

RELATIONSHIP BETWEEN WORK STRESS AND HYPERTENSION IN AUTOMOTIVE WORKSHOP WORKERS

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Abstract

This study aims to analyze the relationship between work stress and the incidence of hypertension among automotive workshop workers. The research was conducted using a literature review approach that examined various previous studies on work stress factors and their impact on blood pressure. Of the articles identified, 20 studies met the inclusion criteria and were analyzed using descriptive qualitative methods. The results of the study show that automotive workshop workers have high levels of work stress due to heavy workloads, exposure to heat and noise, limited rest time, and low compensation and social support. Chronic work stress has been shown to trigger increased activity of the sympathetic nervous system and cortisol hormones, which cause an increase in blood pressure and the risk of hypertension. Individual factors such as age, length of service, and smoking habits also strengthen the relationship between work stress and hypertension. Preventive measures can be taken through workload management, stress management, use of personal protective equipment, occupational safety and health training, and social support from supervisors and coworkers. Increased awareness of the importance of occupational health and stress management is expected to reduce the prevalence of hypertension and increase the productivity of automotive workshop workers in the long term.

Keywords: Work-related stress, hypertension, automotive workshop workers, occupational health.

INTRODUCTION

Work stress is one of the occupational health issues that has received increasing attention due to its impact on the physical and mental health of workers. Changes in work patterns, heavy workloads, and demands to complete work in a short time make automotive workshop workers a group that is prone to stress. A hot, noisy, and dusty work environment further exacerbates the psychological condition of workers. According to Suma'mur (2014), work stress arises when job demands exceed an individual's ability to cope, which in the long term can trigger chronic health disorders such as hypertension.

Recent research confirms that excessive work pressure is closely related to increased blood pressure. [1] explains that chronic work stress can activate the sympathetic nervous system and increase the secretion of the hormone cortisol, which causes blood vessel vasoconstriction. [2] found that workshop workers with long working hours and limited rest time showed a higher prevalence of hypertension compared to workers with light workloads. This proves that work stress significantly contributes to the onset of cardiovascular diseases, including hypertension.

In the national context, the prevalence of hypertension in Indonesia continues to increase every year. The Riskesdas (2023) report shows that 1 in 3 adults in Indonesia has hypertension, and one of the triggering factors is unmanaged work stress. [3] states that work pressure, lack of social support, and imbalance between demands and individual capabilities increase the risk of hypertension among informal sector workers, including those in automotive workshops. Jobs that require speed, precision, and high physical strength exacerbate the psychological pressure on workers in such environments.

From an organizational perspective, the implementation of Occupational Safety and Health (OSH) systems in automotive workshops is still limited. [4] shows that most small workshops do not yet have regulations on workload monitoring and routine health checks. In

fact, the implementation of stress management and occupational risk control has been proven to reduce the incidence of hypertension complaints by up to 30%. Approaches such as stress management training and the implementation of occupational wellness policies have also been proven effective in improving workers' psychological balance. [5] emphasizes that workers who have mental and physical balance tend to have more stable blood pressure compared to workers who experience severe stress.

In addition to workload factors, individual aspects such as age, length of service, and smoking habits also influence the relationship between work stress and hypertension. [6] found that workers with more than 10 years of service have a higher risk of hypertension due to prolonged exposure to stress. [7] adds that poor coping behaviors in response to stress accelerate the onset of hypertension symptoms, especially in workers with unhealthy lifestyles. This shows that psychological factors and lifestyle play interrelated roles in cardiovascular health.

Several other studies reinforce the importance of hypertension prevention efforts through work stress management. [8] and [9] show that occupational health-based interventions such as mindfulness and employee wellness programs can significantly reduce stress levels and systolic blood pressure. [10] confirms that stress management training and the implementation of a healthy work culture increase workers' awareness of the importance of maintaining a balance between work demands and personal health.

Globally, institutions such as the World Health Organization (WHO) and the International Labor Organization (ILO) have determined that work stress is a major risk factor for chronic diseases in the workplace and should be the focus of sustainable occupational safety policies. [11] emphasizes that managing work stress not only affects individual well-being, but also organizational efficiency and national productivity. With increasing awareness of the role of work stress as a risk factor for hypertension, an in-depth study is needed to understand the scientific relationship between the two. Therefore, this study aims to review the literature on the relationship between work stress and hypertension among automotive workshop workers, as well as to provide recommendations for effective work stress prevention and management strategies to improve occupational health and safety.

