

The Correlation of Sleep Patterns toward Student Academic Ability of the Pre-Clinic Students

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Background: Some studies suggest that one-third of adults experience poor sleep habits. Students are one of them, this is because students experience stress due to academic burdens changing sleep patterns and affecting student academic ability.

Objective: To determine the correlation between sleep patterns and academic abilities.

Methods: The research design used was cross-sectional using a self-administered Google form questionnaire given to students of the Faculty of Dental Medicine, Universitas Airlangga, from the third and fifth semesters through social media.

Results: This questionnaire was filled in by 100 respondents (49 respondents from the third-semester student and 51 respondents from the fifth-semester students). As many as 91 students had less sleep duration (<7 hours) before the exam, as many as 2 students had sleep duration more than 8 hours before the exam, and as many as 7 students slept for 7-8 hours before the exam.

Conclusion: The majority of third and fifth-semester students have less sleep duration, which is less than 8 hours. Getting enough sleep at night before the exam is positively related to the final grades of Pharmacology and Therapeutics II and physiology II courses for students.

Keywords: Sleep Patterns, academic abilities, students, final grades.

I. INTRODUCTION

Sleep patterns can affect cognitive abilities, moods, and changes in student behavior patterns. Lack of sleep duration has a big impact on cognitive functions such as decreased memory, decreased ability to solve problems, and lack of focus so that it can affect academic ability. Sleep with sufficient duration can improve cognitive function and academic ability [1,2]. As age increases, the effect of sleep duration on cognitive function can be greater [3].

Sleep is a natural phenomenon and is also a physiological need for every human being and is closely related to circadian rhythm [4,5]. Sufficient time for sleeping is proven to be an important factor in the process of development and overall human health. Sleeping 7-8 hours a day has the biggest positive impact on a person's healthy living habits [6,7].

Today, sleep deprivation among teenagers is widespread. Lack of sleep in the age group is caused by external and internal factors [8,9]. Preclinical students of Dental Medicine Faculty of Airlangga Universitas are examples of those

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included in this age group. In addition to the factors mentioned above, several factors support the lack of sleep of Dental Medicine students, namely the number of academic and non-academic activities, stress levels, etc [10]. Therefore, this study aims to determine and analyze the relationship between sleep patterns and academic abilities of Dental Medicine pre-clinic students at Universitas Airlangga.

II. METHOD

This study used a cross-sectional observational analytic design, with a sample of students in semester 3 and semester 5 of the Faculty of Dental Medicine, Universitas Airlangga. Questionnaires were distributed to pre-clinical students of the Faculty of Dental Medicine, Universitas Airlangga in the form of a Google Form. This research had passed the ethics committee test at the Faculty of Dental Medicine, Universitas Airlangga. This study used 2 variables: sleep pattern as the independent variable and academic ability as the dependent variable. This study used multiple linear regression tests to analyze the correlation between sleep patterns with academic ability. The location of this study was in the Faculty of Dental Medicine, Universitas Airlangga.

The questionnaire consisted of 4 parts: the first part was the demographics of the sample, the second part was about the sleep patterns of the sample during the even semester, the third part was about the sleep patterns of the sample before the test, and the fourth part was the state of the sample in the even semester. Student demographics include age, gender, and current semester (3 or 5), sleep patterns were measured from questions part 2 and 3, while academic performance was measured by the score of physiology II courses and pharmacology and therapy II subjects and GPA in the preceding even semester (2 or 4).

Physiology II and pharmacology and therapy II subjects were selected for the sample groups of the third and fifth semesters. These courses were chosen because they were considered difficult compared to other courses in semester 2 and 4. This questionnaire was not a validated instrument, but we adopted from a journal that discussed the same topic. The pattern of "sleep the night before the test" was measured by (1) sleep time; (2) number of hours of sleep at night; (3) time to wake up earlier than a normal night; and (4) late sleeping than the ordinary nights.

III. RESULTS

Taken several 100 respondents from the third and fifth-semester students who filled out the questionnaire that had been given, consisting of 49 respondents from the third-semester students, and 51 respondents from the fifth-semester students. The demographic description of students can be found in the first part of the questionnaire questions. The number of respondents by sex consisted of 21 men and 79 women. The percentage of respondents based on age were aged less than equal to 19 years old (56%), aged over 19 years old (44%), respondents aged 21 years old (10%), and 13% of respondents answered other age categories.

