

Association Between Physical Activity and Sleep Quality in Students of Tarumanagara Medical University

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ABSTRACT

The Sleep is a physiological process so that living things can perform optimally in their daily activities. The high prevalence of lack of physical activity in the era of the COVID-19 pandemic also coincided with the high prevalence of poor sleep quality. This study aims to determine the relationship between physical activity and sleep quality of medical students of Tarumanagara Medical School. The design of this study is to observe and use analyze the cross-section. The subjects of the study were 96 students from the 2019-2020 class of Tarumanagara University School of Medicine, 17-24 years old, using a cluster random sampling method. This study used the GPAQ (Global Physical Activity Questionnaire) questionnaire to assess physical activity and the PSQI (Pittsburgh Sleep Quality Index) questionnaire to assess sleep quality. Data analysis used Pearson Chi-Square test with 95% confidence level. The results showed 37 respondents (38.5%) were quite active and 59 (61.5%) were less active. In terms of sleep quality, 39 respondents (40.6%) had good sleep quality and 57 respondents (59.4%) had poor sleep quality. The results of Chi-Square analysis showed a significant relationship between physical activity and sleep quality ($p=0.003$) and respondents with less physical activity had a 1756 times higher risk of experiencing poor sleep quality than respondents with sufficient physical activity. This study concludes a significant relationship between physical activity and sleep quality in students of the Faculty of Medicine, Tarumanagara University class 2019-2020.

Keywords: *Physical activity, Sleep quality.*

1. INTRODUCTION

Sleep is an essential physiological system that performs an essential function in human physical functions, sleep is the important thing to being capable of flow optimally in day by day sports due to the fact a third of human life is spent sleeping or trying to sleep. [1] Sleep has an important impact on cognitive feature, productivity and academic performance, specifically for university college students within the device of concentration, learning and memory. [2] A man or woman with sleep problems is not unusual place and function an effect on sleep horrible great and quantity, and this case can increase the morbidity of a person with immoderate sleep issues. Poor sleep great leads to horrible declarative and procedural learning, similarly to decreased neurocognitive and academic performance. Sleep disorders in a person are

categorized into 4 parts, namely people who will no longer sleep, people who can't sleep, people who those with immoderate daylight hours sleepiness or sleep more during the day than at night and people who accelerated motion at some stage in sleep [3] Medical students in Iran found about 85 % had poor sleep quality with a GPA <2.99. These research confirmed that the prevalence of poor sleep quality, daytime sleepiness and insomnia turned into very excessive [4]

Based on the 2018 Riskesdas, Jakarta is in the highest rank for the prevalence of less physical activity at 47.8%. Sedentary behaviour plays a role for non-communicable diseases. A person who performs physical activity by carrying out body movements due to skeletal muscle contraction and producing energy expenditure.[5] Based on WHO, the precept reason of globalwide lack of

existence in 2019 became NCD, the Global Health Risk take a glance at in 2004, determined loss of bodily pastime to be the fourth major factor the pleasant danger of NCD.[6] This study aims to describe the prevalence of physical activity and sleep quality in students aged 17-25 years using the Global Physical Activity Questionnaire (GPAQ) and the Pittsburgh Sleep Quality Index (PSQI) and evaluate the association of physical activity and sleep quality on students of FK UNTAR class of 2019-2020.

2. METHOD

This descriptive cross-sectional have a look at become performed in December 2020 – February 2021. The study targeted university students aged 17–22 years, who were registered medical students of Tarumanagara University for the 2019/2020 academic year. The sample size for this study as 96 students using the sample size and The sampling layout used is cluster random sampling. Data series from all respondents in studies sports and replied all questionnaires submitted with the aid of using G Form. his have a look at makes use of the Pittsburgh Sleep Quality Index (PSQI) become used to decide sleep first-rate during the last month. Its reliability to evaluate sleep first-rate has been set up over the years.[13] . PSQI has the subsequent categories: A score of less than 5: It indicates good sleep quality. A score of 5 or more than 5 indicates poor sleep quality.

