicine and using previously published articles about sleep hygiene. Test-retest reliability was done by calculating intraclass coefficient (ICC). For this, fifty questionnaires were completed again by students after 2 weeks. Result from test-retest has shown that ICC was 0.91 and Chronbach's alpha coefficient was 0.78.

Persian version of Pittsburg Sleep Quality Index (PSQI) was used to evaluate subjective sleep quality of participants. PSQI assesses participant's view about her or his quality sleep during one month ago. It constitutes seven subscales including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction. Each part have four score rating from 0 to 3 which indicates: never, once a week, twice a week, and more than three times a week, respectively. The range of total score is between 0-21 and scores more than 5 shows poor quality of sleep.<sup>22</sup> Reliability and validity of Persian form of PSQI has been assessed in previous published article and its chronbach's alpha was 0.83.<sup>23</sup> Data were analyzed by SPSS Ver 13.

Student t-test was used to determine differences in sleep pattern between weekday-weekend, and between male and female participants. Chi-square test was used to assess differences between males and females in frequency of poor sleep hygiene practices. To determine predictive factors (demographic and lifestyle characteristics and sleep hygiene practices) for poor quality of sleep, we used linear regression model.  $P < 0.05$  was considered statistically significant.

## Results

Total number of students was 325, in which 285 students (response rate: 87.7) have responded to the questionnaires. Of 285 students who responded to questionnaire, 150 were female (52.6). Mean age of students was  $22.8 \pm 1.74$  years (ranged from 20 to 27 years).

Mean of Body Mass Index (BMI) was  $21.9 \pm 0.9$ . Fifty six (19.6%) of students were current smokers, and most of the smokers were male (47 students). More than half (53.7%) of the students were at basic science level, and the others were junior (22.8%) and senior (23.5%). Only 32 (10.8%) medical students were married and others were single. A total of 135 (47.3%), 46 (16.1%), and 104 (36.5%) of students were lived in dorms, renting houses, and parent-owned houses, respectively.

Table 1 shows and compares average time of sleep parameters in weekdays and weekends in males and females. As the table shows sleep parameters were statistically different between the weekdays and weekend in term of sex. Table 2 shows the responses of students to 10 questions about sleep hygiene practices. According to the table, male students had poorer sleep hygiene practices than female students in four items (2, 3, 4, and 7). While, sleep hygiene practices of females were worse than males in two items (5 and 6).

Detail results of PSQI questionnaire are shown in table 3. Mean global PSQI score and average score of four subscales among males were significantly higher than females. Overall, 164 (57.5%) of students (52% of female *vs.* 63.7% of male) had poor sleep quality (total score of them was more than 5).

Table 4 shows linear regression model for detecting predictive variables for poor sleep quality. According to the model, males ( $\beta = -0.85$ ,  $P < 0.05$ ), students at senior level ( $\beta = -0.81$ ,  $P < 0.05$ ), married students ( $\beta = -0.45$ ,  $P < 0.05$ ), and students who had six types of improper sleep hygiene practices reported worse sleep.

**Table 1.** Comparison of sleep patterns between females and males

Sleep variables*	Females		P <sup>a</sup>	Males		P <sup>b</sup>	P <sup>c</sup>
	Week day	Weekend		Week day	weekend		
Time in bed	390 (34)	425 (57)	0.002	365 (28)	379 (31)	0.02	0.001
Sleep latency	18.2 (7.1)	23.4 (6.3)	0.04	22.4(6)	21.7 (4)	0.09	0.03
Total sleep time	371 (32)	412 (21)	0.01	361 (27)	375 (53)	0.005	0.07
Number of awakening during night	1.6 (0.3)	0.9 (0.2)	0.06	0.8 (0.2)	0.9 (0.3)	0.08	0.03
Naptime during the day	26.1 (2.4)	22.3 (3.8)	0.003	18.2(5.1)	21.3 (3.5)	0.03	0.07

\* Minutes, <sup>a</sup>P-value for differences between weekday and weekend variables in females. <sup>b</sup>P-value for differences between weekday and weekend variables in males. <sup>c</sup>P-value for differences between sleep pattern variables between males and females.