Questionnaire part 2 contained variable sleep patterns of Airlangga Universitas, Faculty of Dental Medicine students during the even semester of the 2018/2019 academic year. The first question was about the history drug consuming for the problem of sleep disorders, obtained data as many as 96 students did not have a history of taking drugs while 4 students had taken the drug because of sleep problems he suffered. The second question was about the time when they go to sleep during lectures in the even semester and 35 respondents went to sleep before 11:00 PM, and as many as 65 respondents went to sleep after 11:00 PM. The third question was about the time when they woke up during the lectures in the even semester, as many as 83 students woke up between 04:00 to 07:00 AM, and 17 respondents woke up before 04:00 or after 07:00 AM. The fourth question was regarding sleep duration of respondents during the lectures in the even semester, 21 respondents had sleep duration between 7-8 hours, and 79 respondents had sleep duration of fewer than 7 hours or more than 8 hours. The fifth question asked the correspondent on how many times they took a nap in a week during the lectures in the even

semester, as many of 91 respondents took a nap less than 4 times a week and 9 respondents took a nap more than 4 times a week.

Table 1. Respondent data

Individual characteristic			
Category		Frequency (n)	Percentage (%)
Semester	Semester 3	49	49
	Semester 4	51	51
Age	≤19	56	56
	≥19	44	44
Gender	Male	21	21
	Female	79	79
Characteristic of Sleep Pattern			
Category		Frequency (n)	Percentage (%)
Consuming Sleeping Pills	Ever	4	4
	Never	96	96
Sleeping time During Even Semester	≤11.00 PM	35	35
	≥11.00 PM	65	65
The starting time of the activities during even semester	03.00-07.00AM	83	83
	<03.00 AM or >07.00AM	17	17
Sleep duration during even semester	7-8 Hours	21	21
	<7 Hours or > 8 Hours	79	79
The numbers of nap taken in a week during even semester	<4 Times	91	91
	≥ 4 Times	9	9
Sleeping late before the exam	Yes	73	73
	No	27	27
Wake early before the exam	Yes	64	64
	No	36	36
The sleeping time before the exam	≤11.00 PM	20	20
	≥11.00 PM	80	80
Sleep duration before the exam	7-8 Hours	7	7
	<7 Hours or > 8 Hours	93	93
Fatigue after sleeping (when wake up) 2 times in a week	≤2 Times per weeks	64	64
	≥2 Times per weeks	36	36
Drowsiness in the afternoon	≤2 Times per weeks	32	32
	≥2 Times per weeks	68	68
Drowsiness during individual study	≤2 Times per weeks	60	60
	≥2 Times per weeks	40	40

Drowsiness during lectures	≤2 Times per weeks	62	62
	≥2 Times per weeks	38	38
Characteristic of the academic ability			
Category		Frequency (n)	Percentage (%)
GPA (IPK)	≤3.0	2	2
	≥3.0	98	98
Final Score	≤69.5	21	21
	≥69.5	79	79
Remedy	Ever	22	22
	Never	78	78

The questionnaire part 2 contained variable sleep patterns before the test. The first question asked respondents whether they slept late before the test, 73 respondents slept late before the test, and 27 respondents did not sleep late before the test. The second question asked the respondent whether they got up earlier before the test, as many as 64 respondents got up earlier before the test, and as many as 36 respondents did not get up earlier before the test. The third question was about time to go to sleep on the day before the exam, as many as 20 respondents went to bed before 11:00 PM and as many as 80 respondents went to bed after 11:00 PM. The fourth question was about the sleep duration of respondents before the test, as many as 93 respondents had sleep duration of fewer than 7 hours or more than 8 hours, and 7 respondents had sleep duration of 7-8 hours.