The Global Physical Activity Questionnaire (GPAQ) is used to assess the level of physical activity of medical students and 16 questions about physical activity on the GPAQ which were divided into 3 domains: working activities (high intensity: P1-P3, moderate intensity: P4-P6), activities of walk (P7-P9), leisure time activities (high intensity: P10-P12, moderate intensity: P13-P15) and sitting (P16). This questionnaire become used to evaluate the bodily sports done primarily based totally on the full aggregate of metabolic equivalent (MET) mins inside 1 week.

Assessment of a person's physical activity is calculated by the number of minutes each person's activity is multiplied by the number of days of physical activity. Light activities have been assigned an average of 1.5 METS, moderate activities four METS and full of life activities were assigned eight METS. The MET was calculated and summed over all categories. Total physical activity was classified into low (<600 METSMin/Week) and normal (≥ 600 METSMin/Week). [14]. The data in this study two models are used for analysis, namely univariate and bivariate analysis. Univariate analysis is directed to describe the frequency distribution of variable, percentage values (%), mean, standard deviation (SD), median, minimum and maximum distribution of the variables analyzed using descriptive statistical methods. The chi-square test was used for bivariate analysis with a significance of $p < 0.05$

to to find out the extent of the relationship between physical activity and sleep quality.

3. RESULTS

Table 1 shows the distribution of the characteristics of the study population. The age of the respondents ranged from 17 to 22 years, with a mean of 18.9 (SD = 0.925) and a median of 19 years. About 27.1% of the students were male, while 72.9% were female. The distribution of the academic year 2019 was 50 % respondents and the 2020 was 50 % respondents. Based on the intensity of physical activities, 61.5% performed low activities and 38,5% normal activities. The table shows that according to sleep quality by PSQI, two-thirds of study participants (59.4%; $n = 57$) were poor sleepers, compared with 40.6% ($n = 39$) of the sample who reported having good sleep quality

Based on Table 2 Distribution of Sleep Quality Components, subjective sleep quality assessment through PSQI, the results were 10.4% of students had a very good quality of sleep and 64.6% of students had quite a good quality of sleep. Poor sleep quality in students was found to be 22.9% and 2.1% students had very poor sleep quality. In terms of sleep latency, 24% of students reported having no difficulty falling asleep in the first 30 minutes but 76% of students reported having difficulty falling asleep in the first 30 minutes after lying down with varying frequency and intensity over the past month. Based on the quantity of sleep, 23 students reported sleeping duration of 7-9 hours. In terms of sleep efficiency, it was reported that $n = 82$ (85.4%) students had sleep efficiency above the standard ($>85\%$). Based on sleep disorders, it was reported that 77.1% of students had at least 1 sleep disorder. It was reported that sleeping pills were consumed by 3 students, namely: 2 students took sleeping pills <1 time per week and 1 student took sleeping pills 1-2 times per week. It was reported that the number of students suffering from daytime dysfunction due to poor sleep quality was 22 (22.9%) students with moderately severe levels and 7 (7.3%) students with very severe levels.

Table 1. Characteristics of the participants

Characteristics	N (%)	Mean;SD	Median(Min;Max)
Gender			
Male	26 (27.1)		
Female	70 (72.9)		
Age		18.8; 0.925	19 (17; 22)
Class of 2019	48(50)		
Class of 2020	48(50)		
Physical activity			
Low	59 (61.5)		
Normal	37(38.5)		
Sleep quality			
Poor	57 (59.4)		
Good	39 (40.6)		

In table 3 it can be seen the bivariate analysis between the level of PA and the level of sleep quality. It was reported that 42 (71.2%) students had poor sleep quality with low physical activity (< 600 MET) and 17 (28.8%) students had good sleep quality with low physical activity (< 600 MET). It was reported that 15 students (40.5%) had poor sleep quality with good physical activity level (MET \geq 600) and 22 students (59.5%) had good sleep quality with good physical activity level (MET \geq 600). The statistical test found that the P value is $0.003 < 0.05$, and there is a significant relationship between physical activity and sleep quality. Value of prevalence risk = 1,756 indicates that the risk of poor sleep quality for respondents who are less physically active is 1,756 times that of respondents who are physically active.

