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Association between Lamp Light During Sleep and Sleep Quality in Medical Students

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Abstract

Background: Sleep quality is influenced by numerous factors, including external factors, such as the sleep environment. One aspect of the sleep environment that can influence sleep is lighting. Light exposure emitted by lamps during sleep can impair sleep quality. The aim of this study was to investigate the association between lamp light during sleep and sleep quality in preclinical medical students.

Methods: This cross-sectional observational analytic study was carried out on 386 preclinical medical students who were determined using the cluster sampling method. Data was collected in November 2022. Lamp light during sleep and sleep quality among students were measured using the Indonesian version of the Pittsburgh Sleep Quality Index (PSQI). The association between lamp light and quality of sleep was analyzed by the Chi-Square test.

Results: There were 26.68% of students who used lights when sleeping. Poor sleep quality was detected in 59.22% of students who used lights while sleeping. On the other hand, in the group that did not use lights while sleeping, most students had good sleep quality (58.30%). The association between lamp light during sleep and quality of sleep yielded a p-value of 0.002.

Conclusion: There is a significant association between lamp light during sleep and sleep quality in preclinical medical students. Thus, improving sleep quality in preclinical medical students may be achieved by modifying the lamp light during sleep.

Keywords: Lamp light, medical students, sleep quality

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Introduction

Sleep is an essential physiological process for survival.[1] Various aspects of the body, including the nervous, cardiovascular, endocrine, and immune systems, are affected by sleep.[2,3] It is understood that a healthy sleep is dependent on its quality. Poor sleep quality, however, is generally reported to be a common health problem.[4,5] Anybody can experience poor sleep quality, but medical students are known to be one of the most vulnerable groups to poor sleep quality as medical students encounter academic, social, and lifestyle challenges since the preclinical stage.[6–8] A meta-analysis of 57 kinds of literature on sleep quality among medical students in a wide range of countries showed that the global prevalence of medical students who experienced poor sleep quality was 52.7%. Poor sleep quality among medical students has been reported in many regions, including in countries in Asia, with a pooled prevalence of 47.44%.[9] In Indonesia, the proportion of medical students with poor sleep quality reached 69.84%.[10]

Sleep quality can be affected by various factors. Beyond internal factors such as health problems and stress,[11] external factors

including the sleep environment are also known to play an important role in affecting sleep quality.[12] One of the aspects of the sleep environment that most influences the sleep process is light.[13] The light emitted from lamps at night, especially during sleep, potentially disrupts sleep quality by affecting the circadian rhythm and the production of the hormone melatonin. Melatonin is a sleep-promoting hormone produced by the pineal gland in the brain in response to darkness. Light increases the activity of the circadian rhythm regulator located in the hypothalamus of the brain called the suprachiasmatic nucleus (SCN) which leads to inhibition of melatonin secretion. A low level of melatonin is suggested to contribute to difficulties in falling asleep as well as sleep disturbances.[13,14] Research regarding the impact of the use of lamps while sleeping on sleep quality, especially among medical students, is still limited. Given that poor sleep quality is prevalent among Indonesian medical students and that the use of lamps during sleep is a modifiable environmental factor that can impact sleep quality, it is important to know whether or not there is an association between the use of lamps during sleep and the sleep quality of preclinical medical students. This study aimed to investigate the link between the lamp light during sleep and the quality of sleep among preclinical medical students in Indonesia.

Methods

This study was an observational analytic study with a cross-sectional approach conducted on preclinical medical students attending the School of Medicine and Health Sciences in Atma Jaya Catholic University of Indonesia. The sample for this study included 386 students from batches of 2020, 2021, and 2022, determined using the cluster sampling method. Students eligible for this study were those who agreed to take part as respondents, were not diagnosed with a disease that could cause sleep disturbances, were not diagnosed with sleep disorders, and did not use drugs that could influence sleep quality within one month prior to collecting data. To control the influence of other sleep environment aspects, students who reported being disturbed by noise (too noisy) and uncomfortable room temperature (too hot or cold) during their sleep in the past month were excluded from the study. In addition, the students in this study also had similar schedules and activities.

Research data was obtained digitally through questionnaires shared in November 2022. Demographic information included

Table 1 Demographic Characteristics of Students

Variable	n	%	Mean±SD
Gender			
Male	121	31.35	
Female	265	68.65	
Age (year)			
16	1	0.26	
17	35	9.07	
18	135	34.97	
19	108	27.98	
20	94	24.35	18.81±0.06
21	5	1.30	
22	5	1.30	
23	1	0.26	
24	1	0.26	
25	1	0.26	
Batch (class)			
2020	122	31.61	
2021	96	24.87	
2022	168	43.52	
Total	386	100	

Note: SD= Standard deviation

gender, age, and batch of education (according to the year students were enrolled). The use of lamps during sleep was recorded by stating whether or not the students turned on lamps during sleep. Sleep quality was evaluated using the Indonesian version of the Pittsburgh Sleep Quality Index (PSQI). PSQI had been widely used to assess sleep and was considered a gold standard for self-perceived sleep quality.[15] PSQI was questionnaire consisting of 19 items which yield sub scores for each item, ranging from 0–3. Subscores were then summed to yield a global PSQI score which may range from 0 to 21, with a score of ≤5 indicating good sleep quality and a score >5 indicating poor sleep quality. The questionnaire had been tested to be valid and reliable.[16]

The program STATA version 14.0 was used to enter and analyze the data. Demographic data was categorized to calculate frequencies and percentages. A possible association between lamp light and sleep quality was analyzed by performing a Chi-Square test. A p-value of ≤0.05 was considered significant. Ethics approval for this study was obtained from the Atma Jaya Catholic University of Indonesia Ethical Committee with document number 28/11/KEP-FKIKUAJ/2022.

