

Correlation between Sleep Deprivation and Students Academic Performance in Faculty of Medicine Udayana University Measured by Grade Point Average (GPA)

Nadya Imada¹, Kumara Tini², I Gusti Ngurah Ketut Budiarsa²

¹Faculty of Medicine of Udayana University, Denpasar, Indonesia

²Neurology Department of Sanglah General Hospital, Denpasar, Indonesia

Abstract: Sleep becomes one of the human biological needs. Healthy sleep is indicated with good quality and sufficient duration. Sleep deprivation occurs when someone had either bad sleep quality or insufficient sleep duration. Medical students are one of the population group which had a high risk to suffer from sleep deprivation. People with sleep deprivation have decreased focus level and awareness so the brain is troubled to receive information. Previous studies shown that sleep deprivation correlates with low-grade point average (GPA). This study aims to determine the relationship between sleep deprivation and academic performance among Medical Faculty students at Udayana University measured with a grade point average (GPA). This study was an observational analytic study using a cross-sectional method and involved 70 respondents. Based on the results of the study, there is no significant relationship between sleep quality and GPA ($p = 0.406$) and there is no significant relationship between sleep duration and GPA ($p = 0.253$). It can be concluded that there is no correlation between sleep deprivation and college students' academic performance in the Faculty of Medicine, Udayana University.

Keywords: sleep, sleep quality, sleep duration, GPA.

I. INTRODUCTION

Sleep is a change of consciousness state or a partial unconsciousness where individual can be awoken.^[1] Because sleep is one of human biological needs, so sleep is essential.^[2] Sleep plays important role in memory consolidation because hippocampus structure is affected by sleep quality.^{[3], [4]} Normal and healthy sleep are indicated with sufficient duration, good quality, regular, and no sleep disorder.^[5] Normal sleep for adults 18-60 years old needs 7 hours or more per night^[6]. Many factors can affect sleep, for example living environment, certain drugs effect, caffeine, alcohol, pain, several medic condition, and gadget use before sleep^{[7], [8]}.

Sleep deprivation occurs when someone has a bad sleep quality and or decreased sleep duration.^{[9], [10]} Medical students are at risk to have sleep deprivation is medical students because of high academic demand^[11]. Effect of sleep deprivation, specifically for students, are lower grade point average (GPA), academic failure, disturbed studying activity, mental disorder, and increment of traffic accident rate. Sleep deprivation causes general response deceleration specifically for awareness. On the higher cognitive capacity, sleep deprivation affects memory, perception, and executive function.^{[10], [12]}

Several studies shown that sleep deprivation negatively affect academic performance of medical students. Study by Maheshwari shows that sleep deprivation is associated with lower GPA. Study conducted by Nifilda and Najmir shown that students with bad sleep quality has lower academic achievement.^{[13], [14]} Contrast to the two previous study, study conducted by Nihayah shows that there is no correlation between sleep hours and GPA.^[15]

This research aims to search for correlation between sleep quality and duration on academic performance measured by grade point average (GPA) among medical students at Udayana University.

II. MATERIAL AND METHODS

This is analytical observational study using the cross-sectional method. This research conducted in September 2019 in the Faculty of Medicine Udayana University. Samples were taken from medical students of Udayana University batch 2016 with a consecutive sampling method.

The inclusion criteria of the sample is an active medical student of Udayana University who agree to fill in the given questionnaire. The exclusion criteria of the sample are the samples with incomplete questionnaire answer and sample with a chronic disease which affects sleep.

Data taken was a primary data. Sleep quality and duration as an independent variable was measured using the Pittsburgh Sleep Quality Index (PSQI). Academic performance as the dependent variable was measured by grade point average (GPA). Collected data was computed with SPSS ver. 21 and analyzed using the chi-square method.

III. RESULTS AND DISCUSSION

A. Results

Table 1. Respondents Characteristics

Respondent Characteristics		Patient Number (%)
Sex	Male	23 (32.9%)
	Female	47 (67.1)
Age	19	2 (2.9%)
	20	11 (15.7%)
	21	53 (75.7%)
	22	4 (5.7%)

Samples that fulfilled inclusion and exclusion criteria were 70 students with the characteristics as listed in Table 1. Based on the age group, most of the respondent (75.7%) were 21 years old. Based on the sex group, most of the respondents (67.1%) were female.

