

Analysis of The Relationship Between Sleep Quality and The Incidence of Hypertension at Productive Age in The Working Area of The Tamalanrea Health Center

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ABSTRACT

Introduction: Hypertension is a major global public health problem and a leading risk factor for cardiovascular disease. Although commonly associated with older adults, its prevalence has increased among individuals of productive age due to unhealthy lifestyles, including poor diet, physical inactivity, smoking, alcohol consumption, stress, and inadequate sleep. Poor sleep quality has emerged as a modifiable risk factor for hypertension.

Methods: This study aimed to examine the relationship between sleep quality and hypertension among adults of productive age using a quantitative cross-sectional design. Data were analyzed to assess the association between sleep quality and hypertension status.

Results: The results showed a significant relationship between sleep quality and hypertension ($p = 0.001$), indicating that individuals with poor sleep quality were more likely to experience hypertension.

Conclusion: These findings are consistent with previous studies reporting an increasing prevalence of hypertension among younger and productive-age populations, partly attributable to insufficient sleep and late-night gadget use. High work demands and busy daily routines may contribute to impaired sleep quality, thereby increasing the risk of hypertension. In conclusion, poor sleep quality is significantly associated with hypertension among productive-age adults, highlighting the importance of promoting healthy sleep habits as part of hypertension prevention strategies.

Keywords: *sleep quality; hypertension; productive age*

INTRODUCTION

One of the global targets for non-communicable diseases is to reduce the prevalence of uncontrolled hypertension by 25% between 2010 and 2025, but in reality, hypertension is still a non-communicable disease that has a fairly high prevalence. An estimated 1.4 billion adults aged 30–79 worldwide will suffer from hypertension by 2024; This represents 33% of the population in this age group. Two-thirds of adults aged 30–79 years who suffer from hypertension live in low- and middle-income countries. An estimated 600 million adults with hypertension (44%) are unaware that they have the condition. About 630 million adults with hypertension (44%) are diagnosed and treated. About 320 million adults with hypertension (23%) manage it (WHO, 2025).

This disease is often referred to as the silent killer because it generally does not cause symptoms in the early stages, but can cause various serious complications such as coronary heart disease, stroke, kidney failure, and heart failure if not treated properly. The increasing incidence of hypertension is an important concern because it has an impact on the high rates of pain, disability, and death (Maulidah et al., 2022).

So far, hypertension is more commonly found in the elderly group. However, in recent years, the incidence of hypertension has begun to increase in the productive age group, namely 15–64 years old. This condition is affected by lifestyle changes, such as unhealthy diet, lack of physical activity, stress, smoking habits, alcohol consumption, and poor sleep quality. Productive

age is a group that has high activity, so they often ignore the need for adequate and quality sleep (Sato et al., 2026).

Sleep quality is one of the factors that plays a role in maintaining a balance of the body's physiological functions, including regulating blood pressure. Poor-quality sleep, such as short sleep duration, frequent waking up at night, difficulty falling asleep, or staying up late, can disrupt the autonomic nervous system and increase the activity of the sympathetic nervous system activity. This condition can trigger a continuous increase in blood pressure, increasing the risk of hypertension (Makarem et al., 2021). Several studies show that individuals with poor sleep quality have a higher risk of developing hypertension than individuals with good sleep quality. However, the relationship between sleep quality and the incidence of hypertension in the productive age group still needs further study, especially in people in various regions in Indonesia who have different social characteristics and lifestyles (Vásquez-carrasco et al., 2025; Calhoun and Harding, 2010).

Sleep quality is one of the factors that plays a role in maintaining a balance of the body's physiological functions, including regulating blood pressure. Poor-quality sleep, such as short sleep duration, frequent waking up at night, difficulty starting sleep, or staying up late, can disrupt the autonomic nervous system and increase the activity of the sympathetic nervous system activity. This condition can trigger a continuous increase in blood pressure, increasing the risk of hypertension (Makarem et al., 2021). Several studies show that individuals with poor sleep quality have a higher risk of developing hypertension than individuals with good sleep quality. However, the relationship between sleep quality and the incidence of hypertension in the productive age group still needs further study, especially in people in various regions in Indonesia who have different social characteristics and lifestyles.

METHOD

Study Design

This study employed a quantitative analytical observational design with a cross-sectional approach to examine the association between sleep quality and the incidence of hypertension. A cross-sectional design was selected because it enables the assessment of the relationship between variables at a single point in time without any intervention.

