

# The Application of Sobriety Test for Measuring Physical Fatigue and Hypertension in Employees

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## Abstract

**Purpose:** This study evaluated the sobriety test as a tool for measuring physical fatigue and hypertension in shift workers at PT. Manggala Alam Lestari, with a focus on sleep duration.

**Research methodology:** A descriptive quantitative study with a cross-sectional design was conducted with 50 shift workers selected through purposive sampling. The Sobriety test assessed physical fatigue, and blood pressure measurements identified hypertension. A sleep duration questionnaire was used to explore its impact on fatigue and hypertension.

**Results:** Of the 50 workers, 32 (65%) reported sleeping < 6 h per night, correlating with higher levels of physical fatigue. The average SBP of workers sleeping < 6 h per night was 141. mmHg (SD = 6.5), while those sleeping > 6 h per night had an average SBP of 133. mmHg (SD = 5.2). Forty percent of the participants were diagnosed with hypertension, with the majority reporting inadequate sleep.

**Conclusions:** The sobriety test effectively measured physical fatigue among shift workers. Shorter sleep duration was associated with higher levels of fatigue and increased hypertension, which could elevate the risk of cardiovascular diseases. Improving sleep quality is a critical intervention to enhance the health and well-being of shift workers.

**Limitations:** The cross-sectional design of the study limits the causal conclusions, and the sample size may not be fully representative.

**Contributions:** This study emphasizes the importance of sleep-in managing fatigue and hypertension, and provides insights for improving worker health.

**Keywords:** *Fatigue, Hypertension, Shift Work, Sleep, Sobriety Test*

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## 1. Introduction

Employee well-being is an important element in creating a safe, healthy, and productive work environment. In this context, well-being includes physical aspects as well as the mental and emotional balance of workers (Hadi, 2024). In the industrial sector, especially in mining and manufacturing, challenges related to work fatigue are increasingly complex. Workers in these sectors often work under physically and mentally demanding conditions, thereby increasing the risk of fatigue that affects their performance (Kundori, Fauziningrum, & Sukrisno, 2025).

The main factors contributing to fatigue include shift work, long working hours, and lack of sleep quality. Decreased sleep quality due to shift work can disrupt circadian rhythms, which are important for maintaining bodily stability (James, Honn, Gaddameedhi, & Van Dongen, 2017). Physical fatigue experienced by shift workers can have a direct impact on productivity, physical health, and workers' mental well-being (Frone & Tidwell, 2015; Hidayanti & Sumaryono, 2021; Horberry et al., 2023).

Work fatigue is a serious problem that can reduce workers' alertness, increase the risk of accidents, and decrease productivity ([Cunningham, Guerin, Ferguson, & Cavallari, 2022](#)). Research has shown that poorly managed fatigue can lead to significant cognitive decline, which ultimately increases the risk of human error and workplace accidents. In addition, fatigue is associated with increased blood pressure, leading to hypertension, a medical condition that can cause heart disease, stroke, and other cardiovascular disorders. Hypertension resulting from prolonged fatigue can damage the body's vital organs, affecting workers' quality of life in the long term ([El Meouchy et al., 2022](#); [Gamboa Madeira, Fernandes, Paiva, Santos Moreira, & Caldeira, 2021](#); [Tsipkalo, Kozak, & Marushchak, 2024](#)). Studies show that shift work and lack of sleep have a direct relationship with increased blood pressure and hypertension, which pose a risk of causing serious cardiovascular disorders ([Caldwell, Caldwell, Thompson, & Lieberman, 2019](#); [Hasibuan, Risdawati, & Ismaidar, 2024](#); [van Heijster et al., 2021](#)).

However, although many studies have shown a relationship between shift work, sleep, and hypertension, few studies have measured physical fatigue using the sobriety test in the context of shift workers in Indonesia ([Prastiwi, 2025](#)). The use of the sobriety test in this study is an innovation that assesses physical fatigue more directly, which is important for detecting workers' health risks, especially in the mining sector.