Table 2. Respondents Sleep Quality Distribution

Sleep Quality	Patient Number (%)	Mean ± SD
Good (PSQI <5)	40 (57.1%)	5.4 ± 2.487
Bad (PSQI >5)	30 (42.9%)	

Sleep quality of respondents was measured by the PSQI questionnaire with a global score of 0-5 for good sleep quality and >5 for poor sleep quality. As stated on Table 2, 57.1% of respondents had good sleep quality while the remaining 42.9% had poor sleep quality.

Table 3. Respondents Sleep Duration Distribution

Sleep Quality	Patient Number (%)	Mean ± SD
Insufficient (<7 hours per night)	38 (54.3%)	6.436 ± 1.0458
Sufficient (> 7 hours per night)	32 (45.7%)	

Inadequate or sufficient duration of sleep respondents was categorized based on sleep duration recommended by the CDC according to the age group of 18-60 years, which is 7 hours a night or more.^[6] All respondents included in the age group

of 18-60 years. Based on Table 3, 54.3% of respondents sleep less than 7 hours per night while the other 45.7% sleep 7 hours or more per night.

Table 4. Respondents Sleep Deprivation Distribution

Sleep Deprivation	Patient Number (%)
Yes	47 (67.1%)
No	23 (32.9%)

Sleep deprivation is defined as poor sleep quality and/or insufficient sleep duration. Based on Table 4, from 70 respondents, as many as 67.1% of respondents experienced sleep deprivation while the other 32.9% did not experience sleep deprivation.

Table 5. Respondents Grade Point Average (GPA) Score Distribution

GPA Score	Patient Number (%)	Mean ± SD
<3.50	32 (45.7%)	3.4924 ± 0.17418
≥3.50	38 (54.3%)	

According to Table 5, 45.7% of the respondents have GPA less than 3.50 and the other 54.3% of the respondents have GPA score 3.50 or more.

After a bivariate analysis using the chi-square method between sleep quality and GPA variables, the p value obtained is 0.406 (p = 0.05). The value indicates that there is no significant relationship between sleep quality and GPA. On chi-square test between sleep duration and GPA score, the p value obtained is 0.253 (p = 0.05). The value indicates that there is no significant relationship between sleep duration and GPA.

B. Discussion

In this study, 57.1% of Udayana University medical students had good sleep quality. Even so, from the calculation of the average global PSQI score, the average global PSQI score was obtained by 5.4. With the average global score 5.4, it can be concluded that most of Udayana University medical students has poor sleep quality. Based on the chi-square test, found no relationship between sleep quality and GPA. This is not suitable with Nifilda and Nadjmir's research which states that medical students with poor sleep quality have lower GPA score.^[11]

In this study, it was found 54.3% of Udayana University medical students had less sleep duration. The average sleep duration is 6.436 hours. Based on the recommended sleep duration by CDC, a sufficient sleep duration for adults is 7 hours per night or more. It can be concluded that most of Udayana university medical students have insufficient sleep duration. Based on the chi-square test, there no significant relationship found between sleep quality and GPA. This is inconsistent with research conducted by Maheshwari that medical students with sleep deprivation has lower GPA. However, this result is consistent with research conducted by Nihayah that sleep duration does not significantly correlate with GPA.^{[10], [12]}

No significant correlation between GPA and sleep deprivation was affected by many confounding factors including intelligence, motivation, and curriculum system applied in Medical School of Udayana University. Curriculum system affects passing grade. Medical school of Udayana University set the minimum standard GPA of 3.00^[16]. Another confounding factor that played a role is studying motivation. Recent study by Afritasari shows that students' motivation has a positive correlation with GPA. The higher the motivation, the higher GPA score.^[17] Intelligence also affect GPA. Research conducted by Khosuma involved medical students of Sam Ratulangi Medical School shows that intelligence has positive correlation with GPA. The higher intelligence, the higher GPA score^[18]. Students' learning style affects GPA score. Learning styles are formed from habits and change over a long time and also affect students' ability to remember and comprehend information comprehensively. Research conducted by Rahmawati at the Faculty of Medicine, University of Lampung showed that there was a significant relationship between learning styles and GPA (p = 0.007).^{[19], [20]}

The limitation of this study is the use of the cross-sectional method is author cannot apply controls on confounding variables. In addition, the sampling method in this study was not carried out randomly.

