

The Relationship Between Sleep Quality and Blood Pressure in Students

Muhammad Irwan^{1*}, Irfan², Evawaty³, Rahmin⁴, Risnah⁵, Salmah Arafah⁶

¹Faculty of Health Sciences, Universitas Sulawesi Barat, Majene, Sulawesi Barat, Indonesia, muhammad.irwan@unsulbar.ac.id

²Faculty of Health Sciences, Universitas Sulawesi Barat, Majene, Sulawesi Barat, Indonesia, irvanners@gmail.com

³Faculty of Health Sciences, Universitas Sulawesi Barat, Majene, Sulawesi Barat, Indonesia, evawaty@unsulbar.ac.id

⁴Faculty of Health Sciences, Universitas Sulawesi Barat, Majene, Sulawesi Barat, Indonesia, rahminakiba8627@gmail.com

⁵Faculty of Medicine and Health Sciences, Universitas Islam Negeri Alauddin, Makassar, Sulawesi Selatan, Indonesia, risnah@uin-alauddin.ac.id

⁶Departement of Nursing, STIKES Tanawali, Takalar, Sulawesi Selatan, Indonesia, salmahintan250481@gmail.com

*Corresponding Author: muhammad.irwan@unsulbar.ac.id

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ABSTRACT

Introduction: Sleep is one of the physiological needs that has an impact on the quality and balance of life. The habit of poor sleep quality or a short amount of sleep is also associated with an increase in an individual's blood pressure. If someone's sleep duration is short, the sympathetic nervous system activity will increase, making the person vulnerable to stress, ultimately leading to an increase in blood pressure. Poor sleep quality and quantity not only causes physical discomfort, but also impairs individual memory and cognitive abilities. If this poor quality and quantity of sleep is left unattended for several years, more dangerous complications are likely to occur, such as heart attacks, strokes and psychological problems (such as depression or other mood disorders). The purpose of the study was to determine the relationship between sleep quality and blood pressure in final semester students of the Faculty of Health Sciences, Universitas Sulawesi Barat.

Methods: The study used a cross-sectional approach. The number of samples of 45 respondents was selected by simple random sampling technique

Results: The results of the chi-square test showed that there was no relationship between sleep quality and blood pressure ($p > 0.1$).

Conclusion: there is no significant relationship between sleep quality and blood pressure in students of the Faculty of Health Sciences in the Final Semester of the Universitas Sulawesi Barat.

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INTRODUCTION

Basic human needs are components needed to protect the balance so that the body can function stably. Basic needs are very basic needs for maintaining physical life, according to the needs of food, water, shelter, air, sex, the need for security and care, the need for love, belonging and belonging, the need for self-actualization, and the need for rest and sleep. Sleep is one of the physiological needs that has an impact on the quality and balance of life (1).

Sleep is one of the physiological needs that has an influence on the quality and balance of life. Individuals who experience obstacles in the sleep cycle, so that other physical activities of the body will be hampered or changed. Failure to maintain a stable individual sleep-wake cycle will disrupt individual health (1).

Sleep needs differ from each age. The actual needs at the age of young and young children continue to increase, on the contrary at that age usually experience several changes that often shorten sleep time. What is clear is that school, after-school social activities, culture and part-time jobs reduce the time available for sleep (2). The majority of young people face sleep deprivation, so it is not surprising that there are many phenomena of students falling asleep during lectures (1).

Unbalanced sleep-wake cycles, complex lecture plans and other activities during lectures will result in physical problems such as fatigue. Fatigue due to activities that exceed the limit or stress will make it difficult to sleep. Poor sleep quality can also have an impact due to conditions that are a lot of pressure as individual tension over something and anxiety in completing assignments and taking tests. Anxiety will cause an increase in norepinephrine through the sympathetic nervous system so that it will result in obstructed non-rapid eye movement (NREM) sleep (2).

In addition to educational methods on campus, the existence of a social section as an electronic device in the bedroom such as television, Internet access and gadgets triggers students to wake up at night to play mobile phones such as playing games, browsing, chatting, watching, and listening to music. Increased use of caffeine and poor control of dietary patterns will also affect individual sleep (2).

Poor sleep quality is part of the risk consisting of physical and psychological problems (3). Physical problems that arise are risk factors for cardiovascular disease, such as blood pressure in children, adolescents and adults (1). Lack of sleep and rest is caused by frequent interruptions in the NREM and REM cycles, which cause an increase in blood pressure. Norepinephrine that passes through the nervous system increases, causing blood vessels to get vasoconstriction, which triggers an increase in blood pressure (1).

