

Analysis of the Relationship between Resilience and Stress in Hypertension Patients

Suraying¹, Lailatul Hafidah¹, Faisal Amir², Willi Holis³, Mohammad Shiddiq Suryadi³

¹ Department of Psychiatric and Child Nursing, D-III Nursing Study Program, State Polytechnic of Madura, Indonesia

² Department of Mental Nursing Science Study Program, STIKes Ngudia Husada Madura, Indonesia

³ Department of Psychiatric and Medical Surgical Nursing, Faculty of Nursing, Nazhatut Thullab Al Muafa, Universitas Sampang, Indonesia

Correspondence should be addressed to: Suraying

aying1708@gmail.com

Abstract:

Hypertension is a non-communicable disease that often occurs in society, especially in developing countries. The inability to effectively control hypertension, especially when aggravated by stress, can result in a range of complications and ultimately fatal outcomes. Purpose: The aim of this research is to analyze strengthening resilience towards balancing psychological stress in hypertensive patients. The research method uses a cross-sectional correlation analysis approach carried out in the Bangkalan Regency City Health Center Work Area - Indonesia. The population was 68 patients, and the sample size was 55 respondents taken using simple random sampling. Data were processed using the Spearman Ranks Test with alpha (α) 0.05. The research results show a p value of 0.004 with a correlation coefficient of 0.384, which means there is a positive relationship between strengthening resilience and balancing psychological stress with moderate closeness. Resilience is able to regulate the balance of psychological stress which has an impact on the activation of the neuro-endocrine system to control blood pressure in hypertensive patients.

Article info:

Submitted:
22-02-2024
Revised:
04-05-2024
Accepted:
06-05-2024

Keywords:

resilience; psychological stress; hypertension

DOI: <https://doi.org/10.53713/htechj.v2i3.176>

This work is licensed under CC BY-SA License.



INTRODUCTION

Hypertension is a non-communicable disease often occurring worldwide, especially in developing countries. Hypertension is also mentioned in a study as a global health challenge because of its high prevalence and progressive nature and the pathogenesis seen in sufferers (Harrison et al., 2021). Hypertension is an increase in blood pressure in the arteries (Aulia et al., 2018), which is characterized by systolic pressure above 140 mmHg and diastolic pressure above 90 mmHg (WHO, 2021) and carries a risk of high mortality rates (Umpierre et al., 2019). Hypertension is exacerbated by an imbalance of psychological stress, which leads to negative perceptions, thereby causing stress on the patient's psyche. This is in accordance with research by Cozier et al. (2018), who reported that the etiology and clinical manifestations of hypertension could be exacerbated by psychosocial distress, either directly or indirectly. Moreover, inadequate management of hypertension, especially when compounded by stress, can result in a range of complications and potentially fatal consequences.

According to the World Health Organization (WHO, 2021), the prevalence of hypertension in the world has reached around 1.28 billion sufferers with an age range of 30-79 years. Around 42% of people with hypertension have been diagnosed and are undergoing treatment, but around 46% of the total estimated number of sufferers are not aware that they have high blood pressure. Hypertension has a high mortality rate (WHO, 2021). Hypertension is one of the main causes of death due to disability, with a prevalence of approximately 15% worldwide. Most hypertension patients found in developing countries with low to high incomes do not receive treatment. Meanwhile, most treatment recipients still do not receive medication or reach their blood pressure targets (Heidari et al., 2022).

Hypertension in Indonesia is reported to be 34.1% of the total population. The prevalence in 2013 was 25.8%, and in 2018, it was reported that there had been an increase to 34.1% (Ministry of Health of the Republic of Indonesia, 2018). Data also states that around one-third of the total sufferers have been diagnosed, and the rest are still undiagnosed (Ministry of Health of the Republic of Indonesia, 2018). Meanwhile, in East Java, in 2018, hypertension sufferers reached 11,008,334 people, or 36.3% of the total population. Meanwhile, Bangkalan Regency reportedly contributes around 1,607 people, or 38% of the total population of Bangkalan (Riskesdas Jatim, 2021). A preliminary study at the Bangkalan Community Health Center, Bangkalan Regency, found that 4 out of 10 sufferers experienced severe stress but did not feel it, 3 with moderate stress, and 3 with mild stress. This data confirms that there are still many hypertension sufferers who are stressed with various accompanying psychological manifestations.