Part 4 of the questionnaire contained variables regarding academic ability. The first question asked on how many times the respondent felt tired when they woke up, as many as 64 respondents did not feel tired or only once / twice felt tired when they woke up and 36 respondents felt tired when they woke up more than 2 times a week. The second question asked respondents on how many times they felt drowsiness in a week during lectures in the even semester, 32 respondents did not feel sleepy or once / twice felt sleepy and 68 respondents felt sleepy more than 2 times a week. The third question asked how many times the respondent felt excessive sleepiness while studying independently in a week, 60 respondents never felt excessive sleepiness when studying independently or only once / twice a week, and 40 respondents felt sleepy more than 2 times a week. The fourth question asked on how many times the respondent felt excessive drowsiness when attending lectures in a week, 62 respondents said they never felt sleepy or only once / twice felt sleepy during class in a week, 38 respondents felt sleepy when class more than 2 times a week. The fifth question asked the respondent's final GPA, 2 respondents had a GPA of less than 3, and 98 respondents had a GPA of more than 3. The sixth question asked the final score obtained by the respondent from the Physiology II subject or Pharmacology and Therapy II, 21 respondents had scored less than equal to 69,4 and 79 respondents had scores exceeding 69,4. Table 1 explained that taking drugs, hours of sleep during the even semester, hours of sleep before the exam affected the academic ability which consists of GPA, final exam scores of selected subjects (Physiology II and Pharmacology and therapy II). P-values obtained from taking drugs, hours of sleep during the even semester, and hours of sleep before the exam were: 0.008, 0.020, and 0.006.

IV. DISCUSSION

Sleep has an important and specific role in strengthening memory. Although the exact mechanism behind the correlation between sleep, memory, and neuroplasticity is unknown, in general, specific synaptic connections that are active during activities are strengthened during sleep so that memory capacity is increased. Thus, sleep plays an important role in

strengthening memory because it allows us to remember what we have learned, which is very important for the success of academic performance [11,12].

This study found a correlation between sleeping pills consumption with student academic abilities. The more students never took sleeping pills, the better their academic performance would be. The use of drugs with sedative and anticholinergic effects would cause excessive sedation and drowsiness during the day. This effect could cause poor sleep quality [13,14]. The previous study explained that there was a positive significant correlation between the averages sleep quality and total scores of the students [11,15].

In a previous study of sleep patterns and daytime functions of 3,000 children, students with lower grades reported more late sleep on school days and increased sleep during the weekend [16]. Research conducted by Bahammam in Saudi Arabia showed that staying up late at work on weekdays and weekends was associated with lower academic performance [17]. This study showed that there was a correlation between bedtime and student academic ability, but the strength of the correlation was weak ($B = 0.473$).

The sleep duration of the students of the Faculty of Dental Medicine, Universitas Airlangga during the even semester did not affect their academic abilities because there was no correlation between the two with a p-value of 0.072. The results of the study found that as many as 21% of students slept with a duration of 7-8 hours and as much as 79% slept with a duration of under 7 hours or above 8 hours. Based on previous studies, the average medical student did not get a good duration of sleep (7-9 hours) because of the academic activities they had to go through. However, this does not affect the academic achievement they get [17].

9% of the students took naps more than 4 times a week and 91% took naps less than 4 times a week. There was no significant correlation between the numbers of naps in the even semester with the academic ability of students with a p-value of 0.876.

Sleep deprivation could affect certain parts of the brain, especially the frontal lobes. The function of the frontal lobe control is to make decisions, form memories, plan things, and inhibit socially undesirable behavior. Therefore, it can be concluded that students who had difficulty falling asleep tend to produce worse grades on campus than those who slept well [16].

The results of the study showed that the majority of students started their activities quite early. 83% of respondents woke up between four and seven in the morning. In general, University students especially health students had a strict schedule that requires them to get up early, this is probably because most of them had classes at 7 am [16].

As many as 80% of respondents slept above 11:00 PM before the exam but produced a good score with a strong correlation obtained from P-value = 0.006, this indicated that most students needed additional time to study at night before the exam, whereas the exam started the day after in the morning. This learning method was also called cramming, which was learning that allowed students to remember things for the exam the next day.

Students used this learning strategy because there were several reasons such as: because of the hectic schedule, other works, or other aspects of campus life. Cramming could also be adopted if students believed that studying with time closer to the test would produce a good score with a minimum total time spent [18].

