The Physical Activity Level Of Medical Students Does Not Correlate With Their Sleep Quality And Excessive Daytime Sleepiness (EDS)

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Abstract. One of the main causes of non-communicable diseases is an unhealthy lifestyle. One of the examples is a lack of physical activity. Physical activity is important for good sleep quality and prevents excessive daytime sleepiness (EDS), which can interfere with productivity. This observational analysis with a cross-sectional study approach aims to determine the relationship between the level of physical activity and sleep quality and excessive daytime sleepiness in medical students at the faculty of medicine, Universitas Brawijaya. 444 respondents were included in this study. The level of physical activity was measured using the short version of the International Physical Activity Questionnaire, sleep quality was measured with the Pittsburg Sleep Quality Index (PSQI), and EDS was measured with the Epworth Sleepiness Scale (ESS). The results showed that 230 (51.8%) respondents had moderate levels of physical activity, 286 students (64.4%) had poor sleep quality, and 291 students (65.5%) did not experience EDS. The results of the Chi-square correlation test showed p-values of 0.508 and 0.470 for the relationship between physical activity, sleep quality, and EDS, respectively. It can be concluded that there is no significant relationship between the level of physical activity and sleep quality, and EDS. Further study with many other factors needs to be done to determine the contributing factors to sleep quality and EDS.

1 Introduction

Non-communicable diseases caused 40.5 million global deaths in 2016. This is due to changes in lifestyle, environment and technology that have shifted the pattern of non-communicable diseases as the highest cause of death globally [1]. And lack of physical activity is also a risk factor for non-communicable diseases [2].

Physical activity affects various aspects, both physical and psychological aspects. Physically physical activity affects cardiovascular health, and psychologically good physical activity regulates neurotransmitters and hormones well. Proper regulation of neurotransmitters affects sleep through melatonin or stress through endorphins and cortisol [3].

This study focuses on medical students with a heavy study load and high academic hours that impact their physical activity. Existing research from the University of Sebelas Maret, 15.24% have a low level of physical activity, and from the University of Brawijaya, 60% have a low level of physical activity [4,5]. This becomes a problem in itself because, in the future, medical students are role models for society in healthy living, so it is essential to maintain physical activity to have good quality sleep that avoids EDS.

Considering that there has been no research discussing this before, it is necessary to know the effect level of physical activity on sleep quality and EDS.

2 Material and Methods

This research is an analytic observational with a cross-sectional study approach. The subjects in this study were students of the Medical Education Study Program, Faculty of Medicine, Universitas Brawijaya batch 2015 - 2020 (Levels 1 – 5), with exclusion criteria if the respondent did not fill out the questionnaire completely or had a physical disability so that it could hinder the activities carried out.

Data collection was carried out online using Google Forms to meet the needs of calculating a minimum sample size of 370. The instruments used were demographic data questionnaires (name, gender, age, generation), the International Physical Activity Questionnaire-Short Form (IPAQ-SF) questionnaire for physical activity level variable, the Pittsburg’ Sleep Quality Index (PSQI) questionnaire for sleep quality, the Epworth Sleepiness Scale (ESS) questionnaire for EDS. The research data were analyzed statistically using the SPSS 26 for the windows program with the Chi-Square correlation test.
There of 444 respondents who matched the criteria for inclusion and exclusion where participants were studied. The description of the results is presented in Table 1.

Respondents were dominated by the female sex, 302 people (68%). The majority of respondents came from third-year students (39%), with the most extensive age distribution being 20-22 years (62%). Most of the students had moderate levels of physical activity (51.8%), poor sleep quality (64.4%), and did not have EDS (65.5%).

The questionnaire results found that students dominated the respondents with moderate levels of physical activity with poor sleep quality (34.7%) and moderate levels of physical activity without EDS (34%). The Chi-Square test was used to determine the relationship between the level of physical activity with the dependent variables, namely, sleep quality and EDS. From the analysis results, P-value > 0.05 was obtained for all variables, so there was no significant relationship between physical activity levels with sleep quality and EDS of Medical Students of Brawijaya University.

The research respondents generally represent the student population of Brawijaya University's Medical students, which are mainly female, with the majority of respondents aged between 20-22 years, similar to Paramita (2010), who stated that the average undergraduate student in Indonesia is in the age range of 18 to 24 years [6].

