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Lamp Light Exposure During Sleep and Sleep Quality of Medical Student Universitas Airlangga Batch 2012

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ABSTRACT

Introduction: Sleep disorder commonly happens to teenagers and adults because of light exposure during sleep that affects sleep quality, but the relation of lamp light exposure during sleep and sleep quality of medical students hasn't been determined previously. **Objective:** This research aimed to determine the relation of lamp light exposure and sleep quality of Universitas Airlangga's medical students and to give further information about the right adjustment of lamp light exposure to improve the sleep quality of medical student. **Methods:** Variables in this cross-sectional designed research were lamp light exposure (on or off) as the independent variable and sleep quality as a dependent variable. The research used the PSQI questionnaire to decide the sleep quality of 115 subjects once a week in a month. The collected data were analyzed by chi-square and fisher's exact test. **Results:** Based on the chi-square test, the p-value for lamp light exposure and sleep quality was more than 0.05 ($p = 0.863$). The results also showed that 74.8% of medical students had bad quality sleep. **Conclusion :** In conclusion, there was no relation between lamp light exposure and sleep quality. This research also indicated that most of the subjects had a bad sleep quality so that student should increase their needs for better sleep quality to maintain performance.

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INTRODUCTION

Sleep is one of the basic human needs that are essentially needed in life. To have better cognitive performance and avoid health problems and psychiatric disorders, good quality sleep and an adequate amount of sleep are important.[1] Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunctions are components of sleep quality,[2] if one or more components of sleep quality are poor, good quality sleep can't be reached. The study showed that most medical students and residents had sleep disturbances, which is one of the sleep quality components mentioned above.[1] The negative effects of sleep disturbances themselves can affect student's performances that can result in decreased average scores, increased risk of academic failure, mood disorders, compromised learning, and increased risk of motor vehicle accidents. Whereas, a great value in providing emerging adults with the structured environment knowledges, skills, become successfully employed, and contribute to society can be gained by the college experience.[3]

One of the factors that affect sleep quality is light exposure during sleep,[4] the closest light source during sleep is a lamp. Harvard Health Letter stated that lamp light that is turned on during sleep is not good for health.[5] It was also physiologically explained by light signal reactions during sleep can affect alertness. Circadian rhythm can be affected by light as a primary synchronizer that has been demonstrated in animal and human studies. Light signal that is accepted by the retina in the form of lightwave will affect the suprachiasmatic nucleus with enzyme N-acetyltransferase as the catalyst. N-acetyltransferase catalyzes the synthesis of melatonin and serotonin.

When there is no light, the activity of N-acetyltransferase increases 30 to 70 times that is resulted in higher melatonin to induce sleep.[6] The suprachiasmatic nucleus encounters a feedback loop that begins with a signal transfer to inhibit the activity of the suprachiasmatic nucleus because of the increase of melatonin production. The suppression of wake-promoting signals or neuronal firing at the suprachiasmatic nucleus by melatonin will induce sleep and by decreasing core body temperature, melatonin can adjust the wake-sleep cycle by thermoregulatory mechanism. While the lamp is turned on during sleep, the feedback loop will lead to the suppression of melatonin secretion that can affect sleep quality by inducing alertness.[7]

Based on the studies, it was explained that by the physiologic aspects, light exposure during sleep (lamp light is turned on) will induce alertness which can disrupt good sleep quality. But in fact, there has not been determined previously about lamp light exposure relation with sleep quality in the medical students that had higher disturbances of sleep. Therefore, the hypothesis that lamp light exposure during sleep had a relation with sleep quality will be tested by us on medical students of Universitas Airlangga batch 2012.

OBJECTIVE

There has not been determined previously about lamp light exposure relation with sleep quality in medical students that had higher disturbances of sleep. Therefore, the hypothesis that lamp light exposure during sleep had a relation with sleep quality will be tested by us on medical students of Universitas Airlangga batch 2012.

This research aimed to determine the relation of lamp light exposure and sleep quality of Universitas Airlangga's medical students. This research will give further information too about the right adjustment of lamp light exposure to improve the sleep quality of medical students.

METHODS

This is cross-sectional, observational, questionnaire-based research held from September 2015 to October 2015 at the Medical Faculty of Universitas Airlangga among medical student batch 2012 of Universitas Airlangga, Surabaya. The sample is 115 medical students in the inclusion criteria and agree to receive terms and conditions as the subject of this research after the researcher had given descriptions about the study.