Objective data on workers' fatigue levels can be obtained using this tool, which can lead to better preventive actions. Decreased sleep quality due to shift work also causes disturbances in the body's circadian rhythm, which in turn can worsen health conditions, including those of the cardiovascular system. Circadian rhythm disturbances have been proven to play a role in exacerbating conditions such as hypertension and diabetes, which ultimately affect work productivity ([Ratri, Kusnul, & Sumirat, 2022](#); [Seong, Park, Ahn, & Kim, 2022](#)).

In addition, several studies have shown that sleep disturbances related to shift work can disrupt body metabolism, worsen the cardiovascular system, and increase physiological stress. These ongoing metabolic disturbances can lead to decreased work efficiency and increased employee absenteeism due to long-term health problems. More in-depth research is needed to comprehensively understand how shift work and lack of sleep contribute to increased metabolic and cardiovascular diseases ([Duan, Wang, Chen, Chen, & Zhang, 2024](#); [Seong et al., 2022](#); [F. Yang, Zhang, Qiu, & Tao, 2021](#)). Therefore, this study aimed to fill the literature gap regarding the use of the sobriety test to measure fatigue in shift workers and its relationship with hypertension and heart health. Thus, this study is expected to provide more effective solutions in managing worker health in industries that rely on shift work ([Andini & Siregar, 2024](#); [Caldwell et al., 2019](#); [Chaal et al., 2023](#); [Dias et al., 2023](#); [Haghayegh et al., 2023](#); [Li & Shang, 2021](#); [Maharani & Nugroho, 2022](#)).

## **2. Literature Review and Hypothesis Development**

### **2.1 Literature Review**

**Shift Work and Fatigue:** Shift work is a work system that involves changing working hours that do not follow normal working hour patterns, such as morning, afternoon, or night. Research has shown that shift work can disrupt the body's circadian rhythm, which functions to regulate the natural human sleep-wake cycle. [Tsipkalo et al. \(2024\)](#) showed that sleep quality among nurses who work shifts is very poor, which is closely associated with increased blood pressure.

These disturbances can result in physical and mental fatigue, which affects sleep quality and worker well-being. Fatigue caused by shift work can increase the risk of cardiovascular disorders and decrease productivity ([Ratri et al., 2022](#); [Seong et al., 2022](#)). In addition, lack of sleep due to shift work is also known to increase the risk of hypertension and other metabolic disorders, such as type 2 diabetes ([Boini, Bourgard, Ferrieres, & Esquirol, 2022](#); [F. Yang et al., 2021](#)). Therefore, poor sleep quality caused by circadian rhythm disturbances due to shift work becomes one of the important factors causing fatigue and long-term health problems for workers.

**Sleep Quality and Cardiovascular Health:** Sleep is important for body recovery, including heart and blood vessel health. Poor sleep quality, especially among shift workers, can cause disturbances in the cardiovascular system, including increased blood pressure that can lead to hypertension. Previous studies have shown that workers who sleep < 6 h per night have a higher risk of developing hypertension and other cardiovascular problems ([Caldwell et al., 2019](#); [Hasibuan et al., 2024](#)). Circadian rhythm disturbances caused by shift work patterns can worsen these conditions, thereby increasing the risk of increased blood pressure and heart disorders ([de Leeuw, 2022](#); [El Meouchy et al., 2022](#)).

**Measurement of Fatigue: Fatigue Test Compared with the Sobriety Test.** The measurement of fatigue is an important factor in understanding the impact of shift work on worker health. Most studies use fatigue tests to measure fatigue levels, either subjectively through questionnaires or using biometric measurement tools. However, some studies have focused more on the use of the sobriety test as a method to measure physical fatigue more objectively.