Hypertension that fails to be detected early and treated inadequately carries the risk of causing various health problems, especially to the cardiovascular and respiratory systems. The severity of the disease in hypertension can result in imbalance both physically and mentally. Physically, various complications will worsen the prognosis. Complications that are often found in hypertension include microvascular disorders, ischemia, infarction, coronary heart disease, rupture of cerebral blood vessels, and even stroke, dementia, and kidney failure (Manurung, 2016; Kurnia, 2020; Wang et al., 2020; Ungvari et al., 2021). Management of hypertension according to The Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI) 2003 consists of a pharmacological therapy regimen, balanced physical activity, adhering to the Dietary Approach to Stop Hypertension (DASH) program, maintaining weight ideal body, reducing alcohol consumption and avoiding smoking (Chobanian et al, 2003 in Kurnia, 2020). Apart from that, psychotherapy, such as strengthening resilience, also helps maintain blood pressure control in hypertension sufferers. Resilience has a positive impact on reducing anxiety, depression, and stress and can improve the quality of life of multiple sclerosis patients (Giovannetti et al., 2022). Influential resilience, especially those stimulated by spirituality, directly impacts the physical health of the Madurese people in the new normal era (Amir et al., 2022). The objective of the study is to examine resilience in relation to mitigating psychological stress among hypertensive patients.

METHOD

The research method used in this study is correlation analysis with a cross-sectional approach. Correlation analysis is used to determine the closeness of relationships, while cross-sectional is an observational study that analyzes data over one period of time. This research was conducted in the Bangkalan Community Health Center Working Area, Bangkalan Regency, Indonesia, and data collection was collected in May 2023. The population was 68 hypertensive patients who came to the Community Health Center for examination. Meanwhile, the sample obtained was 55 respondents who were taken using simple random sampling. The study includes

patients diagnosed with hypertension who are willing to participate, while those hypertensive patients experiencing complications and unwilling to participate are excluded. The independent variable in this research is resilience, which is measured using the Nicholson McBride Resilience Questionnaire (NMRQ) instrument. Meanwhile, the dependent variable is psychological stress, measured using the perceived stress scale (PSS). The data was then processed and analyzed using SPSS 22 software, and a correlation test was carried out using the Spearman Ranks test with an alpha (α) significance level of 0.05. After that, conclusions were drawn, and their conformity with the research hypothesis was seen to determine whether there was a relationship between resilience and psychological stress balance in hypertensive patients. The research passed the ethical feasibility test with registered number 1244/KEPK/STIKESNHM/EC/IV/2022.

RESULT

The research results are presented in two categories: general data descriptions and statistical tests displayed in tabular form. General data includes gender, age, education level, and occupation. Meanwhile, special data contains cross-tabulations and statistical test results between hypertensive patients' resilience and psychological stress balance.

Table 1. Frequency Distribution of Respondents Based on Gender in the Bangkalan Community Health Center Work Area, Bangkalan Regency

Gender	Frequency	Percentage (%)
Woman	36	65.5
Man	19	34.5
Total	55	100

Table 1 shows that 36, or around 65.5% of respondents were female. In some cases, many women experience hypertension for various reasons. These causal factors include pregnancy, use of contraceptives, especially oral contraceptives, breastfeeding periods, menopause, hormonal influences, age, race, ethnicity, and other risk factors (Wenger et al., 2018).

Table 2. Frequency Distribution of Respondents Based on Current Age in the Bangkalan Community Health Center Working Area, Bangkalan Regency

Age	Frequency	Percentage (%)
40 – 50 Year	16	29.2
51 – 56 Year	13	23.6
57 – 65 Year	19	34.5
>> 66 Year	7	12.7
Total	55	100

Table 2 above shows that the age range of the largest respondents in this study was 57 – 65 years, with 19 respondents (almost half), or 34.5%. Studies in the United States estimate that the prevalence of hypertension is 76% in adults aged 65-74 years and 82% in adults aged ≥ 75 years (Muntner et al., 2020).