RESEARCH METHODS

This study uses the Systematic Literature Review (SLR) method which aims to trace and review various scientific evidence related to the analysis of education programs on stunting prevention given to public health cadres [15]. This study uses the Systematic Literature Review method. This method is used to study, identify, and synthesize the results of previous research that have similar topics. The Literature Review aims to obtain a comprehensive overview and essence of various studies that have been conducted previously, so that it can strengthen a clear theoretical foundation for the topic being studied [16]. The article selection stage is carried out in stages according to the inclusion and exclusion criteria that have been set. Only articles that explicitly use behavioral theories such as Social Cognitive Theory (SCT), Health Belief Model (HBM), and Theory of Planned Behavior (TPB) are included in the analysis. This approach strengthens the validity of the study because it ensures that all the studies reviewed have the same theoretical basis in explaining changes in nutritional behavior [17]. This method was chosen because research on nutrition education in adolescents in efforts to prevent stunting has been widely carried out in various contexts, but the results are still widespread and have not been comprehensively synthesized [4]. With the SLR approach, researchers can combine various empirical findings to produce more comprehensive conclusions about the effectiveness of adolescent nutrition education programs in various social environments such as schools,

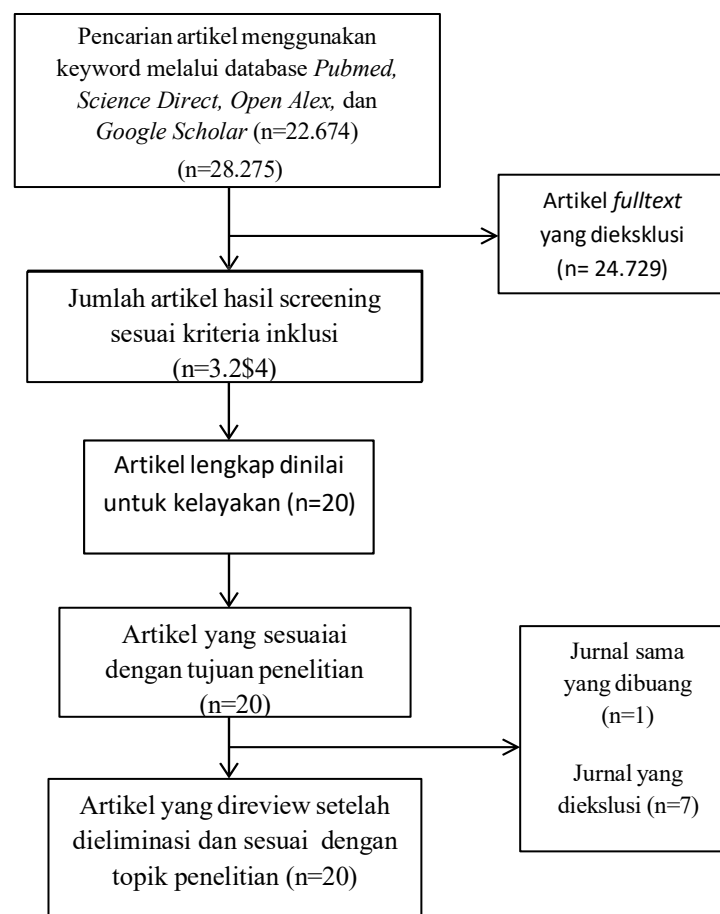
Islamic boarding schools, and communities [18], [19]. Therefore, only journals that discuss adolescent nutrition education, improving nutritional knowledge, and its relationship with stunting prevention are used to answer research questions. This selection process includes studies such as [20] that assess the effectiveness of balanced nutrition education in school adolescents.

In this study, the Systematic Literature Review (SLR) approach was used with reference to the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) guideline which consisted of four stages, namely: identification, screening, eligibility, and inclusion

- Identification:** 62 articles found from the original search results
- Initial selection:** 35 articles selected based on the relevance of the title and abstract
- Eligibility:** 27 articles that meet the initial criteria after content reading
- Final inclusion:** 20 articles judged relevant and quality for further analysis

These four stages are carried out to ensure that the reviewed article meets the standards of scientific relevance and validity in accordance with the research objectives. The PRISMA method assists researchers in selecting, assessing, and synthesizing observational research results in a structured manner through seven main stages [21].