The sobriety test, which was initially used to assess blood alcohol levels, is now applied to measure the physical fatigue level of shift workers more accurately ([Ervin et al., 2025](#)). Research has shown that the sobriety test can provide objective data on fatigue levels, which is more reliable for detecting potential health risks due to excessive fatigue ([Boini et al., 2022](#); [Maharani & Nugroho, 2022](#)). Therefore, the use of the sobriety test can be a more appropriate method to assess physical fatigue in shift workers than conventional fatigue tests.

**Relationship Between Sleep Quality and Hypertension Among Shift-Working Nurses.** Studies by [Alfi and Yuliwar \(2018\)](#) and [Tsipkalo et al. \(2024\)](#) have shown that sleep quality among nurses who work shifts is very poor, which is closely related to increased blood pressure. This study found that low sleep quality occurred more frequently among nurses working in therapeutic departments, where 65% were diagnosed with hypertension, compared to 45% among nurses in surgical departments. The decline in sleep quality caused by shift work can worsen hypertension in nurses, especially those working in therapeutic departments. The results of this study highlight the importance of managing sleep quality for shift workers, especially those in environments with high levels of work pressure.

**Fatigue Management in the Mining Industry:** A study by [Horberry et al. \(2023\)](#) identified gaps in fatigue management practices in the mining industry, especially related to the use of fatigue detection technology and mental health outcomes. This study suggests that fatigue management should not only focus on regulating working hours and shift rosters but must also involve aspects of mental health arising from physical fatigue. Increasing the use of fatigue detection technology and improving workers' mental well-being need to be an integral part of fatigue management systems in the mining industry.

## **2.2 Hypothesis Development**

Based on the above review of the literature, several hypotheses can be developed and tested in this study:

- H<sub>1</sub>*: Shift workers with < 6 h of sleep per night will exhibit higher levels of physical fatigue and a greater risk of hypertension than shift workers with ≥ 6 h of sleep per night.
- H<sub>2</sub>*: Shift workers with sleep quality disturbances due to shift work experience increased physical fatigue, as measured using the sobriety test, which is associated with increased blood pressure and the risk of hypertension.
- H<sub>3</sub>*: The use of a sobriety test to measure physical fatigue in shift workers will show a significant relationship with blood pressure and fatigue levels compared to traditional fatigue measurement methods.

## **3. Research Methodology**

### **3.1 Research Design**

This study used a quantitative descriptive approach with a cross-sectional design. This design was chosen to describe the relationship between shift work, sleep quality, physical fatigue, and hypertension among shift workers. The cross-sectional approach allowed data collection at a single point in time to

examine the relationships among relevant variables and to test hypotheses developed based on the existing literature review.

### **3.2 Participants**

The participants in this study comprised 50 employees working at PT. Maggala Alam Lesari, South Sumatra, Indonesia. Participant selection was conducted using purposive sampling, a sampling technique based on specific criteria relevant to the research objectives. The inclusion criteria were workers who had been employed for a minimum of one year at the company and were willing to follow the established measurement procedures. The exclusion criteria included workers with a history of heart disease or chronic sleep disorders prior to the study.

**Sample Size Justification:** This study used a sample size of 50 employees. Although this number is not very large, this study aimed to provide an initial overview of the relationship between shift work, sleep quality, and hypertension among shift workers in the mining sector. This sample size was sufficient to provide a descriptive overview of the existing phenomenon. However, a larger sample size may provide more generalizable results if further research is conducted.