Setting & Participants

The study was conducted at Tamalanrea Primary Health Center (Puskesmas Tamalanrea), Makassar. The target population consisted of productive-age individuals attending the health center during the study period. Based on the classification of Statistics Indonesia (BPS) and the Indonesian Ministry of Health, the productive age group ranges from 15 to 64 years. Participants were recruited using purposive sampling. The inclusion criteria were patients aged 15–64 years, currently employed, willing to participate in the study, and able to communicate effectively. Patients with hypertension-related complications or other severe medical conditions were excluded from the study.

Variables & Measurement

This study examined one independent variable, sleep quality, and one dependent variable, hypertension. Sleep quality was assessed using a modified version of the Pittsburgh Sleep Quality Index (PSQI), which demonstrated excellent internal consistency with a Cronbach's alpha coefficient of 0.91 (Jamaluddin, 2017). The PSQI is a validated instrument widely used to evaluate subjective sleep quality and sleep disturbances. Hypertension was measured using a calibrated sphygmomanometer following standard blood pressure measurement procedures.

Data Collection

Primary data were collected directly from eligible participants after obtaining informed consent. Sleep quality data were obtained through face-to-face interviews using the modified PSQI

questionnaire, while blood pressure measurements were performed by the researcher using a calibrated sphygmomanometer according to standardized procedures. Sociodemographic characteristics were also recorded using a structured questionnaire.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Univariate analysis was

performed to describe the characteristics of the respondents and the distribution of each study variable. Bivariate analysis was conducted using the Chi-square test to determine the association between sleep quality and hypertension. Statistical significance was established at a p-value of less than 0.05.

RESULTS

Table 1. Frequency Distribution of Characteristics of Responders (n=45)

Respondent Characteristics	n	%
Gender		
Male	30	66.7
Female	15	33.3
Jobs		
Housewives	8	17.8
Civil Apparatus	12	26.7
Private Employees	11	24.4
Students	11	24.4
Farmer	3	6.7
Education		
Elementary School	17	37.8
First Secondary School	8	17.8
High School	8	17.8
Diploma	5	11.1
Bachelor	7	15.6

Based on the table above, it can be seen that most of the patients are men, namely 30 respondents (66.7%). Moreover, most of them have jobs as ASN, namely 12 respondents (26.7%), and a few are farmers, namely 3

respondents (6.7%). Meanwhile, the most common education is elementary school, with 17 respondents (37.8%), and the least is diploma education, with 5 respondents (11.1%).

Table 2. Distribution of Sleep Quality Frequency, Age, and Patient Blood Pressure (n=45)

Variable	n	%
Sleep Quality		
Poor sleep quality	27	60.0
Good Sleep Quality	18	40.0
Age		
Productive Age	30	66.7
Elderly Age	15	33.3
Blood Pressure		
Hypertension	26	57.8
Normal	19	42.2

Based on Table 2, it can be seen that most patients have sleep disorders. For sleep duration, most normal patients only sleep six to seven hours a day (40.0%), and for sleep subjectivity, it is mostly not good (62.2%). Furthermore, for sleep latency, which is the time it takes for a person to fall asleep from lying down, some respondents needed 31-60 minutes, which was 37.8%. Meanwhile, the patient's sleep efficiency was mostly < 65%, which is 55.6%. The average number of sleep disturbances per day for patients is 7-9 times a day, with 51.1% of patients presenting this. Patients who used sleep

medication 2-3 times a week were 71.1%. Moreover, the average person who experiences daily disturbances due to sleep deprivation 2-3 times is 71.1%.

The results also showed that most of them were of productive age, namely 30 out of 45 respondents, with a percentage of 66.7%. Respondents were obtained during 1 week of data collection by excluding hypertension patients who experienced complications and were not willing to be used as respondents. Most of the respondents experienced hypertension, namely 26 respondents with a presentation of 57.8%.

Table 3. Analysis of the relationship between sleep quality and the incidence of hypertension at productive age (n=45)

Quality of sleep	Blood pressure				Total		P-Value
	Hypertension		Normal				
	n	%	n	%	n	%	
Poor sleep quality	21	46.7	6	13.3	27	60.0	0.001
Good Sleep Quality	5	11.1	13	28.9	18	40.0	
Total	26	57.8	19	42.2	45	100	

Uji Chi-Square

Based on Table 4, it is known that out of 45 respondents, 26 have hypertension with poor sleep quality, 21 respondents have normal blood pressure, and 5 respondents (11.1%) have good sleep quality. Furthermore, 19 respondents had normal blood pressure, including 6 respondents (13.3%) with poor sleep quality and 13 respondents (28.9%) with good sleep quality. Based on the results of data analysis using chi-square, the value of $p=0.001 < \alpha=0.05$ was obtained.