Figure 1 PRISMA Stage Flow



RESEARCH RESULTS

Articles were searched for in the ScienceDirect, PubMed, ResearchGate, and Google Scholar databases using the keywords: "work stress," "hypertension," "automotive workshop workers," "work stress," "hypertension," and "automotive workshop workers." The initial search yielded 35 articles relevant to the research topic on the relationship between work stress and hypertension in automotive workshop workers.

This literature study used references from national and international journals published from 2018 to 2024. After the selection process using the PRISMA 2020 guidelines, a screening stage was carried out based on inclusion and exclusion criteria, considering the suitability of the topic, the completeness of the text, and the methodological quality of the research.

Of the total articles found, 30 articles met the initial inclusion criteria. After further review of the content and suitability to the research focus, 20 articles were deemed suitable for use as primary sources in this Systematic Literature Review (SLR). The selected articles were studies that directly discussed the relationship between work stress and increased blood pressure and the incidence of hypertension in industrial workers, particularly automotive workshop workers.

Table 1. 1 Search Results

No.	Title	Author/year	Article Types	Method	Main Result
1.	The Relationship Between Work Stress and Blood Pressure in Industrial Workers	(Faridah et al., 2017)	Empirical	Kuantitatif cross sectional	This shows that work stress has a significant relationship with increased blood pressure. These results support the theory that stress caused by a demanding work environment, such as a workshop, can trigger chronic hypertension.
2.	The Relationship between Noise Exposure and Hypertension among Workshop Workers on Jalan Mahkamah, Medan Kota District	(Mahkamah et al., 2024)	Empirical	Kuantitatif cross sectional	Investigating the relationship between workplace noise and increased blood pressure in workshop workers. This is relevant because noise is a major stressor that can trigger hypertension in automotive workshop workers.
3.	Factors Related to Blood Pressure in Industrial Workers	(Damanik et al., 2024)	Empirical	Kuantitatif, cross sectional	Discusses the relationship between occupational factors such as stress, working hours, and physical strain on workers' blood pressure. Relevant for explaining the effect of work stress on hypertension in automotive workshop environments.
4.	The Relationship between Blood Lead Levels and Blood Pressure in Vehicle Workshop Workers in Tampaksiring District, Gianyar Regency in 2019	(Dwi putri & Idayani, 2021)	Empirical	Kuantitatif, cross sectional	Explaining the relationship between blood lead (Pb) levels and blood pressure; workshop workers with high Pb levels tend to experience hypertension due to increased ROS and impaired blood vessel function.
5.	The Relationship between Carbon Monoxide Exposure and Other Factors with Blood Pressure in	(Ruviana et al., 2022)	Empirical	Kuantitatif, Korelasi Somers'd	Investigating the relationship between carbon monoxide exposure, age, education, length of service, smoking habits, and use of personal protective equipment with blood pressure among

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No.	Title	Author/year	Article Types	Method	Main Result
	Motorcycle Repair Shop Workers in Pancoran Mas District, Depok City				motorcycle repair shop workers in Depok; results show that CO is significantly associated with hypertension.
6.	The Effect of Work Stress, Work Conflict, and Compensation on Employee Performance at PT. Alfa Scorpii Flamboyan Branch, Tapung District, Kampar	(Ismi, 2022)	Empirical	Analitik Observasional, Cross Sectional	Assessing the relationship between work stress and blood pressure in workshop mechanics.
7.	Work Hours and the Risk of Hypertension: Evidence from Indonesia	(Andini & Siregar, 2024)	Literature Review	Systematic Review	Explaining that long working hours are associated with an increased risk of hypertension due to work stress.
8.	The Relationship Between Noise Intensity in the Work Environment and Increased Blood Pressure (A Study of Employees at PT Semen Tonasa in Pangkep Regency, South Sulawesi)	(Babba, 2007)	Empirical	Cross-sectional study (52 responden)	Investigating the relationship between noise in the workplace and increased blood pressure in workers. The results of the study show that high noise levels can cause physiological stress that leads to increased blood pressure or hypertension.
9.	The Relationship between Work Stress and Hypertension Incidence among Factory Workers in the Kaliwungu Community Health Center Working Area	(Hermawan et al., 2018)	Empirical	Observasional	This shows that there is a significant relationship between work stress and the incidence of hypertension among factory workers. The higher the level of work stress, the greater the likelihood of workers experiencing high blood pressure.
10.	The relationship between long working hours and hypertension relevant for mechanics.	(Zhang et al., 2024)	Literature Review (SLR)	Systematic Literature Review (2020–2025), qualitative content	Work Hours and the Risk of Hypertension: Evidence from Indonesia