Table 2. Distribution of Sleep Quality Components through PSQI

Characteristics	N (%)
Subjective sleep quality	
Very good quality	10 (10.4)
Good quality	62 (64.6)
Poor Quality	22 (22.9)
Very poor quality	2 (2.1)
Sleep latency	
0	23 (24)
1-2	37 (38.5)
3-4	27 (28.1)
5-6	9 (9.4)
Sleep duration	
>7 hours	23 (24)
6-7 hours	44 (45.8)
5-6 hours	21 (21.9)
<5 hours	8 (8.3)
Sleep efficiency	
>85%	82 (85.4)
75-84%	10 (10.4)
65-74%	4 (4.2)
<65%	0 (0)
Sleep disturbances	
0	9 (9.4)
1-9	74 (77.1)
10-18	12 (12.5)
19-27	1 (1)
Use Of Sleeping Medication	
No take in a month	93 (96.9)
<1 time per weeks	2 (2.1)
1-2 time per weks	1 (1)
>3 time perweeks	0 (0)
Day Time Disfunction	
Low	13 (13.5)
Moderate	54 (56.3)
High	22 (22.9)
Severe	7 (7.3)

Table 3. The association between the physical activity and sleep quality

Parameter	Sleep Quality		Total	P-Value	PR
	Good	Poor			
≥600 METs	17 (28.8%)	42 (71.2%)	59		
<600 METs	22 (59.5%)	15 (40.5%)	37	0.003	1.756
Total	39 (40.6%)	57(59.4%)	96		

4. DISCUSSION

The results of the study reported that there was a relationship between the level of sleep activity, and the quality of sleep, the high prevalence of poor sleep quality could be due to the high prevalence of lack of physical activity. A meta-analysis study with a total of 54,231 respondents from 13 countries reported that the average prevalence of poor sleep quality was 35.6% with a range of 29.4-42.4%. The prevalence of poor sleep quality in this study was 1.6 times the global prevalence of sleep quality [8]. The prevalence of lack of physical activity in this study (61.5%) was more than higher than similar studies by Nina et al. (42.9%), Baso (50.9%), and Iqbal (36.3%) which used research respondents before the pandemic. [9-11] The high prevalence of poor sleep quality in this study was caused by various factors: caffeine consumption, academic stress, use of digital media before bedtime, daytime napping, and organic insomnia. The sampling time of this study was carried out during the global COVID-19 pandemic lockdown. Governments from various countries have closed various educational institutions with the aim of limiting the degree of infection from the virus. Various activities in public places, including lectures, were temporarily suspended and replaced with online distance learning. The sampling of this research was carried out in early February 2021 to mid-March 2021, where the COVID-19 pandemic was ongoing for almost a year and students who were initially quite active became relatively less active. From those who initially needed to come to campus to study and be able to carry out various recreational activities to study at home. In terms of sleep quality, during the COVID-19 pandemic, it has had a major impact on changes in sleep quality. Cellini et al's study reported changes in sleep quality parameters during the COVID-19 lockdown in Italy, increase in the prevalence of poor sleep quality (from 40.5% to 52.4%). [12]

Limitations of this study include confounding bias because multivariate test analysis was not carried out and other factors that could influence the relationship. In addition, there is also an information bias because the data collection of this research is using a questionnaire that is filled in online via Google Form. The difficulty

that arises is that respondents may not understand the questionnaire

5. CONCLUSION

There is a significant relationship between physical activity and sleep quality (p-value = 0.003) in students of the Faculty of Medicine, Tarumanagara University class 2019-2020. Future research is expected to use objective measurements of physical activity such as pedometers or accelerometers because research has never been conducted in Indonesia with objective measurement tools for physical activity such as actigraphy or on sleep quality such as polysomnography. It is recommended to explore other confounding factors that can affect sleep quality, and to use objective data collection methods to describe more concrete results.