DISCUSSION

This study found that the results were significant with a value of $p=0.001 < \alpha=0.05$, which means that there is a relationship between sleep quality and the incidence of hypertension in productive age. These results suggest that the worse a person's sleep quality, the greater the risk of an increase in blood pressure. These findings are in line with the theory that sleep is a physiological process that plays an important role

in maintaining the balance of the cardiovascular system. Impaired sleep quality can increase the activity of the sympathetic nervous system and stress hormones, such as cortisol, leading to vasoconstriction of blood vessels, increased heart rate, and increased blood pressure.

People with impaired sleep quality experience this because the suprachiasmatic nucleus, which controls endogenous circadian rhythms, becomes metabolically and arithmetically flat due to limited sleep and a chronic reverse behavior cycle that does not correspond to the 24-hour light/dark cycle. In addition, short sleep and shift work are associated with activity at unconventional circadian times that causes a desynchronization between the main clock in the brain and the peripheral clock in the organ, thus creating a state of metabolic dysfunction that triggers hypertension (Morris et al., 2016).

At productive age, poor sleep quality is generally influenced by high work demands,

stress, use of gadgets before bed, habits of staying up late, and irregular lifestyles. This condition causes the duration and quality of sleep to decrease so that the body's recovery process does not take place optimally. If it lasts long-term, sleep disorders can increase the risk of hypertension and various other cardiovascular diseases.

Sleep quality is one of the factors that has an important role in controlling blood pressure; poor sleep quality, especially less than 6 hours or more than 9 hours, increases the risk of hypertension by activating the stress response, increasing cortisol, and interfering with the body's natural blood pressure decrease during sleep (Alkathem et al., 2024). The same thing was expressed by Makarem et al. (2021), who stated that adequate and insufficient sleep habits are related to changes in blood pressure.

Some of the habits that cause changes in sleep habits that affect sleep quality are working with the swiff system (Safitri, 2019). In addition, the use of smartphones, computers, or laptops before bed is very prevalent. Blue light from the screen can deceive the brain so that it suppresses the production of the hormone melatonin (a hormone that triggers drowsiness), thus making it more difficult for a person to fall asleep (Alfianto et al., 2026)

In addition to sleep quality, hypertension is also affected by various other factors, such as age, gender, family history, body mass index (BMI), diet high in sodium, lack of physical activity, smoking habits, alcohol consumption, and stress levels. These factors can strengthen or weaken the relationship between sleep quality and hypertension. Therefore, in interpreting the results of the study, it is necessary to consider the possibility of confounding variables that also affect blood pressure.

The results of this study are in line with research conducted by (Junidar et al., 2025), which states that hypertension does not only occur

in the elderly but has also begun to increase in adolescence, which is caused by the habit of playing gadgets until late at night. The same thing is expressed by (Fiandari et al., 2025), who state that most hypertensive patients are of productive age, with an average age of 32 years, with a presentation of 70%.

The findings of the study show the importance of nurses including sleep quality assessments in education and assessment of hypertension risk factors, especially in the productive age group.

Recommendations For Future Research

Future studies should employ longitudinal or prospective cohort designs to clarify better the temporal relationship between sleep quality and the development of hypertension among productive-age adults. Larger, multicenter studies using probability sampling are also recommended to improve the representativeness and generalizability of the findings. Additionally, future research should investigate other factors that may influence hypertension, including dietary patterns, physical activity, body mass index, smoking, alcohol consumption, psychological stress, family history of hypertension, and socioeconomic status. Intervention studies evaluating the effectiveness of sleep quality improvement programs in reducing blood pressure are also warranted to provide stronger evidence for hypertension prevention.

CONCLUSION

Based on the results of the study, it can be concluded that there is a meaningful relationship between sleep quality and the incidence of hypertension in respondents in the working area of the Tamalanrea Health Center. Respondents with poor sleep quality experienced more hypertension than respondents with good sleep quality. These findings show the importance of attention to sleep

quality as one of the aspects in promotive and preventive efforts to control hypertension.

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Conflict of Interest

The authors declare that they have no competing interests, financial relationships, or personal affiliations that could have influenced the conduct or reporting of this study.

Authors' Contributions

M.J.; S.N.: Conceptualization, methodology, investigation, formal analysis, writing original draft. **M.J.:** Supervision, validation, writing review and editing. **N:** Data curation, investigation, visualization, writing review and editing. All authors read and approved the final manuscript.

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Declaration of Generative AI Use

The authors confirm that no generative artificial intelligence (AI) tools were used in the conception and design of the study, data collection, data analysis, interpretation of the findings, or preparation of this manuscript.

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