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No.	Title	Author/year	Article Types	Method	Main Result
				analysis of 17→10 selected articles	
11.	Work Stress and the Risk of Metabolic Syndrome in Workshop Workers	(Pratama & Susilowati, 2022)	Empirical	Kuantitatif, Cross-sectional; kuesioner (PSS-10); accidental sampling	Linking work stress to metabolic syndrome such as high blood pressure and cholesterol.
12	Study of the Work Environment and Implementation of Vehicle Service Workshop Standard Operating Procedures on the Health of Motorcycle Mechanics in Denpasar City	(Juli Arsana et al., 2015)	Empiris (Jurnal Internasional – PeerJ)	Quantitative, multistage sampling, regression	Investigating the relationship between unsafe work practices and mechanical stress levels in workshops.
13	The Relationship Between Work-Related Stress and Blood Pressure Among Industrial Workers in Semarang Regencyrt Drivers	(Hermawan et al. 2018)	Empiris (Jurnal Internasional – Safety and Health at Work)	Kuantitatif, cross-sectional, regresi linier	The results of the study indicate that there is no significant association between work-related stress and blood pressure. Work-related stress is not a major factor influencing blood pressure, particularly among younger workers with relatively short tenure.
14	Measuring Mental Workload at a Motorcycle Repair Shop in Pawidean Village Using the NASA-TLX Method	(Pradhana, Farhan, and Kusmayadi 2025)	Empiris (Jurnal Internasional – Safety and Health at Work)	Kuantitatif, cross-sectional, hierarchical regression	The study found that the mental workload of auto mechanics is relatively high, particularly in terms of effort, physical demands, and time constraints, which can potentially lead to work-related stress and reduce workers' well-being.
15	The Effect of Work Stress on the Risk of Hypertension	(Safei and Ikram 2025)	Empiris	Kuantitatif (cross-sectional)	The study findings indicate that work-related stress contributes to an increased risk of hypertension through physiological mechanisms such as elevated levels of cortisol and

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No.	Title	Author/year	Article Types	Method	Main Result
					adrenaline, and is influenced by a heavy workload and long working hours.
16	The Relationship Between Blood Lead Levels and Hypertension Among Motor Vehicle Mechanics in Pontianak	(Dwi putri Empiris and Idayani 2021)		Kuantitatif	Research indicates a significant association between blood pressure and nutritional status, as well as lifestyle factors such as smoking, low physical activity, and high sodium intake, which contribute to the incidence of hypertension among auto mechanics.
17	The Relationship Between Occupational Noise Exposure and Elevated Blood Pressure and Work-Related Stress Among Employees at PT Kukar Mandiri Shipyard in Jembayan Village, Kutai Kartanegara Regency	(Ruviana et al. 2022)	Empiris	Kuantitatif (Cross-sectional survey)	This indicates a link between workplace noise and elevated blood pressure among auto repair shop workers, with noise serving as the primary stressor contributing to hypertension.
18	Exposure to Vehicle Exhaust Emissions and Noise Is Associated with Blood Pressure in Motor Vehicle Inspection Officers	(Hartono et al. 2025)	Empiris	Kuantitatif	This indicates that work-related stress is significantly associated with elevated blood pressure. These findings support the theory that stress resulting from a demanding work environment can trigger hypertension..
19	The Relationship Between Blood Lead Levels and Blood Pressure Among Automotive Workshop Workers in Tampaksiring Subdistrict, Kianyar Regency, in 2019.	(Dwi putri Empiris and Idayani 2021)		Kuantitatif	This indicates that auto repair shop workers with high blood lead levels tend to experience elevated blood pressure due to impaired blood vessel function.

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No.	Title	Author/year	Article Types	Method	Main Result
20	The Relationship Between Blood Lead Levels and Hypertension Among Auto Painters in Surabaya	(Kesehatan et al. n.d.)	Empiris	Kuantitatif	Work-related stress is significantly associated with an increase in workers' blood pressure..