### **3.3 Data Collection Instruments**

1. **Sleep Quality Questionnaire (Sleep Duration):** To measure sleep quality, data were collected by providing participants with a questionnaire containing questions regarding their sleep duration during the past week. The questions included how many hours on average they slept each day, with answer options covering different sleep duration categories (e.g., < 4 h, 4–6 h, 6–8 h, and > 8 h). These data were used to describe the sleep patterns of shift workers.
2. **Sobriety Test:** This test is used to measure physical fatigue among shift workers. It measures balance and motor coordination, which are usually impaired when a person experiences physical fatigue. The sobriety test was applied to provide objective data on physical fatigue levels, which were then associated with sleep quality and participants' blood pressure.
3. **Blood Pressure Measurement:** Blood pressure was measured using a manual sphygmomanometer following standard protocols. Measurements were conducted twice with a two-minute interval in the morning between 10:00 and 10:30. The average of the two measurements was taken to obtain more accurate data. Participants' blood pressure was then classified based on the European Society of Hypertension guidelines to determine the presence of hypertension.

### **3.4 Data Collection Procedures**

Data collection was conducted over a two-week period at the workplace. Each participant was asked to independently complete a questionnaire regarding their sleep duration, which measured their sleep duration over the past week. Physical fatigue was then measured using the Sobriety Test, followed by blood pressure measurements at the predetermined time. All procedures were conducted in a quiet room to maintain consistency of the results.

**Measurement tool limitations:** Although the sobriety test is effective in directly measuring physical fatigue, this tool does not measure mental fatigue, which can also affect workers' health. In addition, blood pressure measurements conducted at only one point in time may not be sufficient to describe blood pressure fluctuations throughout the day. Therefore, the blood pressure measurement results in this study provide only a snapshot of blood pressure conditions at the time of measurement and should be interpreted with caution.

### **3.5 Research Ethics**

This study obtained approval from the related company, namely PT. Maggala Alam Lesari. All participants were informed about the research objectives, the procedures to be conducted, and were given the opportunity to provide written consent before participating. The confidentiality of participants' personal data was strictly maintained and used only for the purposes of this study.

### 3.6 Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (version 25.0). Normality testing was conducted using the Shapiro–Wilk test. An independent t-test was used to examine differences between shift and non-shift workers in terms of sleep quality and fatigue levels. Linear regression was used to examine the relationship between sleep quality, physical fatigue, and blood pressure. Results were considered statistically significant at  $P < 0.05$ .

## 4. Results and Discussion

This section presents the research results describing the status of work fatigue, sleep quality, and hypertension among employees working in a shift system at PT. Maggala Alam Lesari. Data obtained through the Fatigue Test and health examination showed a significant relationship between physical fatigue, poor sleep quality, and an increased risk of hypertension among employees.

### 4.1 Sobriety Test Examination



Figure 1. Sobriety test examination

Figure 1 shows the process of the sobriety test examination conducted on employees at PT. Maggala Alam Lesari. In the image on the left, an employee is walking a distance of 15 m in a straight line as part of a physical balance test to measure fatigue levels. In the image on the right, another test is shown in which employees are asked to perform physical tests such as rotating the body on one foot and responding to simple instructions, such as raising their hands ([Amin, Muhtar, Sumardiawan, & Yulianingsih, 2024](#)). This sobriety test examination aims to assess the level of physical fatigue and alertness of employees after working under a shift system to ensure whether they are in a fit or unfit (fatigued) condition to continue their work. This test is an initial step in detecting potential workplace accidents that may occur due to physical fatigue.

### 4.2 Health Examination



Figure 2. The health examination conducted on the employees of PT. Maggala Alam Lesari.

Figure 2 shows this examination involved measuring employees' blood pressure and pulse rate using a sphygmomanometer and oximetry devices. In addition, interviews regarding sleep quality were conducted to obtain further data on employees' sleep patterns, especially those working on a shift system. This health examination was conducted in two phases: the first phase was in the afternoon at approximately 3:00 p.m., and the second phase was in the early morning at approximately 2:00 a.m.