**Table 2.** Comparison of sleep hygiene practices between females and males

Sleep hygiene practices (SHP) of participants	Females		Males		p
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	
Take a nap during daytime occasionally	34 (22.6)	116 (77.4)	46 (34)	89 (66)	0.08
Smoke within 2 hours before bedtime	9 (6)	141 (94)	47 (34.8)	88 (65.2)	<0.001
Eat heavy night meals near the bedtime	43 (28.6)	107 (71.4)	60 (44.4)	75 (55.6)	0.02
perform dynamic physical activities within 2 hours before asleep	23 (15.3)	127 (84.7)	39 (28.9)	96 (71.1)	0.01
Go to bed thirsty or hungry	37 (24.6)	113 (75.4)	25 (18.5)	110 (81.5)	0.004
Think about day's events and worries at bed	75 (50)	75 (50)	39 (28.9)	96 (71.1)	<0.001
Engage yourself with highly demanded activities near to bedtime, like watching exciting movies	57 (38)	93 (62)	71 (52.6)	64 (47.4)	0.03
Use your bed for activities other than sleep	48 (32)	102 (68)	35 (25.9)	100 (74.1)	0.07
Sleep in uncomfortable bedroom (in term of temperature, light, noise)	23 (15.3)	127 (84.7)	31 (22.9)	104 (77.1)	0.19
Sleep and wake at the different time during the week	51 (34)	99 (66)	42 (31.1)	93 (68.9)	0.12

**Table 3.** Pittsburgh Sleep Quality Index (PSQI) global and component means and standard deviations

Variables	Female Mean (SD)	Males Mean (SD)	P
Global score of PSQI	5.82 (0.9)	6.64 (1.1)	0.003
Subjective sleep quality	1.27 (0.4)	1.49 (0.5)	0.02
Sleep latency	0.9 (0.3)	0.9 (0.5)	0.09
Sleep duration	1.34 (0.5)	1.51 (0.4)	0.009
Habitual sleep efficiency	0.31 (0.08)	0.36 (0.1)	0.005
Sleep disturbance	0.85 (0.2)	1.22 (0.4)	0.001
Use of sleep medications	0.24 (0.07)	0.14 (0.09)	0.07
Daytime dysfunction	0.91 (0.3)	1.02 (0.5)	0.21

**Table 4.** Linear regression of the factors predicting sleep quality of medical students

Variables	R	t	Standardized $\beta$
Age	0.21	1.3	0.01
Gender	0.24*	-1.9	-0.85*
Body mass index	-0.56	1.07	0.23
Type of accommodation	-0.34	0.41	0.32
Years of education	-0.65*	-1.8	-0.81*
Marriage	-0.78*	-0.79	-0.45*
Total sleep time	-0.3	1.8	0.21
Take a nap during daytime occasionally	0.28	-0.73	-0.09
Smoke within 2 hours before bedtime	0.61*	1.6	0.86*
Eat heavy night meals near the bedtime	-0.09	0.46	0.08
perform dynamic physical activities within 2 hours before a sleep	0.59*	0.81	0.65*
Go to bed thirsty or hungry	0.27*	1.9	0.76*
Think about day's events and worries at bed	0.75*	1.13	0.45*
Engage yourself with highly demanded activities near to bedtime like watching exciting movies	0.63*	1.7	0.51*
Use your bed for activities other than sleep	-0.09	-0.53	-0.08
Sleep in uncomfortable bedroom (temperature, light, noise)	0.05	1.02	0.26
Sleep and wake at the different time during the week	0.58*	2.5	0.61*