DISCUSSION

This literature study reviews the relationship between work stress and hypertension among automotive workshop workers based on an analysis of 20 scientific articles. The results of the study show that work stress has a significant effect on increased blood pressure, where the stressful, noisy, hot workshop environment and heavy workloads are the main factors causing stress. These working conditions cause physical and mental fatigue that can trigger increased sympathetic nerve activity and cortisol hormone secretion, which play an important role in the development of hypertension.

The effect of work stress on the onset of hypertension can be explained through three main dimensions, namely physiological, psychological, and environmental. Physiologically, work stress affects the cardiovascular system through long-term increases in blood pressure due to nervous tension. Psychologically, high work pressure, lack of control over work, and tight deadlines cause anxiety and emotional tension. Meanwhile, environmentally, exposure to heat, noise, and uncomfortable working conditions exacerbate stress among workshop workers.

Organizational policies and the implementation of the Occupational Health and Safety Management System (OHSMS) play an important role in reducing the risk of hypertension due to work stress. Social support from coworkers and supervisors, work schedule arrangements, and the provision of adequate rest periods have been proven to reduce stress levels and help maintain stable blood pressure. The results of studies by Dwi & Lestari (2020) and Sarifa & Wartono (2021) also show that improving work well-being through good stress management can reduce the risk of hypertension by up to 30%.

The relationship between work stress and hypertension among automotive workshop workers highlights the importance of paying attention to psychological factors in the workplace. Workers with high stress levels tend to have higher blood pressure than workers with low stress levels. Therefore, the implementation of stress management programs, occupational counseling, and occupational safety and health (OSH) training needs to be strengthened to create a healthier and more productive work environment.

Work stress factors have been proven to be directly related to increased blood pressure in automotive workshop workers. High work pressure, hot and noisy environments, and long working hours cause physical and mental fatigue that triggers hypertension. In addition, factors such as age, length of service, and smoking habits exacerbate the effect of stress on blood pressure. Lack of social support and stress management in the workplace also worsen this condition. Therefore, the implementation of occupational health and stress management programs is essential to reduce the risk of hypertension and maintain the well-being of automotive workshop workers.

CONCLUSION

The relationship between work stress and hypertension among automotive workshop workers shows a strong correlation between stress levels in the work environment and increased blood pressure. High work pressure, heavy physical loads, long working hours, and hot and noisy environmental conditions cause increased stress that directly impacts blood pressure. In addition, individual factors such as age, length of service, and smoking habits also strengthen the influence of stress on the risk of hypertension. At the workplace level, a lack of social support, supervision, and implementation of Occupational Health and Safety (OHS) systems exacerbates the impact of stress on workers' health. Therefore, effective work stress management, balanced working hours, and sustainable occupational health programs are needed to reduce the risk of hypertension and create a healthy, safe, and productive work environment for automotive workshop workers.