Variables are lamp light exposure during sleep (light on or light off) as an independent variable and sleep quality as a dependent variable. The instrument is the Pittsburgh Sleep Quality Index that had passed the validity and reliability test on a subsample of 55 students. The questionnaire was given to the subjects once a week in a month and carried out under the supervision of the authors in conjunction with the collecting of subject's characteristics regarding sex, age, staying status, and lamp light exposure.

The Pittsburgh Sleep Quality Index is the questionnaire to assess the sleep quality of medical students and analyze the seven components of sleep quality. It has 19 short questions that have different scoring for each of the components.[2] The score of the seven components are added together to get a single number. A number in the 0-5 range is considered to have a good quality of sleep and above 5 is considered to have bad quality of sleep. All data continued through the editing, coding, scoring, entry, and cleaning process using the Statistical Package for Social Sciences (SPSS, Chicago, Illinois, USA),

version 22.0.

The results showed the univariate and bivariate analysis. The univariate analysis is shown as frequency and percentage for subject characteristics and mean, median, standard deviation, minimum, maximum, skewness, and SE of skewness for sleep quality. The bivariate analysis is shown as p-value using the chi-square method with statistical significance at $p \leq 0.05$ to test for significant relationships between variables.

RESULTS

Subjects Characteristics

Subjects in this research were 115 medical students who passed the inclusion criteria. Collected primary data were sex, age, staying status, lamp light exposure, and sleep quality. Data from Table 1. indicated that most of the subjects in this study were females (66.1%), followed by male subjects were 39 from 115 subjects (33.9%). Age data shows that most of the subjects were 21 years old (64.3%), followed by 20, 22, 19 years old (25.2%, 6.1%, 4.3%) (Table 2).

This research found that most of the subjects stayed at their parent's house (51.3%), followed by subjects who stayed at the boarding house, rented houses, apartement, and dorms (43.5%, 2.6%, 1.7%, 0.9%) (Table 3). Data that were shown in Table 4 indicate, most of the subjects (58.3%) sleep without lamp light exposure and 41,.% chose to sleep with lamp light exposure.

Sleep Quality

The sleep quality of medical students in this study is mostly bad (74.8%) and just 25.5% had a good sleep quality (Table 5). Sleep quality's univariate analysis is shown in Table 6. This table shows a 6.68 (>5) sleep quality score as the mean, implying that most of the medical students of Universitas Airlangga had a bad sleep quality. The best sleep quality score was 0 and the worst sleep quality score was 13. The sleep quality variables were normally distributed because the skewness (0.155) was divided by the standard error skewness (0.226) was 0.686 which was less than 2.

Relation of Lamp Light Exposure and Sleep Quality

Bivariate analysis in this study used chi-square to see the relation between lamp light exposure and sleep quality. If $p < 0,05$, means that there is a relation between those variables (H_0 rejected, H_1 accepted). Based on the bivariate analysis result in Table 7, subjects who sleep without lamp light exposure (67 subjects) had a higher bad sleep quality percentage (44.4%) than those with good sleep quality (13,9%). Subjects who slept with lamp light exposure were 48 subjects who had higher bad sleep quality (30.4%) than those with good sleep quality (11.3%).

Based on the statistical test using chi-square (Table 7), 0 % cell had expected count less than 5, so the value that was used to determine the significance of the relation is continuity correction. P-value was 0.863 ($p > 0.05$) showed that there is no significant relation between lamp light exposure and sleep quality of medical students of Universitas Airlangga batch 2012.

DISCUSSION

Sleep Quality of Medical Student Universitas Airlangga Batch 2012

The measurement of sleep quality of medical student Universitas Airlangga batch 2012 used the Pittsburgh Sleep Quality Index questionnaire that passed the validity and reliability test. The PSQI questionnaire consists of seven components that had a score range of 0 to 21. Good sleep quality reached if the score was 0 to 5 and the sleep quality was bad if the score was more than 5.[2] The subject distribution based on sleep quality showed most of the subjects had bad sleep quality (74.8%). Moreover, based on univariate analysis, the average score of sleep quality was 6.68 (>5) that showed most of the subjects had a bad quality of sleep.

A study about the sleep quality of medical faculty students, had been done before by Giri (2013), at the Pravara Institute of Medical Sciences (Deemed University), India. The study showed that postgraduates and undergraduates had a higher percentage of sleep disruptions, compared with interns. Those results corroborate with the findings in this study that most of the medical students, Universitas Airlangga batch 2012, had bad sleep quality. One of the components of sleep quality is sleep disruption.