### 3.1 Physical Activity Levels

At the level of physical activity, most respondents engage in moderate levels of physical activity. These results are also supported by research conducted on the University of Indonesia's third-year medical students, which showed that most respondents had moderate physical activity levels [7]. However, it is different from research on medical students at Udayana University, where 40 majorities of activity levels [8]. However, even so, it is expected that medical students have a high level of physical activity by the WHO's recommendations; namely 3000-4000 MET per week [9]. This can happen because each individual's level of physical activity can be positively influenced by culture, influence, and family support and support from friends or sports partners, or negatively influenced by medical students who make academic matters a top priority [10].
3.2 Sleep Quality

The quality of sleep majority of respondents has poor sleep quality. In line with research on Andalas University, medical students 56% had poor sleep quality. This can happen because students lack adapting, both managing and efficient use of time, especially in processing. Andalas University (2021) [17], which said that only 24.6% of all respondents have moderate physical activity levels, poor sleep quality and do not experience excessive daytime sleepiness. No significant relationship was found between the level of physical activity and EDS. This is different from the research by McClain (2014), which state that there's an interface between physical activity and EDS [18]. The research may differ from the results obtained by researchers due to differences in the number of respondents, situations or characteristics, especially customs and habits between Asians and Europeans.

This study is supported by research from Butner in 2013, which said that exercise and physical activity had no relationship to EDS [19]. Theorell-Haglow research also says that fatigue is more associated with EDS, while physical activity and exercise are not directly related to EDS [20]. He is supported by research by Shimamoto (2021), who suspects a negative effect of increasing physical activity on mental health and EDS in college students. This is because related physical activities such as part-time work and competitive sports are considered stressors that harm mental health and EDS [21]. This is also supported by research by Seravine (2019), which states that the main factors that can affect the results of EDS are body mass index (BMI), sleep duration and depression [22]. This proves that the physical activity's level of someone is not the only factor that significantly influences EDS. Other factors that can influence include neurological disorders, circadian rhythms, sleep deprivation, psychiatric disorders, drugs, and metabolic disorders [23].

4 Conclusion

Medical students of the Faculty of Medicine, Brawijaya University, have moderate physical activity levels, poor sleep quality and do not experience EDS. No significant relationship was found between the level of physical activity, sleep quality, and EDS. There are allegations of other factors affecting the dependent variable, which have not been studied in this research.

Authors' Contributions

YK carried out the concept of the studies, led the studies, and drafted the manuscript. SU and DA were in charge of data collection, analysis, and manuscript writing. RR was

| Sleep Quality | Physical Activity Levels | P-value |
|---------------|--------------------------|---------|
|               | Low          | Moderate | High  |
| Good          | 46 (10.4%)  | 76 (17.1%) | 36 (8.1%) |
| Bad           | 75 (16.9%)  | 154 (34.7%) | 57 (12.8%) |

Table 2. Relationship between Physical Activity Levels with Sleep Quality

| Excessive Daytime Sleepiness | Physical Activity Levels | P-value |
|-----------------------------|--------------------------|---------|
|                            | Low          | Moderate | High  |
| Yes                        | 38 (8.6%)   | 79 (17.8%) | 36 (8.1%) |
| No                         | 83 (18.7%)  | 151 (34.0%) | 57 (12.8%) |

Table 3. Relationship between Physical Activity Levels with Excessive Daytime Sleepiness

The analysis found that physical activity did not have a significant effect or relationship with excessive daytime sleepiness. This is different from the research by McClain (2014), which state that there's an interface between physical activity and EDS [18]. The research may differ from the results obtained by researchers due to differences in the number of respondents, situations or characteristics, especially customs and habits between Asians and Europeans. This study is supported by research from Butner in 2013, which said that exercise and physical activity had no relationship to EDS [19]. Theorell-Haglow research also says that fatigue is more associated with EDS, while physical activity and exercise are not directly related to EDS [20]. He is supported by research by Shimamoto (2021), who suspects a negative effect of increasing physical activity on mental health and EDS in college students. This is because related physical activities such as part-time work and competitive sports are considered stressors that harm mental health and EDS [21]. This is also supported by research by Seravine (2019), which states that the main factors that can affect the results of EDS are body mass index (BMI), sleep duration and depression [22]. This proves that the physical activity's level of someone is not the only factor that significantly influences EDS. Other factors that can influence include neurological disorders, circadian rhythms, sleep deprivation, psychiatric disorders, drugs, and metabolic disorders [23].

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in charge of coordination and design, as well as helping draft the manuscript. All authors read and approved the final manuscript.

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**Ethical Clearance Statement**

All subjects participated voluntarily and received a small compensation. The participant provides their written agreement and consent to participate in the research. The ethics committee of Universitas Brawijaya’s School of Medicine gave their approval to the study.

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