Table 3. Frequency Distribution of Respondents Based on Education Level in the Bangkalan Community Health Center Work Area, Bangkalan Regency

Education	Frequency	Percentage (%)
No school	0	0
Elementary (Elementary/Middle School)	22	40.0
Intermediate (Senior / Vocational High School)	23	41.8
Higher Education (D3-S3)	10	18.2
Total	55	100

Table 3 above shows that almost half of the respondents' education level (41.8%) has secondary education (Senior/Vocational High School). Education is related to an individual's knowledge and ability to receive and translate information. According to Nursalam (2008), the higher a person's education, the easier it is to receive information (Rahmawati et al., 2022). Education is also related to a person's level of knowledge regarding the recognition of a disease, prevention efforts, and therapy that must be undertaken if sick.

Table 4. Frequency Distribution of Respondents Based on Occupation in the Bangkalan Community Health Center Work Area, Bangkalan Regency

Occupation	Frequency	Percentage (%)
Housewife	17	30.9
Civil Servants /Police/Army	14	25.5
Self-employed	12	21.8
Farmers/Fishermen	12	21.8
Total	55	100

Table 4 above shows that almost half of the respondents in this study are housewives, with 17 respondents or around 30.9% of the total respondents. Occupational factors are related to physical activity and also psychological stress. Physical activity in elderly people with hypertension must be regular and should not be excessive, which risks vasoconstriction of blood vessels during activity. Stress at work is also a risk and influences the occurrence of hypertension, especially for those who work in the industrial sector (Rengganis et al., 2020). This also applies to housewives with their own type and level of stress when they have to do work of the house.

Table 5. Frequency Distribution of Respondents Based on the Relationship between Strengthening Resilience and Psychological Stress Balance in the Bangkalan Community Health Center Work Area, Bangkalan Regency

		Psychological Distress					Total
		Normal	Light	Medium	Heavy	Very Heavy	
Strengthening Resilience	Low	1 (1.8%)	2 (3.6%)	1 (1.8%)	1 (1.8%)	1 (1.9%)	6 (10.9%)
	Currently	4 (7.3%)	5 (9.1%)	4 (7.3%)	6 (10.9%)	2 (3.6%)	21 (38.2%)
	Tall	3 (5.5%)	5 (9.1%)	7 (12.7%)	5 (9.1%)	0 (0%)	20 (36.4%)
	Very High	7 (12.7%)	0 (0%)	0 (0%)	1 (1.8%)	0 (0%)	8 (14.5%)
	Total	15 (24.2%)	15 (27.3%)	12 (21.8%)	12 (21.8%)	13 (23.6%)	3 (5.5%)

Spearman Rho; Alpha (α) = 0.05; p-value = 0.004; Correlation Coefficient = 0.384

Table 5 above shows the cross-tabulation and statistical test results with Spearman Rho between strengthening resilience and balancing psychological stress. These results show a p-value of 0.004, meaning a significant relationship exists between strengthening resilience and psychological stress. Meanwhile, the correlation coefficient shows a value of 0.384, which means a positive relationship and moderate closeness. Stress balance is an individual's condition that is psychologically able to adapt using effective coping mechanisms. Apart from that, biological stress balance is characterized by the balance of hormones, chemicals, metabolic activities, and various other physiological activities. Hans Selye (1974) translated eustress as positive stress, which stimulates individuals to feel happy, happier, and more motivated, as well as a positive cognitive response to their situation (Bienertova-Vasku et al., 2020). Eustress can result in someone having resilience when facing problems or conversely.

DISCUSSION

Resilience is a process that allows individuals to adapt to adverse conditions and recover from these conditions. This process is supported by the individual's quality of controlling stress, manifested in personal control, positive thinking, optimism, and social support (Dantzer et al., 2018). Resilience includes a person's internal mental efforts to survive, adapt, and regain mental health, even in difficult and detrimental situations. Resilience is a dynamic concept and a combination of internal factors such as gender and age, which interact with external factors such as social, cultural, and environmental factors (Fonseca et al., 2021). Resilience is manifested by the speed of recovery required for individuals to return to their original condition after experiencing difficulties, including when facing various pressures and burdensome psychological stress situations. This is in accordance with the opinion of Babić et al. (2020), who explains that resilience refers to the ability to overcome difficult, stressful, and traumatic situations described by surviving and trying to restore normal function. So, the higher an individual's resilience, the lower their susceptibility to disease, including, in this case, hypertension.