The sleep quality of medical students will affect their academic performance, studying process and memory.[8] Moreover, mood, depression, fatigue, emotion, disorientation, and blood pressure are affected by the bad sleep quality of medical students.[9] Therefore, bad sleep quality in this study related to the sleep disruptions will lead to disturbance of medical students academic performance.

Relation of Lamp Light Exposure and Sleep Quality of Medical Student Universitas Airlangga Batch 2012

In this study, chi-square analysis was used to determine the proportion between two data groups.[10] The result showed that the p-value 0.863 ($p > 0.05$), meant that H_0 was accepted or the hypothesis was rejected. So, it can be stated that there is no relation

between lamp light exposure during sleep and sleep quality of medical student Universitas Airlangga batch 2012. It is also shown in Table 7, subjects who sleep with or without lamp light exposure, had a higher bad sleep quality (44.4% lamp off and 30.4% lamp on).

Lamp light exposure during sleep is one of the factors that affects sleep quality.[4] Circadian rhythm can be affected by light as a primary synchronizer that has been demonstrated in animal and human studies. Duration, intensity, and wavelength from the light stimulus of the human circadian system affects some phases in sleep, such as the reset phase and suppression of melatonin. The theory from the study above is not in accordance with the result of this study. It happened because of several factors that influence the result.

In this study, the questionnaire was given in the seventh semester while the medical students had to quickly establish their research and spent more time learning to face the final exam. Therefore, subjects tended to begin sleeping late at night and wake up early in the morning for the next day.[11] caused subjects to experience academic stress that made most of the subjects restless and difficult to begin sleep and decrease their sleep hours to finish their study or tasks first before going to sleep.

That difficulty was caused by the activation of the sympatho-adreno-medullary system and hypothalamic-pituitary-adrenal axis that continued to hypersecretion of adrenocorticotropic hormone and increase alertness as the result.[12] Besides academic stressors, there were other factors that affected the subject's sleep quality more than lamp light exposure, the factors were exercise and fatigue. Exercise and fatigue can shorten the slow-wave sleep stage. It can make the subjects initiate sleep faster. Fatigue from daily activities of medical students intra or extra-campus might lead to the unmatched result of these studies with previous theories. Because fatigue more affects the sleep quality than lamp light exposure itself. Moreover, subjects are active medical students of Universitas Airlangga who still did the academic tasks and are active in several campus or extra-campus organizations.

CONCLUSION

Based on the present study, lamp light exposure during sleep on the medical student is not significantly related to sleep quality (p=0.863). This might be caused by the academic stress related to examination, incoming schedule and task deadlines had a much stronger relation to the sleep quality than the lamp light exposure. The descriptive analysis also showed that most of the medical student batch 2012 Airlangga University had a bad quality of sleep. This result indicated that medical students have to be more concerned about their sleep to improve their sleep quality and maintain good performance as a medical student.

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ATTACHMENT

Table 1. Subjects distribution based on sex in 2015

Sex	Frequency	Percentage
Male	39	33.9 %
Female	76	66.1 %
Total	115	100 %

Table 2. Subjects distribution based on age in 2015

Age	Frequency	Percentage
19	5	4.3 %
20	29	25.2 %
21	74	64.3 %
22	7	6.1 %
Total	115	100%

Table 3. Subjects distribution based on staying status in 2015

Staying Status	Frequency	Percentage
Apartement	2	1.7 %
Dorm	1	0.9 %
Boarding house	50	43.5 %
Rented house	3	2.6 %
Parents house	59	51.3 %
Total	115	100 %

Table 4. Subjects distribution based lamp light exposure in 2015

Lamp Light Exposure	Frequency	Percentage
Lamp off	67	58.3 %
Lamp on	48	41.7 %
Total	115	100 %

Table 5. Distribution of subjects based on sleep quality in 2015

Sleep Quality	Frequency	Precentage
Good	29	25.2 %
Bad	86	74.8 %
Total	115	100 %

Table 6. Univariate analysis of subject's sleep quality in 2015

Variable	Mean	Median	SD	Min	Max	Skewness	SE of Skewness
Sleep Quality	6.68	6.75	2.472	0	13	0.155	0.226

Table 7. Univariate analysis of subject's sleep quality in 2015

Lamp Light Exposure	Sleep Quality				N	P
	Bad		Good			
	Freq	Percentage	Freq.	Percentage		
Lamp off	51	44.4%	16	13.9%	67	
Lamp on	35	30.4%	13	11.3%	48	0.863
Total	86	74.8%	29	25.2%	115	