\*P&lt;0.05

## Discussion

The findings of this study showed that the prevalence of poor sleep quality in medical students is generally, more than half of the students participating in the study suffered from poor quality of sleep. Also, complaint from this problem was more prevalent in male students than females. These results are consistent with most of the studies have been performed in other countries such as Ethiopia<sup>3</sup>, Saudi Arabia,<sup>10</sup> and America.<sup>20,21</sup>

However, some studies reported a lower prevalence of poor sleep quality in students such as Brazil,<sup>24,25</sup> and Palestinian students.<sup>26</sup> The variation between results from different studies may be related to differences in cultural habits, socioeconomic status and university characteristics of different countries. In the other words, in studies that have examined students' sleep quality during exam periods, the situation was worse. In a study conducted on 162 students at Zanjan University of medical sciences in Iran during exam period, 86.4% of students had poor quality of sleep.<sup>27</sup>

Current study also showed that sleep quality of males was worse than females. Results of other studies conducted in this area are inconsistent. Cheng and her colleagues assessed sleep quality of incoming university students. They found that poor sleep quality was significantly associated with female gender.<sup>28</sup> This is also consistent with other studies which have been reported high prevalence of morning fatigue and daytime sleepiness in female than male students.<sup>25-28</sup> This may be due to the fact that females physiologically need more time for sleep.<sup>15,25</sup> It should be noted that this study assessed incoming students (newly signed in) and this leads to discrepancies between the results. In some other studies, no difference was reported between males and females in terms of sleep quality.<sup>12,14</sup> Based on present results, male students had worse sleep hygiene practices than females. It could be a reason

for higher prevalence of poor sleep quality in this group.

Other finding of this study showed that the mean sleeping time of participants in the study was less than recommended sleep amounts. In previous studies, association between short sleep duration with various health problems has been reported.<sup>8,9</sup>

Based on the other results, sleep hygiene practices for males was lower than females. Smoking close to bedtime, eating heavy dinner, performing dynamic physical activity, and highly demanded activities before bedtime (like watching exciting movies) were higher among males. Instead, females were more likely to go to bed thirstily and hungry. Furthermore, thinking about daily events and worry thoughts were more prevalent in females. According to the results, improper sleep hygiene behaviors might be a reason for poor quality of sleep in medical students. These results are in line with previous studies.<sup>11-14,17,18</sup>

Improper behavior of sleep hygiene and poor sleep quality can ultimately lead to poor academic performance and increased medical errors in medical students.<sup>13</sup> A study conducted in Hong Kong indicated that students' awareness of sleep hygiene practices was low. In this study, undesirable sleep hygiene practices were significantly associated with poor quality of sleep.<sup>18</sup>

Good knowledge of students about sleep hygiene practices is not sufficient for improving sleep quality as reported by Brown et al. In fact, implementing and practicing these principles would help to improve sleep quality.<sup>20</sup>

Males, students at senior level, married students, and those with improper sleep hygiene practices had worse sleep. Sleep hygiene practices is shown to be associated with a higher prevalence of insomnia in other studies.<sup>13,14,19</sup>

Current study results showed that study, senior students had worse sleep quality. Poor quality of sleep in senior students can be due to their shift work schedules. Also, it

is assumed that junior students may have developed better coping strategies for their university needs.<sup>29</sup> Similar results have been reported in other studies.<sup>13,14</sup>

This study has some limitations too. First the study population were the medical students on Qazvin University of medical sciences and do not cover the all of the Iranian medical students. Secondly, we used self-reported questionnaire for detecting variables, which could have been subject to bias. More subjective instrument like sleep diary, will give more accurate results. To avoid prolonging the questionnaire, authors did not assess some important variables influencing sleep such as stress, anxiety and depression.

### Conclusion

In conclusion, sleep hygiene is one of fundamental factors affecting sleep quality. Current findings recommend conducting further interventional studies for measuring the effects of educational programs on sleep hygiene and academic performance. Moreover, assessing changes of academic performance in students after interventional programs will be helpful.

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### Ethical issues

None to be declared.

### Conflict of interest

The authors declare no conflict of interest in this study.

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