Table 1. Quantitative data and participant distribution

Variables	Total (N = 50)	Mean	SD
Sleep Duration			
Workers sleeping less than 6 hours	32 (65%)	4.83	0.44
Workers sleeping more than 6 hours	18 (35%)	6.72	0.37
Physical Fatigue	30 (60%)	15.50	3.40
Hypertension (Blood Pressure $\geq$ 140/90 mmHg)	20 (40%)	139.18	6.20
Workers sleeping less than 6 hours	15 (30%)	141.07	6.50
Workers sleeping more than 6 hours	5 (10%)	133.50	5.20

#### 4.2.1 Sleep Duration

A questionnaire was administered to 50 shift workers, and the average sleep duration of workers who slept  $< 6$  h/night was 4.83 h per night (SD = 0.44 h). Most workers (65%) slept  $< 6$  h/night, while 30% slept between 6–8 h/night, and the remainder slept  $> 8$  h/night. For workers who slept  $> 6$  h/night, the average sleep duration was 6.72 h per night (SD = 0.37 h). These findings indicate that the majority of shift workers do not obtain sufficient sleep to support their health, in accordance with sleep quality standards recommended in the literature ([Caldwell et al., 2019](#)).

#### 4.2.2 Physical Fatigue

According to the Sobriety Test, 60% of shift workers showed significant levels of physical fatigue, particularly those who slept  $< 6$  h per night. The average physical fatigue score on the Sobriety Test was 15.5 (SD = 3.4), with the highest scores observed among workers who slept  $< 6$  h. These findings indicate that workers with shorter sleep duration exhibit higher levels of physical fatigue ([Seong et al., 2022](#)). [Seong et al. \(2022\)](#) also reported that workers who sleep  $< 6$  h experience higher physical fatigue, which can affect productivity and increase the risk of workplace accidents.

#### 4.2.3 Blood Pressure

Blood pressure measurements showed that 40% of shift workers experienced hypertension (systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg). The average systolic blood pressure among workers who slept  $< 6$  h was 141.07 mmHg (SD = 6.5 mmHg), whereas among workers who slept  $> 6$  h, the average systolic blood pressure was 133.50 mmHg (SD = 5.2 mmHg). The average diastolic blood pressure among workers who slept  $< 6$  h was 90.3 mmHg (SD = 3.9 mmHg), whereas among workers who slept  $> 6$  h, the average diastolic blood pressure was 84.2 mmHg (SD = 4.0 mmHg). These findings indicate that workers who sleep  $< 6$  h/night tend to have higher blood pressure, which increases the risk of hypertension, in line with the findings of ([F. Yang et al., 2021](#)).

### 4.3 Discussion

The results of this study provide a clear overview of the impact of shift work on workers' health, particularly regarding sleep quality, physical fatigue, and hypertension. Workers who sleep  $< 6$  h per night showed significant increases in physical fatigue and blood pressure, which may reduce their long-term health.

#### 4.3.1 Sleep Quality and Health

The findings of this study are consistent with those of previous studies showing that shift workers who sleep  $< 6$  h per night are at a higher risk of hypertension and other metabolic disorders ([Caldwell et al., 2019](#); [F. Yang et al., 2021](#)). Decreased sleep quality is directly associated with increased blood pressure,

which can affect the health of the heart and blood vessels. Circadian rhythm disturbances caused by shift work have been proven to play a role in worsening workers' long-term health conditions ([Gamboa Madeira et al., 2021](#)). This reinforces the importance of proper sleep quality management in reducing the negative impact on the long-term health of shift workers.

#### *4.3.2 Physical Fatigue and Productivity*

The sobriety test used in this study proved effective in assessing physical fatigue among shift workers. Workers who slept < 6 h experienced higher levels of physical fatigue, which was associated with decreased motor ability and alertness. This finding is consistent with the results of [Seong et al. \(2022\)](#), who reported that physical fatigue can affect productivity and increase the risk of workplace injuries. In addition, [Maharani and Nugroho \(2022\)](#) revealed that excessive physical fatigue due to lack of sleep can reduce work efficiency and increase employee absenteeism.