Epidemiological studies state that there is a relationship between sleep disturbances and an increased risk of hypertension in terms of duration and quality (4). A cross-sectional study conducted by Susilo (2017) on healthy adolescents reported that after adjusting for relevant factors, there was a relationship between low sleep efficiency (an objective indicator of sleep quality is the percentage of time spent in bed) and hypertension.

Hypertension is an increase in blood pressure that causes persistent symptoms in target organs, such as stroke, coronary heart disease in the heart arteries and myocardium. Hypertension is a major public health problem in Indonesia and several countries in the world. It is estimated that the most important increase in hypertension cases in developing countries in 2025 will reach around 80% of this increase, from 639 million cases in 2000 it is estimated to reach 1.15 billion in 2025. Patients with hypertension and their population are currently increasing (5).

The results of Riskesdas (2013) showed that the prevalence of hypertension increased from 7.6% in 2007 to 2013. The prevalence rate for the population 18 years and over in Indonesia is 25.8%. The highest prevalence of hypertension is in Bangka Belitung (30.9%), followed by South Kalimantan (26.7%) and the lowest in West Papua (16.8%). East Kalimantan (29.5%), West Java (29.4%), Gorontalo (29.0%), Central Sulawesi (28.7%), Central Kalimantan (26.7%) are provinces with a high prevalence, namely 25.8% (6).

In everyday life, students have to complete many assignments, challenges and requirements. Various things and situations can also affect student success or even hinder it. This is illustrated when taking semester exams, they will control their nerves and always remain calm and even fear and panic about the failures they experience. Therefore, there are various problems, ranging from irregular eating patterns, and lack of rest to sleep disturbances. For students who are able to adapt well to themselves, these problems can be overcome. On the other hand, those who are less able to adapt to the environment will interfere with daily activities in lectures and family activities, so they have obstacles in them (7).

Sleeping too long or too little is part of the risk of high blood pressure. It is known that women are more likely to suffer from this risk than men. Sleep plays an important role in maintaining the immune system, metabolic system, memory, learning, and other important functions. Individuals with adequate sleep and the best quality will affect the individual's activities. Individuals with sleep deprivation have limited energy when carrying out activities, are in a bad mood, and tend to feel tired. Lack of sleep in the long term can affect blood pressure. If a person's sleep time is short, sympathetic nerve activity will increase, making that person vulnerable to stress which leads to an increase in blood pressure (8). Therefore, this research aims to provide further insights into the relationship

between the sleep quality experienced by students and its impact on their blood pressure. With a deeper understanding of this matter, it is expected that more effective preventive measures and better health support can be implemented for students in the academic environment

The Universitas Sulawesi Barat is one of the State Universities in West Sulawesi. It has eight faculties, one of which is the Faculty of Health Sciences. There are 82 students in the Faculty of Health Sciences who are working on their final project or better known as thesis. Based on this background, the researchers described the study entitled "The Relationship between Sleep Quality and Blood Pressure in Final Semester Students of the Faculty of Health Sciences, Universitas Sulawesi Barat." The purpose of the study was to determine the relationship between sleep quality and blood pressure in final semester students of the Faculty of Health Sciences, Universitas Sulawesi Barat.

METHOD

This study used a quantitative research design with analytic observational methods with a cross sectional approach. This study intends to describe and analyze the relationship between sleep quality and blood pressure in final semester students of the Faculty of Health Sciences, Universitas Sulawesi Barat. This research will be conducted in the Scope Area of the Faculty of Health at the Universitas Sulawesi Barat. This research was conducted from July 14 2021 to July 16 2021. The location was chosen because in the final semester the health science faculty students will experience poor sleep quality because students often stay up late to complete their final assignment, namely a thesis. So that it can affect blood pressure in students of the faculty of health sciences. Data collection involves using questionnaires and measuring respondents' blood pressure, with statistical testing conducted using Chi-Square tests.

The population in this study were all 82 students of the Faculty of Health Sciences at the Universitas Sulawesi Barat. Sampling is a method of selecting respondents who will represent the existing population (9). Sample research was taken by Simple Random Sampling by selecting samples randomly among the population (10). The researcher will make a lottery containing the names of the respondents then randomly, the names that come out will be used as respondents and continue up to 45 times.