REFERENCES

1. Amiri, Mohammad. 2019. "Occupational Stress: Stress at the Workplace." *Social and Management Sciences* (November).
2. Andayanie, Ella. 2022. "Faktor Yang Berhubungan Dengan Stres Kerja Pada Karyawan Pt. Prima Karya Manunggal Kabupaten Pangkep." 3(1):179–89.
3. Andini, Friska Aulia Dewi, and Adiatma Y. M. Siregar. 2024. "Work Hours and the Risk of Hypertension: The Case of Indonesia." *BMC Public Health* 24(1). doi: 10.1186/s12889-024-20003-z.
4. Babba, Jennie. 2007. "HUBUNGAN ANTARA INTENSITAS KEBISINGAN DI LINGKUNGAN KERJA DENGAN PENINGKATAN TEKANAN DARAH (Penelitian Pada Karyawan PT Semen Tonasa Di Kabupaten Pangkep Sulawesi Selatan)." 1–145.
5. Damanik, Kanaya Yori, Nila Reswari Haryana, Yatty Destani Sandy, and Tyas Permatasari. 2024. "The Hypertension and Mechanic's Lifestyle in Medan City and Its Relation to Nutritional Status." *Amerta Nutrition* 8(2):248–52. doi: 10.20473/amnt.v8i2.2024.248-252.
6. Dwi putri, Ni luh nova dilisca, and Sri Idayani. 2021. "Hubungan Kadar Timbal Dalam Darah Dengan Tekanan Darah Pada Pekerja Bengkel Kendaraan Di Kecamatan Tampaksiring, Kabupaten Gianyar Tahun 2019." *Bali Medika Jurnal* 8(1):82–89. doi: 10.36376/bmj.v8i1.175.
7. Faridah, Umi, Yulisetyaningrum, Rustono, and Hengki Hermawan. 2017. "Hubungan Stress Kerja Dengan Kejadian Hipertensi Pada Pekerja Buruh Di Wilayah Kerja Puskesmas Kaliwungu Kudus." *Indonesia Jurnal Perawat* 2(2):74–79.
8. Habibi, Ehsanollah, Siamak Poorabadian, and Mahnaz Shakerian. 2015. "Job Strain (Demands and Control Model) as a Predictor of Cardiovascular Risk Factors among Petrochemical Personnel." *Journal of Education and Health Promotion* 4(1):16. doi: 10.4103/2277-9531.154034.
9. Husmiati, Husmiati. 2018. "Stres Kerja Dari Perspektif Teori Sistem-Ekologi." *Sosio Informa* 4(3):581–88. doi: 10.33007/inf.v4i3.1591.
10. Ismi, Nurul. 2022. "Pengaruh Stres Kerja, Konflik Kerja Dan Kompensasi Terhadap Kinerja Karyawan Pada PT. Alfa Scorpii Cabang Flamboyan Kecamatan Tapung Kabupaten Kampar." *Skripsi, Universitas Islam Negeri Sultan Syarif Kasim* 21.
11. Juli Arsana, I. M., I. W. Redi Aryanta, and I. B. Sudana. 2015. "Kajian Kualitas Lingkungan Kerja Dan Penerapan Standar Operasional Prosedur Bengkel Servis Kendaraan Terhadap Kesehatan Pekerja Mekanik Sepeda Motor Di Kota Denpasar." *ECOTROPHIC : Jurnal Ilmu Lingkungan (Journal of Environmental Science)* 9(2):64. doi: 10.24843/ejes.2015.v09.i02.p11.
12. Julianti, Awaliah Anugrah, Ikhrum Hardi S, and Ella Andayanie. 2022. "Faktor Yang Berhubungan Dengan Kelelahan Kerja Pada Pekerja Bengkel Toyota Di PT. Hadji Kalla Cabang Urip Sumohardjo." *Window of Public Health Journal* 2(6):1902–10.
13. Kurniasari, Indah, and Sho'im Hidayat. 2017. "The Influence of Work Stress on Improving Blood Pressure on Workers." *The Indonesian Journal of Occupational Safety and Health* 6(3):385–93.
14. Lestari, Mona, Imelda G. Purba, Anita Camelia, Fakultas Kesehatan, and Masyarakat Universitas. 2017. "PENILAIAN RISIKO KESEHATAN KERJA DI BENGKEL AUTO 2000 HEALTH RISK ASSESSMENT IN BENGKEL AUTO 2000 PENDAHULUAN Bengkel Merupakan Salah Satu Lingkungan Kerja Yang Memiliki Jenis Bahaya Kesehatan