Hypertension is a blood disorder that is influenced by multifactorial causes involving genetics, epigenetics, and the environment (Oparil et al., 2019). Apart from that, psychological stress factors are also often the cause of the emergence and increase in severity in hypertension sufferers. Chronic stress is a major risk factor for essential hypertension (Liu et al., 2019). Stress also often results in an increased risk of hypertension (Wu et al., 2020). to other clinical manifestations in the form of chronic pain (Greenson & Chin, 2019). Various causes can trigger increased psychological stress in a person's soul, which then has an impact on various disorders, both cardiovascular and other body systems. One example of a cause of stress is environmental noise (Münzel et al., Citation 2018) and loneliness (Xia & Li, 2018), which is thought to be a chronic factor that is associated with increased oxidative stress, endothelial dysfunction, and hypertension, as well as other cardiovascular disorders (Münzel et al., 2018; Xia & Li, 2018). Additional research suggests that expectant mothers experiencing mild stress are prone to developing preeclampsia, with an odds ratio of 4.7 (Novelia et al., 2024).

Stress or various other negative psychological symptoms can be overcome by increasing coping mechanisms to become more adaptive. Individuals with adaptive coping mechanisms can solve problems well and avoid prolonged stress. Stress in people with hypertension is a form of attitude and behavior of individuals with hypertension that are interrelated. Individuals who lose adaptive coping in dealing with their illness are vulnerable to health problems, including psychosocial health (Fikriana et al., 2020). So, coping that is oriented towards positive emotions can actually reduce stress. However, this does not always work, and in some conditions, it can

increase stress, thereby indirectly increasing blood pressure (Zapater-Fajari et al., 2021). This means that, in this case, there are actually many factors involved in the process of stress that can shift the physiological balance, both physical and psychological. However, coping by focusing on emotional regulation will stabilize blood pressure, most likely mediated by stress factors. Scientific study by (Chapuis-de-Andrade et al., 2022). explained that coping that focuses on emotional regulation is negatively related to blood pressure in pregnant women. This means that the higher the level of coping, the easier it will be to control blood pressure or the lower the possibility of hypertension.

This can be achieved by optimizing individual adaptive coping factors, one of which is resilience. Resilience as an adaptive coping strategy will work optimally to regulate anxiety and depression, which has the potential to improve the quality of life and daily activities in Behçet's Disease patients (Atay & Erturan, 2019). Resilience and psychological stress also influence blood pressure in adult individuals. This is in accordance with research by Ozamiz Etxerbarria (2022) and Kalisch et al. (2019), which explains that data stress causes repeated increases in blood pressure, both systolic and diastolic. This occurs partly due to the effects of neuro-endocrine stress response mechanisms. Progressive stress has an impact on downregulation of glucocorticoid receptors and cortisol resistance. Apart from that, chronic stress also has a negative impact, resulting in reduced immune system capacity in inflammatory processes, mild chronic inflammation, accumulation of intra-abdominal visceral fat, increased salt retention, and insulin resistance (Mocayar Marón et al., 2019). The current analysis primarily focuses on abstract psychological factors and overlooks concrete biological aspects. Therefore, future studies should employ quasi-experimental or pure experimental designs to more concretely explore the relationship between resilience and psychological stress.

Multiple pathways may be involved in the development of chronic psychological stress-related hypertension. Experimental studies in animal models and healthy adult volunteers show that prolonged stress causes a high risk of progressive exposure to Hypothalamic Pituitary Adrenal (HPA) axis hyperactivity. This mechanism contributes to an increase in cortisol which causes a negative impact on glucocorticoid receptor resistance (Cohen et al., 2012; Amir et al., 2018). Stress, in this case, can be regulated by increasing resilience as a psychological strengthening of the individual. So, if resilience can be optimized, various symptoms of psychological stress will be regulated by emotional regulation in the limbic system. Resilience interventions are even able to reduce the stress levels of comorbid patients during the COVID-19 pandemic. Comorbid patients experience decreased stress levels from moderate to mild (Nikopoulou et al., 2022). Resilience is related to the ability to form optimism, which helps adapt positively to physical and psychological stress (Dantzer et al., 2018). Jika stres pada pasien menurun akan berimplikasi positif terhadap kontrol tekanan darah melalui jalur Hypothalamus Pituitary Adrenal (HPA) Axis and Sympathetic Adrenal Medullary (SAM) Axis (Amir et al, 2023). Resilience is positively correlated with reducing distress as psychological pressure worsens illness (Song et al., 2022) and enables individuals to survive and recover from adversity (Bhatnagar, 2021). Even in its implementation, resilience is able to reduce levels of stress, anxiety, and depression and improve the quality of life in patients with multiple sclerosis (Giovannetti et al., 2022). Researchers argue, based on various studies, that resilience is able to regulate psychological stress balance. Balanced psychological stress activates the neuro-endocrine system to improve blood pressure control in hypertensive patients.