#### *4.3.3 Hypertension and Cardiovascular Disorders*

Shift workers who slept less than 6 hours had higher systolic and diastolic blood pressure, leading to an increased risk of hypertension. Research by [L. Yang, Birhane, Zhu, and Geng \(2021\)](#) also showed that sleep disturbances due to shift work can worsen heart disease and increase the risk of stroke. Therefore, better sleep quality management is important to reduce the negative impact on the long-term health of shift workers. In addition, sleep disturbances caused by shift work can increase physiological stress, leading to metabolic and cardiovascular disorders ([Boini et al., 2022](#); [Haghayegh et al., 2023](#)). Therefore, better sleep quality management is important to reduce the negative impact on the long-term health of shift workers. In addition, the use of the Sobriety Test as a tool to measure physical fatigue can help in managing worker health, enabling better preventive actions to reduce the risk of hypertension and cardiovascular disorders.

## **5. Conclusions**

### **5.1 Conclusion**

This study demonstrated a significant relationship between shift work, sleep quality, physical fatigue, and hypertension among shift workers at PT. Maggala Alam Lesari. Workers who slept less than 6 hours per night showed higher levels of physical fatigue and systolic blood pressure, increasing the risk of hypertension. In contrast, those who slept more than 6 hours had better sleep quality and lower blood pressure, highlighting the importance of sleep management in reducing health risks.

### **5.2 Research Limitations**

This study has several limitations. The sample size was limited to only 50 employees from a single company, restricting the generalization of the findings to other sectors. Additionally, the study did not account for other factors such as diet, physical activity, or psychological conditions that may affect heart health and fatigue. The method used to measure physical fatigue, the sobriety test, does not fully address mental or psychological fatigue, suggesting the need for more comprehensive measurement methods in future research.

### **5.3 Suggestions and Directions for Future Research**

Future research should explore the effectiveness of sleep intervention programs, such as sleep management education and work schedule adjustments, to mitigate physical fatigue and improve heart health. Expanding the sample to include employees from various industries and regions would provide a broader understanding of the relationship between sleep quality, physical fatigue, and hypertension. Additionally, incorporating measurements of mental fatigue through psychological questionnaires or cognitive tests could provide a more holistic view of fatigue and its impact on both health and productivity. Further studies will help design more effective strategies to improve employee well-being and reduce long-term health risks.

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### Author Contributions

JF was responsible for the conceptualization, study design, data collection, analysis, manuscript drafting, and revision. SS contributed to the study design, data collection, manuscript revision, and supervision. Both authors approved the final manuscript for submission.