RESULTS

Univariate analysis

The results of the study are divided into several data, namely general data and special data. General data consists of gender and ethnicity. Meanwhile, special data shows sleep quality and blood pressure in students of the Faculty of Health Sciences, Universitas Sulawesi Barat.

Table 1. Characteristics of Respondents by Gender in Students Faculty of Health Sciences, Universitas Sulawesi Barat

Gender	Amount	Percentage (%)
Man	6	13,3
Woman	39	86.7
Total	45	100

Table 2. Characteristics of Respondents by Ethnicity in Students Faculty of Health Sciences, Universitas Sulawesi Barat

Ethnic group	Amount	Percentage (%)
Mandarin	31	68,9
Bugis	6	13,3
Toraja	8	17,8
Total	45	100

In Table 1 it can be seen that the number of male respondents was 6 students (13.3%) and 39 female students (86.7%). And in Table 2 it can be seen that the number of respondents from the Mandar tribe was 31 students (68.9%), the Bugis tribe was 6 students (13.3%) and the Toraja tribe was 8 students (17.8%).

Bivariate Analysis

Table 3. Characteristics of Respondents' Sleep Quality in Students Faculty of Health Sciences, Universitas Sulawesi Barat

Variable	Means	Median	mode	Min Max	SD	90% CI
Sleep Quality	8,7	9.0	7.0	2.0 15.0	3,2	7,9 9,5

Table 3 shows that the sleep quality score of students of the Faculty of Health Sciences in the final semester of the Universitas Sulawesi Barat is a median value of 9.0, a mode value of 7.0, a minimum value of 2.0 which includes good sleep quality and a maximum value of 15.0 including poor sleep quality. At a standard deviation of 3.2 with a confidence level of 90%, the quality of the respondent's sleep is at a value of 7.9 to a value of 9.5. The data shows that the mean respondent has a sleep quality score of 8.7. So it can be concluded that students of the Faculty of Health Sciences in the Final Semester of the Universitas Sulawesi Barat are in the category of poor sleep quality.

Table 4. Characteristics of Respondents' Systolic Blood Pressure in College Students Faculty of Health Sciences, Universitas Sulawesi Barat

Variable	Means	Median	mode	Min Max	SD	90% CI
systolic blood pressure	103.8	100.0	100.0	80.0 130.0	7,5	101.9 105.7

Table 4 shows that the maximum systolic blood pressure is 130.0 mmHg and the highest systolic blood pressure is 100.0 mmHg. At a mean systolic blood pressure of 103.8 mmHg and a minimum of 80.0 mmHg. At a standard deviation of 7.5 with a 90% confidence level, the respondent's blood pressure was between 101.9 mmHg and 105.7 mmHg. The mean value of systolic blood pressure is 103.8 mmHg including normal blood pressure. The maximum blood pressure value is 130.0 mmHg including high blood pressure.

Table 5. Characteristics of Respondents' Diastolic Blood Pressure in College Students Faculty of Health Sciences, Universitas Sulawesi Barat

Variable	Means	Median	mode	Min Max	SD	90% CI
Diastolic blood pressure	76,2	80.0	80.0	60.0 100.0	8,6	74,1 78.4

Table 5 shows that the maximum diastolic blood pressure is 100.0 mmHg and the highest diastolic blood pressure is 80.0 mmHg. At a mean systolic blood pressure of 76.2 mmHg and a minimum of 60.0 mmHg. At a standard deviation of 8.6 with a 90% confidence level, the respondent's blood pressure ranged from 74.1 mmHg to 78.4 mmHg. The mean systolic blood pressure is 76.2mmHg including normal blood pressure. The maximum blood pressure value is 100.0 mmHg including high blood pressure.

Table 6. Analysis of the Relationship between Sleep Quality and Systolic Blood Pressure in Students of the Faculty of Health Sciences, Universitas Sulawesi Barat

Sleep Quality	Systolic Blood Pressure						*p
	Normal		An Increase Occurs		Total		
	n	%	N	%	n	%	
Good	7	15.6	0	0	7	15,6	0.685
Bad	37	82,2	1	2,2	38	84.6	
Total	44	97.8	1	2,2	45	100.0	

In Table 6, the results of the analysis of the relationship between sleep quality and systolic blood pressure show that the majority of respondents, namely 7 individuals (15.6%), have good sleep quality with systolic blood pressure which is included in normal blood pressure. And 37 individuals (82.2%) had poor sleep quality with normal systolic blood pressure. Then as many as 1 individual (2.2%) had poor sleep quality with increased systolic blood pressure. In the results of the Chi Square test, sleep quality and systolic blood pressure showed that there was no relationship between sleep quality and systolic blood pressure ($p=0.685$) ($p>0.1$).