Results

Research data was obtained from 386 students. Based on the demographic characteristics of students shown in Table 1, the majority of students (68.65%) were female. The students' ages ranged from 16 to 25 years with a mean±SD of 18.81±0.06 years. As many as 43.52% of students came from the batch of 2022.

More than half of the students did not use lamps while sleeping and only about one-fourth of the students used lamps while sleeping (Table 2). In the group of students who used lamps while sleeping, the majority of the students used LED lamps. Calculation of the global PSQI score among students showed that the prevalence of poor sleep quality, indicated by a global PSQI score >5, was reported by 46.37% of students (Table 2).

In the group of students who used lamps during sleep, a higher proportion of poor sleep quality was discovered (59.22%). On the other hand, in the group that did not use lights while sleeping, most students had good sleep quality (58.30%). Chi-Square bivariate analysis yielded a p-value of 0.002 indicating that lamp light while sleeping significantly affected the sleep quality of preclinical students at the Atma Jaya Catholic University of Indonesia (Table 3).

Discussion

Based on the results of this study, a large percentage of students did not use lamps during sleep. A study conducted in Cilegon

Table 2 Lamp Light During Sleep and Sleep Quality

	n	%
Lamp light during sleep		
Yes	103	26.68
No	283	73.32
Sleep quality*		
Good (score ≤5)	207	53.63
Poor (score >5)	179	46.37
Total	386	100

Note: *based on the Pittsburgh Sleep Quality Index (PSQI) score

Table 3 Association between Lamp Light and Sleep Quality

Lamp Light during Sleep	Sleep Quality						p	OR
	Good		Poor		Total			
	n	%	n	%	n	%		
Yes	42	40.78	61	59.22	103	100	0.002*	1.42
No	165	58.30	118	41.70	283	100		

Note: *=Chi-Square bivariate analysis, p-value of ≤0.05 was considered significant

city revealed that the majority of people did not use lights during sleep.[17] The use of lamps while sleeping is part of personal preference and habit in bedroom settings. The reason that drives most of the population not to use lamps while sleeping can be related to the effects of light exposure from lamps. Light exposure during sleep can inhibit melatonin secretion and disturb sleep.[14]

The prevalence of poor sleep quality which was found to be fairly high in this study is supported by other findings.[9] Medical students are known to be prone to poor sleep quality because they have a huge academic burden.[18] Long duration of study and high frequency of exams can take up sleep time and increase the risk of stress and anxiety that interferes with sleep. Poor sleep quality in medical students can also occur due to high exposure to electronic devices,[19] low levels of physical activity,[20] and unconducive sleep environment including exposure to light from the use of lamps.[13,14]

In this study, lamp light during sleep strongly affected the sleep quality of preclinical medical students. This finding is consistent with the result of a study conducted in West Kalimantan.[21] It is also in line with the result of research held among medical students in India.[22] The light emitted by lamps is known to be disruptive to the circadian rhythms, a natural cycle of physical, mental, and behavioral changes that occur within 24 hours.[14] Light affects circadian rhythms by inhibiting melatonin secretion.[13,14,23] Melatonin is a sleep-regulating hormone produced by the pineal gland in the brain.[13]

When the eye detects light, a group of nerve fibers called the retinohypothalamic tract transmits impulses from the retina to the suprachiasmatic nucleus (SCN) in the hypothalamus in the brain.[13,14] The SCN is the regulator of the circadian rhythm. One of the main functions of the SCN, in its active state, is to inhibit a group of nerve cells called the paraventricular nucleus (PVN) which is also localized in the hypothalamus.[14,23] The PVN, in its active state, stimulates melatonin secretion from the pineal gland.[13,14] Dark conditions lead to a decrease in SCN activity and an increase in PVN activity which triggers the secretion of melatonin. Conversely, bright conditions caused by the use of lamps increases in SCN activity and a decrease in PVN activity, thus inhibiting melatonin secretion.[23–25] Having lamps being turned on during sleep, therefore, can give rise to difficulties and disturbances of sleep, which results in poor sleep quality.[23–25]

The limitation of this study is the lack of lamp description. The light intensity and type of lamp being used during sleep were not analyzed in detail. The effect of light intensity and type of lamp on the quality of sleep can be examined in future research.

In conclusion, there is a significant association between the use of lamps during sleep and the sleep quality of preclinical medical students in Indonesia. It is therefore recommended for preclinical medical students to sleep with lights off to have better sleep quality.

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