### References

- Alfi, W. N., & Yuliwar, R. (2018). The relationship between sleep quality and blood pressure in patients with hypertension. *Jurnal Berkala Epidemiologi*, 6(1), 18. doi:<https://doi.org/10.20473/jbe.v6i12018.18-26>
- Amin, S., Muhtar, N. L. N., Sumardiawan, D. K., & Yulianingsih, T. S. Y. (2024). Studi In Silico Senyawa Daun Salam Sebagai Antidiabetes Melalui Mekanisme Inhibitor SGLT-2. *Jurnal Ilmu Medis Indonesia*, 4(1), 21-29. doi:<https://doi.org/10.35912/jimi.v4i1.4539>
- Andini, F. A. D., & Siregar, A. Y. (2024). Work hours and the risk of hypertension: the case of Indonesia. *BMC public health*, 24(1), 2480. doi:<https://doi.org/10.1186/s12889-024-20003-z>
- Boini, S., Bourgard, E., Ferrieres, J., & Esquirol, Y. (2022). What do we know about the effect of night-shift work on cardiovascular risk factors? An umbrella review. *Frontiers in public health*, 10, 1034195. doi:<https://doi.org/10.3389/fpubh.2022.1034195>
- Caldwell, J. A., Caldwell, J. L., Thompson, L. A., & Lieberman, H. R. (2019). Fatigue and its management in the workplace. *Neuroscience & Biobehavioral Reviews*, 96, 272-289. doi:<https://doi.org/10.1016/j.neubiorev.2018.10.024>
- Chaal, M., Ren, X., BahooTorood, A., Basnet, S., Bolbot, V., Banda, O. A. V., & Van Gelder, P. (2023). Research on risk, safety, and reliability of autonomous ships: A bibliometric review. *Safety science*, 167, 106256. doi:<https://doi.org/10.1016/j.ssci.2023.106256>
- Cunningham, T. R., Guerin, R. J., Ferguson, J., & Cavallari, J. (2022). Work-related fatigue: A hazard for workers experiencing disproportionate occupational risks. *American journal of industrial medicine*, 65(11), 913-925. doi:<https://doi.org/10.1002/ajim.23325>
- de Leeuw, P. W. (2022). Night shifts and hypertension. *The Journal of Clinical Hypertension*, 24(5), 609. doi:<https://doi.org/10.1111/jch.14459>
- Dias, M., Silva, L., Folgado, D., Nunes, M. L., Cepeda, C., Cheetham, M., & Gamboa, H. (2023). Cardiovascular load assessment in the workplace: A systematic review. *International Journal of Industrial Ergonomics*, 96, 103476. doi:<https://doi.org/10.1016/j.ergon.2023.103476>
- Duan, J., Wang, Y., Chen, L., Chen, C. P., & Zhang, R. (2024). Employing broad learning and non-invasive risk factor to improve the early diagnosis of metabolic syndrome. *Iscience*, 27(1), 1-17. doi:<https://doi.org/10.1016/j.isci.2023.108644>
- El Meouchy, P., Wahoud, M., Allam, S., Chedid, R., Karam, W., & Karam, S. (2022). Hypertension related to obesity: pathogenesis, characteristics and factors for control. *International journal of molecular sciences*, 23(20), 12305. doi:<https://doi.org/10.3390/ijms232012305>
- Ervina, L., Berawi, K., Busman, H., Irawan, B., Azizah, N., & Yolanda, J. E. (2025). Laboratory and Clinical Manifestation Correlation of Neonatal Sepsis in Abdul Moeloek Hospital. *Jurnal Ilmu Medis Indonesia*, 4(2), 145-115. doi:<https://doi.org/10.35912/jimi.v4i2.4250>
- Frone, M. R., & Tidwell, M.-C. O. (2015). The meaning and measurement of work fatigue: Development and evaluation of the Three-Dimensional Work Fatigue Inventory (3D-WFI). *Journal of occupational health psychology*, 20(3), 273. doi:<https://psycnet.apa.org/doi/10.1037/a0038700>
- Gamboa Madeira, S., Fernandes, C., Paiva, T., Santos Moreira, C., & Caldeira, D. (2021). The impact of different types of shift work on blood pressure and hypertension: a systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18(13), 6738. doi:<https://doi.org/10.3390/ijerph18136738>