CONCLUSION

Resilience is a mechanism enabling individuals to adjust to challenging circumstances and bounce back from stressors. This mechanism relies on the individual's ability to manage stress, demonstrated through traits like personal control, positive mindset, optimism, and access to social support. Effective resilience cultivates inner strength that can counterbalance psychological stress. Resilience, capable of regulating the balance of psychological stress, activates the neuroendocrine system, thus enhancing blood pressure regulation in hypertensive patients.

REFERENCES

- Amir, F., Mastutik, G., Hasinuddin, M., & Putra, S. T. (2018). Dhikr (Recitation) and Relaxation Improve Stress Perception and Reduce Blood Cortisol Level in Type 2 Diabetes Mellitus Patients with OAD. *Folia Medica Indonesiana*, 54(4), 249. <https://doi.org/10.20473/fmi.v54i4.10707>
- Amir, F., Sulistyorini, L., Suhron, M., & Sulaihah, S. (2023). Spiritual Meaning Impacts Psychological Distress and Control of Mean Arterial Pressure in Hypertension Patients. *Health and Technology Journal (HTechJ)*, 1(6), 646–655. <https://doi.org/10.53713/htechj.v1i6.128>
- Amir, F., Wahyudi, R., & Sulaihah, S. (2022). Model of Spiritual Culture of Madurese People in Resilience and Adaptation of New Normal. *10(1)*, 27–36.
- Atay, I. M., & Erturan, I. (2019). The impact of coping strategies on depression, anxiety, quality of life and disease activity in Behçet's disease. *European Neuropsychopharmacology*, 29, S166–S167. <https://doi.org/https://doi.org/10.1016/j.euroneuro.2018.11.288>
- Babić, R., Babić, M., Rastović, P., Ćurlin, M., Šimić, J., Mandić, K., & Pavlović, K. (2020). Resilience in Health and Illness. *Psychiatria Danubina*, 32(Suppl 2), 226–232.
- Bhatnagar, S. (2021). Rethinking stress resilience. *Trends in Neurosciences*, 44(12), 936–945. <https://doi.org/10.1016/j.tins.2021.09.005>
- Bienertova-Vasku, J., Lenart, P., & Scherlinger, M. (2020). Eustress and Distress: Neither Good Nor Bad, but Rather the Same? *BioEssays*, 42, 1900238. <https://doi.org/10.1002/bies.201900238>
- Chapuis-de-Andrade, S., Moret-Tatay, C., Irigaray, T. Q., Antonello, I. C. F., & Pinheiro da Costa, B. E. (2022). The Mediation Effect of Coping Strategies between Personality and Blood Pressure in Pregnancy Complicated by Hypertension. *Healthcare (Basel, Switzerland)*, 10(2). <https://doi.org/10.3390/healthcare10020341>
- Cohen, S., Janicki-Deverts, D., Doyle, W. J., Miller, G. E., Frank, E., Rabin, B. S., & Turner, R. B. (2012). Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. *Proceedings of the National Academy of Sciences of the United States of America*, 109(16), 5995–5999. <https://doi.org/10.1073/pnas.1118355109>
- Cozier, Y. C., Yu, J., Wise, L. A., VanderWeele, T. J., Balboni, T. A., Argentieri, M. A., Rosenberg, L., Palmer, J. R., & Shields, A. E. (2018). Religious and Spiritual Coping and Risk of Incident Hypertension in the Black Women's Health Study. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, 52(12), 989–998. <https://doi.org/10.1093/abm/kay001>
- Dantzer, R., Cohen, S., Russo, S. J., & Dinan, T. G. (2018). Resilience and immunity. *Brain, Behavior, and Immunity*, 74, 28–42. <https://doi.org/10.1016/j.bbi.2018.08.010>
- Fikriana, R., Nusalam., Devy, S.R., Ahsam., & Afik, A. (2020). The Effect of Coping Strategies on the Dietary Regulation of Patients with Hypertension. *International Journal of Psychosocial Rehabilitation*, 24(7), 7781-7787
- Giovannetti, A. M., Solari, A., & Pakenham, K. I. (2022). Effectiveness of a group resilience intervention for people with multiple sclerosis delivered via frontline services. *Disability and Rehabilitation*, 44(22), 6582–6592. <https://doi.org/10.1080/09638288.2021.1960441>