Table 7. Analysis of the Relationship between Sleep Quality and Diastolic Blood Pressure in Students of the Faculty of Health Sciences, Universitas Sulawesi Barat

Sleep Quality	Diastolic Blood Pressure						*p
	Normal		An Increase Occurs		Total		
	N	%	N	%	n	%	
Good	7	15.6	0	0	7	15,6	0.914
Bad	35	77,8	3	6,7	38	84.6	
Total	42	93,3	3	6,7	45	100.0	

In Table 7, the results of the analysis of the relationship between sleep quality and diastolic blood pressure show that the majority of respondents, namely 7 individuals (15.6%), had good sleep quality with diastolic blood pressure which is included in normal blood pressure. And 35 individuals (77.8%) had poor sleep quality with normal category diastolic blood pressure. Then as many as 3 individuals (6.7%) had poor sleep quality with increased diastolic blood pressure. In the results of the Chi Square test, sleep quality and systolic blood pressure showed that there was no relationship between sleep quality and systolic blood pressure ($p=0.914$) ($p>0.1$).

DISCUSSION

Interpretation of Key Findings

Based on the results of data collection using a questionnaire for respondents in July 2021 which had been processed, researchers will discuss the relationship between sleep quality and blood pressure in students of the Faculty of Health Sciences, Universitas Sulawesi Barat.

Sleep Quality

Based on the results of the study in table 3, the average value of the respondent's sleep quality is 8.7, the mean value of sleep quality is 9.0 and the value that occurs most often is 7.0 and the minimum value of sleep quality is 2.0 and the maximum value is 15. 0 with a standard deviation of 3.2. With a 90% confidence level, the respondent's sleep quality is at a value of 7.9 to 9.5.

Based on the results obtained for component 1 of sleep quality, subjective sleep quality was obtained from 45 respondents, 31 respondents rated their sleep quality as poor. Component 2 sleep latency 23 respondents needed more than 30 minutes to fall asleep. Component 3 sleep duration 26 respondents rated deep sleep for 5 hours. Component 4 sleep efficiency 25 respondents rated their sleep time as being very less than a person's normal sleep time. Component 5 sleep disturbance 13 respondents experienced sleep disturbances at night. Component 6 used drugs, most of the respondents did not take sleeping pills, only 2 respondents often consumed them. Component 7 dysfunction during the day 25 respondents who could not concentrate during the day for 1 week. From the data of all respondents it can be concluded that most of the respondents experienced sleep disturbances.

Based on the validity of the data, it can be concluded that students of the Faculty of Health Sciences, Universitas Sulawesi Barat have poor sleep quality with an average score of 8.7. Students of the Faculty of Health Sciences, Universitas Sulawesi Barat, have poor sleep quality due to the reduced number of hours they sleep and experience stress because they think about their final project.

Sleep is a physiological process in the body that aims to restore the body after a day of activities. Sleep generally occurs at night, with an individual's normal duration of sleep being 6-8 hours a day (11). Sleep quality is a highly elusive event, relating to many areas including assessment of sleep quantity, sleep disturbance, sleep latency,

daytime sleep dysfunction, sleep efficiency, sleep quality and use of sleeping pills. Therefore, if one of the seven domains is disturbed, then it can cause a decrease in sleep quality (1).

The average respondent considered that the quality of sleep over the past week was poor. Respondents also had difficulty initiating sleep, spending about 30 minutes in bed until they finally fell asleep. The majority of respondents slept for 5 hours in the last week and experienced disruption of activities during the day. There are 38 students (84.4%) who have poor sleep quality. The results of this study are in accordance with research conducted by Pitaloka et al (2015) which examined the relationship between sleep quality and blood pressure and the concentration ability of students in the Nursing Science study program, University of Riau, 72% of students experienced poor sleep quality (12).

Blood Pressure

Based on tables 4 and 5, the average systolic and diastolic blood pressure values are 103.8/76.2 mmHg in the normal blood pressure category, the median blood pressure value is 100.0/80.0 mmHg, the mode value is 100.0/80.0 mmHg, the minimum value of systolic and diastolic blood pressure is 80.0/60.0 mmHg and the maximum is 130.0/100.0 in the prehypertension blood pressure category. At a standard deviation of 7.5 with a 90% confidence level the systolic and diastolic blood pressure of the respondents was at a value of 101.9/74.1 mmHg with 105.7/78.4 mmHg. The data shows that systolic and diastolic blood pressure in students of the Faculty of Health Sciences, Universitas Sulawesi Barat are included in normal blood pressure, which is 100/80 mmHg.