IV. CONCLUSION

Based on the results of the study, there was no significant relationship between sleep deprivations with student academic performance as measured by a cumulative achievement index (GPA). Further research is needed in the form of case-control research to determine the effect of sleep quality and duration on GPA. If further research is to be carried out, sample randomization and sample amount increment are needed.

REFERENCES

- [1] Tortora G, Derrickson B. Principles of anatomy & physiology. 14th ed. Wiley; 2014, p. 590.
- [2] Buysse D. Sleep Health: Can We Define It? Does It Matter?. SLEEP. 2014.
- [3] Brown L. Can sleep deprivation studies explain why human adults sleep?. Current Opinion in Pulmonary Medicine. 2012;18(6):541-545.
- [4] Prince T, Abel T. The impact of sleep loss on hippocampal function. Learning & Memory. 2013;20(10):558-569.
- [5] Medic G, Wille M, Hemels M. Short- and long-term health consequences of sleep disruption. Nature and Science of Sleep. 2017 9:151-161.
- [6] CDC - How Much Sleep Do I Need? - Sleep and Sleep Disorders [Internet]. Cdc.gov. 2020 [cited 21 January 2020]. Available from: https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html
- [7] The Characteristics of Sleep | Healthy Sleep [Internet]. Healthysleep.med.harvard.edu. 2016 [cited 21 January 2020]. Available from: <http://healthysleep.med.harvard.edu/healthy/science/what/characteristics>
- [8] Hershner S, Chervin R. Causes and consequences of sleepiness among college students. Nature and Science of Sleep. 2014;:73.
- [9] Sleep Deprivation and Deficiency | National Heart, Lung, and Blood Institute (NHLBI) [Internet]. Nhlbi.nih.gov. 2017 [cited 21 January 2020]. Available from: <https://www.nhlbi.nih.gov/health/health-topics/topics/sdd>
- [10] Krishnan V, Auckley D. Sleep Deprivation: Pathophysiology. Sleep & Safety. 2012:13-24.
- [11] Chinawa J, Chukwu B, Obu H. Sleep practices among medical students in Pediatrics Department of University of Nigeria Teaching Hospital, Ituku/Ozalla, Enugu, Nigeria. Nigerian Journal of Clinical Practice. 2014;17(2):232.
- [12] Killgore W. Effects of sleep deprivation on cognition', *Prog Brain Res.* 2010:185, pp. 105–129.
- [13] Maheshwari G, Shaukat F. Impact of Poor Sleep Quality on the Academic Performance of Medical Students. Cureus. 2019; 11(4):e4357. doi: 10.7759/cureus.4357.
- [14] Nifilda H, Nadjmir H. Hubungan Kualitas Tidur dengan Prestasi Akademik Mahasiswa Program Studi Pendidikan Dokter Angkatan 2010 FK Universitas Andalas. Jurnal Kesehatan Andalas. 2010;5(1):243-249
- [15] Nihayah, M. & Ishak, Ismarul & Lubis, Syarif & Zakiah, M. & Omar, Baharudin & Fadzil, M.H.. Sleeping Hours and Academic Achievements: A Study among Biomedical Science Students. Procedia - Social and Behavioral Sciences. 2011; 18. 617-621. 10.1016/j.sbspro.2011.05.090.
- [16] Udayana University. 'Pedoman Akademik PSPD FK Unud tahun 2017'. *FK Unud.* 2017. p. 15-16.
- [17] Afritasari, S. PENGARUH KOMPETENSI DOSEN DAN MOTIVASI BELAJAR TERHADAP PRESTASI BELAJAR MAHASISWA. Surakarta: Universitas Sebelas Maret. 2013.
- [18] Khosuma A., Wariki WMV, Manoppo FP. Hubungan Nilai *Intelligence Quotient* dengan Indeks Prestasi Kumulatif Semester Satu sampai Enam Mahasiswa Angkatan 2015 Fakultas Kedokteran Universitas Sam Ratulangi. *E-Journal Unsrat*, 2018: 1(2).
- [19] Hardiansyah, H. Pengaruh Gaya Belajar Terhadap Prestasi Akademik Mahasiswa Fakultas Kedokteran. Universitas Diponegoro. 2014
- [20] Rahmawati E, Saputra, O, Saftarina F. Hubungan Gaya Belajar terhadap Indeks Prestasi Kumulatif (IPK) Mahasiswa Fakultas Kedokteran Universitas Lampung. *Jurnal Kedokteran Universitas Lampung*, 2018: 18(1).