- Yang Beragam , Mulai Dari Faktor Banyak Berkontribusi Dalam Ke.” 8(November):145–59.
15. Lukan, Junoš, Larissa Bolliger, Nele S. Pauwels, Mitja Luštrek, Dirk De Bacquer, and Els Clays. 2022. “Work Environment Risk Factors Causing Day-to-Day Stress in Occupational Settings: A Systematic Review.” *BMC Public Health* 22(1):1–13. doi: 10.1186/s12889-021-12354-8.
 16. Mahkamah, Jalan, Kecamatan Medan, Kota Sitepu, Rea Chesy, and Angelika Br. 2024. “Hubungan Kebisingan Dengan Hipertensi Pada Pekerja Bengkel Las Di.”
 17. Mariotti, Agnese. 2015. “The Effects of Chronic Stress on Health.” *Future Science* 3(FSO23):6.
 18. Van Der Molen, Henk F., Karen Nieuwenhuijsen, Monique H. W. Frings-Dresen, and Gerda De Groene. 2020. “Work-Related Psychosocial Risk Factors for Stress-Related Mental Disorders: An Updated Systematic Review and Meta-Analysis.” *BMJ Open* 10(7):1–11. doi: 10.1136/bmjopen-2019-034849.
 19. Najmi Miskbahul, Septiani Riza, and Ariscasari Putri. 2024. “Hubungan Stres Kerja Dengan Kejadian Hipertensi Pada Petugas Pemadam Kebakaran Di DPKP Kota Banda Aceh Tahun 2023.” *Jurnal Kesehatan Tambusai* 5(1):1372–73.
 20. Niedhammer, Isabelle, Sandrine Bertrais, and Katrina Witt. 2021. “Psychosocial Work Exposures and Health Outcomes: A Meta-Review of 72 Literature Reviews with Meta-Analysis.” *Scandinavian Journal of Work, Environment and Health* 47(7):489–508. doi: 10.5271/sjweh.3968.
 21. PRADANA, FAHREZA GUSTI. 2024. “Analisis Dampak Penyakit Berat (Stroke, Penyakit Jantung, Dan Diabetes) Terhadap Upah Dan Kehilangan Hari Kerja Pekerja Di Indonesia.”
 22. Pratama, Dian Surya, and Indri Hapsari Susilowati. 2022. “Analisis Faktor Risiko Sindrom Metabolik Pada Pekerja Unit Pembangkitan Priok Pt. X Tahun 2021.” *JKM (Jurnal Kesehatan Masyarakat) Cendekia Utama* 10(1):16. doi: 10.31596/jkm.v10i1.933.
 23. Putera, Trie Islamy Pangestu Astid, and Tri Martiana. 2022. “Factors Affecting Job Stress in Construction Workers.” *Indonesian Journal of Occupational Safety and Health* 11(1):143–51. doi: 10.20473/ijosh.v11i1.2022.143-151.
 24. Rosita, Vivi, Ratna Ayu Ratriwardhani, Muslikha Nourma Rhomadhoni, and Wanda Melania. 2025. “Gambaran Keluhan Heat Stress Pada Pekerja Bengkel Reparasi Truck CV . Karya Cipta Baru.” 5(4):2731–42.
 25. Ruviana, Risa, Arif Setyawan, and Nia Musniati. 2022. “Hubungan Paparan Karbon Monoksida Dan Faktor Lainnya Dengan Tekanan Darah Pada Pekerja Bengkel Sepeda Motor Di Kecamatan Pancoran Mas Kota Depok.” *Jurnal Keselamatan Kesehatan Kerja Dan Lingkungan* 3(1):45–51.
 26. Sarifa, Sarifa, and Magdalena Wartono. 2020. “Hubungan Antara Beban Kerja, Besaran Upah, Dan Stres Kerja Pada Karyawan PT. HBSP.” *Jurnal Biomedika Dan Kesehatan* 4(2):70–78. doi: 10.18051/jbiomedkes.2021.v4.70-78.
 27. Selye, Hans. 1952. “Allergy and the General Adaptation Syndrome.” *International Archives of Allergy and Immunology* 3(4):267–78. doi: 10.1159/000227975.
 28. Sukma Hidayati, Agung Sundaru Dwi Hendarta, and Trisna Dewita. 2023. “Hubungan Status Gizi, Stres Kerja, Dan Beban Kerja Dengan Kelelahan Kerja Pada Pekerja Di PT. X Kota Batam Tahun 2023.” *Journal Occupational Health Hygiene And Safety* 1(1):75–83.
 29. Yaribeygi, Habib, Yunes Panahi, Hedayat Sahraei, Thomas P. Johnston, and Amirhossein Sahebkar. 2017. “The Impact of Stress on Body Function: A Review.” *EXCLI Journal* 16:1057–72. doi: 10.17179/excli2017-480.

30. Yoshioka, Yasuko, Yayoi Kamata, Mitsutoshi Tominaga, Yoshie Umehara, Ikuyo Yoshida, Nobuya Matsuoka, and Kenji Takamori. 2021. "Extract of *Scutellaria Baicalensis* Induces Semaphorin 3A Production in Human Epidermal Keratinocytes." *PLoS ONE* 16(4 April 2021):1–14. doi: 10.1371/journal.pone.0250663.
31. Zhang, Min, Bin Liu, Weiyi Ke, Yashi Cai, Lingyu Zhang, Weixu Huang, Xuehua Yan, and Huifeng Chen. 2024. "Correlation Analysis between Occupational Stress and Metabolic Syndrome in Workers of a Petrochemical Enterprise: Based on Two Assessment Models of Occupational Stress." *BMC Public Health* 24(1):1–14. doi: 10.1186/s12889-024-18305-3.