The results of this study are in accordance with research conducted by Pitaloka et al (2015) concerning blood pressure of students of the Riau University Nursing Study Program, the results showed that the majority of respondents from 68 students on average had normal blood pressure (68%). This is due to the gender characteristics of the respondents who are mostly female (82%). In this study, systolic and diastolic blood pressure in students of the Faculty of Health Sciences, Universitas Sulawesi Barat, the majority of respondents had an average normal blood pressure of 44 respondents (97.8%). This is due to the gender characteristics of the majority of female respondents (86.7%) (12).

The Relationship between Sleep Quality and Blood Pressure

Statistical test results using the chi square test about the relationship between sleep quality and systolic blood pressure showed that there was no relationship between sleep quality and systolic blood pressure $0.685 > 0.1$, so the results of the study showed that most of the respondents had poor sleep quality with systolic blood pressure of 38 respondents. (84.4%). And also diastolic blood pressure has no relationship between sleep quality and diastolic blood pressure ($p=0.941$)($p>0.1$).

From the results of this study, the average respondent had normal blood pressure with poor sleep quality because students had adapted to a heavy workload. From the early semester, respondents had received many assignments that made students accustomed to staying up late. So that in the final semester this did not affect the pressure. student blood because the respondent's sleep pattern has changed.

The results of this study are in line with the study of Pitaloka et al. (2015) which showed that there was no relationship between sleep quality and blood pressure in Nursing Science Study Program students at the University of Riau with ($p=0.418$) ($p>0.05$) (12). Meanwhile, the results of this study are inversely proportional to research conducted by Aftab et.al (2023) concerning the relationship between sleep quality and blood pressure in medical students at the University of North Sumatra ($p=0.035$)($p<0.05$) (13).

The results of this study are also consistent with research conducted by Yaqin (2016) that there is no relationship between sleep quality and systolic blood pressure ($p=0.083$) and diastolic blood pressure ($p=0.292$). In this study, the age of the respondents who were still classified as productive age and the sex of women who were not in menopause, on average, had normal blood pressure (14). This study was conducted in which most of the respondents who were studied had normal systolic blood pressure of 40 individuals (52.5%) and normal diastolic blood pressure of 32 individuals (42.1%). The results of this study on average (86.7%) of female respondents who are classified as young adults and not in menopause who have normal blood pressure.

The results of this study contradict the research of Alfi & Yuliwar (2018) on the characteristics of respondents based on age, it was found that most respondents who suffer from high blood pressure are aged 41-60 years (8). The average respondent with high blood pressure has poor sleep quality. The average respondent revealed that they often wake up to go to the bathroom at night, feel sick and have a headache so they don't sleep well, and have difficulty getting to sleep and there are even respondents who can't fall asleep for 30 minutes. Meanwhile, in this study, the average age of respondents was young adults. On average, respondents had no sleep disturbances at night and were able to fall asleep for 30 minutes, and did not feel sick or dizzy.

Another factor considered to potentially influenced the blood pressure of respondents including the intake of vitamins and smoking behavior among students. This aligns with the research conducted by Deni, 2017 which elucidated that smoking behavior is a common phenomenon among students. For the majority of the Indonesian population, smoking is a daily behavioral pattern (15). Another study by (Munawwarah, 2023) revealed a significant relationship between the administration of Vitamin D and blood pressure, with a significance value of 0.00. This underscores the importance of paying attention to nutritional intake and vitamins as a preventive measure in averting premature deaths and other diseases. Health professionals and all stakeholders are expected to play their respective roles in addressing this concern (16).

The method utilizing questionnaires and blood pressure measurements can be relied upon and yields valid results. The statistical analysis, employing chi-square tests, is in line with the collected data and ensures the reliability of the results. Consequently, there is no significant relationship between sleep quality and blood pressure among students. This research's findings align with Pitaloka et al.'s (2015) study, indicating no correlation between sleep quality and blood pressure in nursing students at the University of Riau ($p=0.418$) ($p>0.05$). Similarly, Yaqin's (2016) research concludes that there is no association between sleep quality and systolic blood pressure ($p=0.083$) and diastolic blood pressure ($p=0.292$) (14). The results of the study can be applied broadly or may be specific to certain contexts. Nevertheless, they hold relevance in the context of student health and can contribute to policy improvement or preventive measures.