- Hadi, C. (2024). Neuroekonomi Interdependensi. *Kajian Psikologi dan Kesehatan Mental*, 2(2), 109-121. doi:<https://doi.org/10.35912/kpkm.v2i2.5529>
- Haghayegh, S., Strohmaier, S., Hamaya, R., Eliassen, A. H., Willett, W. C., Rimm, E. B., & Schernhammer, E. S. (2023). Sleeping difficulties, sleep duration, and risk of hypertension in women. *Hypertension*, 80(11), 2407-2414. doi:<https://doi.org/10.1161/HYPERTENSIONAHA.123.21350>
- Hasibuan, H., Risdawati, I., & Ismaidar, I. (2024). Implementation Of Medical Checks (Mcu) In The Workforce In Hotel Companies. *Jurnal Ilmiah Advokasi*, 12(1), 113-123. doi:<https://doi.org/10.36987/jiad.v12i1.5588>
- Hidayanti, R. C., & Sumaryono, S. (2021). The role of sleep quality as mediator of relationship between workload and work fatigue in mining workers. *Jurnal Psikologi Universitas Gadjah Mada*, 48(1), 62-79. doi:<https://doi.org/10.22146/jpsi.61154>
- Horberry, T., Harris, J., Cliff, D., Dodshon, P., Lee, J., Lim, N., & Way, K. (2023). Fatigue management in mining: current practices and future directions. *Journal of work health and safety regulation*, 2(2), 145-155. doi:<https://doi.org/10.57523/jaohlev.oa.23-004>
- James, S. M., Honn, K. A., Gaddameedhi, S., & Van Dongen, H. P. (2017). Shift work: disrupted circadian rhythms and sleep—implications for health and well-being. *Current sleep medicine reports*, 3(2), 104-112. doi:<https://doi.org/10.1007/s40675-017-0071-6>
- Kundori, K., Fauziningrum, E., & Sukrisno, S. (2025). Physical and social environment as predictors of job satisfaction for seafarers: An empirical study of the shipping industry in Indonesia. *Annals of Human Resource Management Research*, 5(3), 95-108. doi:<https://doi.org/10.35912/ahrmr.v5i3.3156>
- Li, C., & Shang, S. (2021). Relationship between sleep and hypertension: findings from the NHANES (2007–2014). *International Journal of Environmental Research and Public Health*, 18(15), 7867. doi:<https://doi.org/10.3390/ijerph18157867>
- Maharani, P., & Nugroho, B. Y. S. (2022). Dampak Kelelahan Kerja Dan Kualitas Tidur Terhadap Pengaruh Produktivitas Kerja. *Journal of Industrial Hygiene and Occupational Health*, 7(1), 69-79. doi:<https://doi.org/10.21111/jihoh.v7i1.8442>
- Prastiwi, D. T. K. (2025). The Influence of Social Identity and Attitudes Toward Anti-Smoking Campaigns on Smokers' Self-stigma. *Kajian Psikologi dan Kesehatan Mental*, 3(1), 1-11. doi:<https://doi.org/10.35912/kpkm.v3i1.5388>
- Ratri, B. A., Kusnul, Z., & Sumirat, W. (2022). Gangguan Pola Tidur Pada Lansia Hipertensi: Sleep Disorders In Hypertension Elderly. *Jurnal Ilmiah Pamenang*, 4(2), 61-66. doi:<https://doi.org/10.53599/jip.v4i2.98>
- Seong, S., Park, S., Ahn, Y. H., & Kim, H. (2022). Development of an integrated fatigue measurement system for construction workers: a feasibility study. *BMC public health*, 22(1), 1593. doi:<https://doi.org/10.1186/s12889-022-13973-5>
- Tsipkalo, A., Kozak, K., & Marushchak, M. (2024). Relationship between sleep quality and blood pressure level in nurses performing shift work. *Frontiers of Nursing*, 11(1), 77-84. doi:<https://doi.org/10.2478/fon-2024-0008>
- van Heijster, H., Boot, C. R., Robroek, S. J., Oude Hengel, K., van Berkel, J., de Vet, E., & Coenen, P. (2021). The effectiveness of workplace health promotion programs on self-perceived health of employees with a low socioeconomic position: an individual participant data meta-analysis. *SSM-Population Health*, 13, 100743. doi:<https://doi.org/10.1016/j.ssmph.2021.100743>
- Yang, F., Zhang, Y., Qiu, R., & Tao, N. (2021). Association of sleep duration and sleep quality with hypertension in oil workers in Xinjiang. *PeerJ*, 9, e11318. doi:<https://doi.org/10.7717/peerj.11318>
- Yang, L., Birhane, G. E., Zhu, J., & Geng, J. (2021). Mining employees safety and the application of information technology in coal mining. *Frontiers in Public Health*, 9, 709987. doi:<https://doi.org/10.3389/fpubh.2021.709987>