AUTHORS' CONTRIBUTIONS

David Christian created the proposal, collected data about physical activity, characteristic responden and sleep quality and Susy Olivia Lontoh analyzed data and created the article

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REFERENCES

[1] L. Sherwood. Human Physiology: From Cells to Systems. 9th edition. Boston, MA, USA: Cengage Learning; 2016.

[2] S.L.Worley. The Extraordinary Importance of Sleep: The Detrimental Effects of Inadequate Sleep on Health and Public Safety Drive an Explosion of Sleep Research. P T Peer-Rev J Formul Manag. 2018 Dec;43(12):758–63 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6281147/>

[3] G. Curcio ,M. Ferrara M, L. Degennaro . Sleep loss, learning capacity and academic performance. Sleep

- Med Rev. 2006 Oct;10(5):323–37.
<https://doi.org/10.1016/j.smrv.2005.11.001>
- [4] S. Rasekhi , F. Ashouri, A. Pirouzan. Effects of Sleep Quality on the Academic Performance of Undergraduate Medical Students. *Health Scope*. 2016 Feb 17;5(3). doi:[10.17795/jhealthscope-31641](https://doi.org/10.17795/jhealthscope-31641)
- [5] Riskesdas. National Report Publishing Institute for Health Research and Development. 2020. 628 p. <https://www.litbang.kemkes.go.id/laporan-riiset-kesehatan-dasar-riskesdas/V>.
- [6] WHO. Global health risks: mortality and burden of disease attributable to selected major risks. Geneva, Switzerland: World Health Organization; 2009. 62 p. <https://apps.who.int/iris/handle/10665/44203>
- [7] A.I. Almojali, S.A. Almalki, A.S. Alothman, E.M. Masuadi, M.K. Alaqeel. The prevalence and association of stress with sleep quality among medical students. *J Epidemiol Glob Health*. 2017;7(3):169. doi: [10.1016/j.jegh.2017.04.005](https://doi.org/10.1016/j.jegh.2017.04.005)
- [8] H. Jahrami, A.S. BaHammam, N.L. Bragazzi, Z. Saif, M. Faris, M.V. Vitiello. Sleep problems during the COVID-19 pandemic by population: a systematic review and meta-analysis. *J Clin Sleep Med*. 2021 Feb;17(2):299–313. <https://doi.org/10.5664/jcsm.8930>
- [9] N. Nina N, F.C. Angela, F.G. Langi. Relationship between physical activity and sleep quality in coastal communities of manado city. *Kesmas 2018* ;7(4).<https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/23171>
- [10] C. Miranda, L.Fima. The relationship between physical activity and sleep quality in adolescents in sma negeri 9 Manado. *Kesmas 2018* ;7(5). <https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/23171>
- [11] M.D.Iqbal. The relationship of physical activity with sleep quality of foreign students in yogyakarta.2017;6(11).<http://journal.student.uny.ac.id/ojs/index.php/pjkr/article/view/8711/8355S>.
- [12] N. Cellini, N. Canale, G. Mioni , S. Costa. Changes in sleep pattern, sense of time, and digital media use during COVID-19 lockdown in Italy. *J Sleep Res*. 2020 Apr. e13074. doi: [10.1111/jsr.13074](https://doi.org/10.1111/jsr.13074)
- [13] M.A Grandner, D.F. Kripke, I.Y. Yoon, S.D. Youngstedt. Pittsburgh Sleep Quality Index: investigation in a non-clinical sample. *Sleep Biol Rhythms*. 2006;4:129–136. doi: [10.1111/j.1479-8425.2006.00207.x](https://doi.org/10.1111/j.1479-8425.2006.00207.x)
- [14] WHO. Global Physical Activity Questionnaire (GPAQ) Analysis Guide. Available from: https://www.who.int/ncds/surveillance/steps/resources/GPAQ_Analysis_Guide.pdf