Comparison with Previous Studies

The results of this study indicated that there was no correlation between sleep quality and blood pressure. This is consistent with previous research by Pitaloka et al. (2015), which found no relationship between sleep quality and the blood pressure of nursing students at the University of Riau. However, other studies have shown different results (12). For instance, Gangwisch's (2015) epidemiological study stated that there was a connection between sleep disturbances and an increased risk of hypertension in terms of both duration and quality. Comparing various findings from previous studies can serve as a basis for consideration in optimizing future research endeavors (17).

Implications for Public Health

Health services were expected to pay special attention to adolescents, particularly students, in addressing sleep quality issues, as indicated by research findings that revealed poor average sleep quality among students. Health services can contribute by providing education on the prevention and management of sleep quality issues in students. It is hoped that respondents will prioritize their fundamental need for quality sleep and consider adopting a healthier lifestyle. This includes paying attention to excessive activities, stress management, and sleep patterns, which are deemed essential for improving sleep quality. In line with the research conducted by Munir Salham et. al 2021, healthcare professionals are advised to consistently impart comprehensive understanding and knowledge to the public regarding the importance and benefits of health education in preventing hypertension (18).

Limitations and Cautions

The limitations of this study included the gender distribution among respondents, with the majority being female, contributing to the predominance of normal blood pressure results in 97.8% of respondents. This gender distribution is considered one of the factors that prevented the research from establishing a correlation between sleep quality and blood pressure. Another limitation is that the researcher did not identify other factors that could

influence blood pressure, potentially resulting in blood pressure outcomes being influenced not only by the sleep quality factor of the respondents.

Recommendations for Future Research

For future research, it is recommended to control factors that may influence blood pressure among respondents, including gender, age, stress levels, and other factors deemed to impact blood pressure. This approach ensures that the obtained results can specifically focus on changes influenced by sleep quality.

CONCLUSION

This research concludes that the average value of the respondents' sleep quality is 8.7 and is included in the category of poor sleep quality.

The average systolic blood pressure of the respondents was 103.8 mmHg, the systolic blood pressure that often appeared was 100 mmHg and the maximum systolic blood pressure was 130 mmHg and the minimum was 80 mmHg. While the mean value of the respondent's diastolic blood pressure was 76.2 mmHg, the diastolic blood pressure that often appeared was 80 mmHg and the maximum diastolic blood pressure value was 100 mmHg and a minimum of 60 mmHg. It can be seen that blood pressure in students of the Faculty of Health Sciences, Universitas Sulawesi Barat is included in normal blood pressure.

Chi Square test obtained the value of sleep quality with systolic blood pressure ($p=0.685$)($p>0.1$). Meanwhile, sleep quality with diastolic blood pressure ($p=0.941$)($p>0.1$). So that there is no significant relationship between sleep quality and blood pressure in final semester students of the Faculty of Health Sciences, Universitas Sulawesi Barat.

This study indicates that there is no significant relationship between sleep quality and blood pressure among students. The implication of these findings is that other factors may contribute to the variability of students' blood pressure. Despite the absence of a significant relationship, the research results remain relevant in the context of student health. They highlight the need to consider other factors that can influence blood pressure besides sleep quality, and the outcomes can aid in formulating more holistic health policies in the academic environment. Therefore, preventive efforts and better health support can be directed towards other health aspects that may impact the overall well-being of students.

For future researchers, it is encouraged to expand upon this study by examining other factors that influence blood pressure.

For respondents, it is advised to pay attention to physiological needs, regulate sleep duration to achieve good sleep quality, manage dietary patterns, and maintain overall health.

For the University of West Sulawesi, it is recommended to enhance the reference sources and bibliography for the University of West Sulawesi regarding the relationship between sleep quality and blood pressure.

AUTHOR'S CONTRIBUTION STATEMENT

All authors contributed extensively to study implementation, monitoring the study progress, writing the original draft, and draft the manuscript. Muhammad Irwan : Contacted respective authorities. Conceptualizing the study, study designing and was responsible for proofreading and critical revision of the content. Rahmin, Evawaty: Sample collection, and sample processing. Irfan: Statistical analysis, interpreted the data, data collection. Salmah Arafah: Managed study implementation and was responsible for proofreading and critical revision of the content. Risnah: Contacted respective authorities, editing draft. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interests or personal relationships that could have appeared to influence the work reported in this paper

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