The results of the study show that good sleep duration, ideally between 7-8 hours before the exam began, did not affect the academic ability of the student of Dental Medicine of Universitas Airlangga with a P-value = 0.952, this was because most students spent their time to do additional learning (cramming) at night before the exam so that students had poor sleep duration (<7 hours). Learning strategies with the cramming method could produce a good exam score, but this learning strategy could not be used to produce long-term memory [18]. Adequate sleep could strengthen memory, while lack of sleep duration could give an effect on the cognitive and psychomotor abilities of the student [10,17].

Slept late and woke up earlier before the test conducted by most of the Dental Medicine students of Universitas Airlangga did not have a correlation with students' academic abilities. These actions resulted in less sleep duration, less sleep duration, which greatly affected students and they might not be aware of that. This resulted in slow body reactions, impaired immune function, increased risk of infection, and could even damage the memory function, and learning [19].

Based on the survey it was found that most students woke up or started their activities during the even semester between 04: 00-07: 00 AM, but there was no correlation between the time of the Dental Medicine students of Universitas Airlangga to start activities on academic ability with a P-value = 0.375. A study said that extending sleep duration was very important for students, especially teenagers, this is due to achieving the recommended sleep duration of about 9 hours during lecture days or school [20].

Feeling fatigued after waking up from sleep was rarely felt the dental Medicine students of Universitas Airlangga, but the seldom phenomenon of feeling tired when waking up to students was not correlated to academic ability with the acquisition of P-value = 0.808. This happened because most the Dental Medicine students of Universitas Airlangga, did a sufficient study before the exams so that the exhausting feeling in exams during the lectures day did not affect the academic ability of the students. However, there was another opinion about this phenomenon that fatigue when waking up was caused by irregular sleep habits because academic demands and hectic schedules had a big impact on sleep patterns [17]. Other factors that can change sleep habits included coffee and tea consumption, too often use the internet and other social media, and the use of sleeping pills. Also, various medical problems greatly disrupted sleep, including obstructive apnea, depression, chronic sleep deprivation, narcolepsy, cataplexy, and idiopathic hypersomnia [21].

Drowsiness means the brain is lacking oxygen. Oxygen was needed by brain cells to carry out daily routine activities. If the oxygen circulating in the blood did not meet the metabolic needs, the brain will lack oxygen[22]. Because if someone had a poor sleep pattern and will affect the intake of O₂ in the brain and will affect one's concentration so that it affects the student's learning process which was generally caused by the feeling of drowsiness and fatigue [23].

This study obtained the results that students with drowsiness during the day, drowsiness while studying, and drowsiness during lectures had nothing to do with students' academic abilities. These results were also the same as a study conducted by Genzel et al (2013) in which sleep patterns did not have a significant relationship with the exam scores [24].

However, according to Prasadja (2009), poor sleep patterns could affect one's mental abilities, but the ability to memorize at a young adult age may still be optimal. At a young age, the circadian rhythm of the body will fluctuate, and the body will adjust the hours of sleep to their daily activities, the changing sleep patterns were caused by busyness and work demands. Changing hours of sleep in young adults were not affect mentally and the ability to concentrate. Unlike in children, sleep would affect the development and ability of the children's brains. Because during sleep, the growth and the development of the organs of the body of children will develop rapidly [24]. Everyone had a different circadian clock, for those who entered aged 20, they will scarcely sleep at 10 pm due to its special circadian clock. For the teenagers and young adults at 10 pm, their brains were in a state of fresh and full of creativity. This was the right time for them to work and study because young adults would get drowsy after midnight. So it was quite normal if the young adults slept after midnight [24]. Sleep quality and quantity of sleep in young adults were not the main factors influencing student achievement. According to Sarwono (2004), learning achievement was also influenced by several factors, namely the quality of learning experiences (curriculum, ways of delivering lessons and relationships with teachers), tolerance to stress, and social skills [24].

Future research can improve generalizations and provide a further understanding of the sleep patterns of Dental Medicine students. For example, similar studies can be done at other universities in various regions. An experimental study investigating the effects of sleep on academic performance would be ideal (for example, including the use of poly-

sonography to provide a more objective measure of sleep quality), but such studies cannot easily be done. Observational studies with strict methods can also be considered. For example, to get rid of bias memories on respondents, students' hours of sleep can be recorded using a diary, and student scores can be obtained by permission of student records.

V. CONCLUSION

There was a correlation between sleep patterns and academic abilities of the students of the Faculty of Dental Medicine of Universitas Airlangga.

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