- Greeson, J. M., & Chin, G. R. (2019). Mindfulness and physical disease: a concise review. *Current Opinion in Psychology*, 28, 204–210. <https://doi.org/https://doi.org/10.1016/j.copsyc.2018.12.014>
- Harrison, D. G., Coffman, T. M., & Wilcox, C. S. (2021). Pathophysiology of Hypertension. *Circulation Research*, 128(7), 847–863. <https://doi.org/10.1161/CIRCRESAHA.121.318082>
- Heidari, B., Avenatti, E., & Nasir, K. (2022). Pharmacotherapy for Essential Hypertension: A Brief Review. *Methodist DeBakey Cardiovascular Journal*, 18(5), 5–16. <https://doi.org/10.14797/mdcvj.1175>
- Kalisch, et al. (2019). Deconstructing and Reconstructing Resilience: A Dynamic Network Approach Perspectives on Psychological Science. 14(5). <http://doi.org/10.1177/174569161985563>
- Kemenkes RI. (2018). 2018 Basic Health Research Results. *Indonesian Ministry of Health*, 53(9), 1689–1699.
- Liu, Y., Lee, D.-C., Li, Y., Zhu, W., Zhang, R., Sui, X., Lavie, C. J., & Blair, S. N. (2019). Associations of Resistance Exercise with Cardiovascular Disease Morbidity and Mortality. *Medicine and Science in Sports and Exercise*, 51(3), 499–508. <https://doi.org/10.1249/MSS.0000000000001822>
- Mocayar Marón, F. J., Ferder, L., Saraví, F. D., & Manucha, W. (2019). Hypertension linked to allostatic load: from psychosocial stress to inflammation and mitochondrial dysfunction. *Stress (Amsterdam, Netherlands)*, 22(2), 169–181. <https://doi.org/10.1080/10253890.2018.1542683>
- Muntner, P., Hardy, S. T., Fine, L. J., Jaeger, B. C., Wozniak, G., Levitan, E. B., & Colantonio, L. D. (2020). Trends in Blood Pressure Control Among US Adults With Hypertension, 1999–2000 to 2017–2018. *JAMA*, 324(12), 1190–1200. <https://doi.org/10.1001/jama.2020.14545>
- Münzel, T., Sørensen, M., Schmidt, F., Schmidt, E., Steven, S., Kröller-Schön, S., & Daiber, A. (2018). The Adverse Effects of Environmental Noise Exposure on Oxidative Stress and Cardiovascular Risk. *Antioxidants & Redox Signaling*, 28(9), 873–908. <https://doi.org/10.1089/ars.2017.7118>
- Nikopoulou, V. A., Gliatas, I., Blekas, A., Parlapani, E., Holeva, V., Tsiropoulou, V., Karamouzi, P., Godosidis, A., & Diakogiannis, I. (2022). Uncertainty, Stress, and Resilience During the COVID-19 Pandemic in Greece. *Journal of Nervous and Mental Disease*, 210(4). <https://doi.org/10.1097/NMD.0000000000001491>
- Novelia, S., Rukmaini, & Puspita Sari, E. (2024). Stress Levels and Pre-Eclampsia in Pregnancy. *Health and Technology Journal (HTechJ)*, 2(1), 81–86. <https://doi.org/10.53713/htechj.v2i1.135>
- Oparil, S., Acelajado, M. C., Bakris, G. L., Berlowitz, D. R., Cifková, R., Dominiczak, A. F., Grassi, G., Jordan, J., Poulter, N. R., Rodgers, A., & Whelton, P. K. (2019). HHS Public Access. Hypertension. *Nature Reviews Disease Primers*, 22(4), 1–48. <https://doi.org/10.1038/nrdp.2018.14.Hypertension>
- Ozamiz Etzerbaria et al. (2020). Stress, Anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in Northern Spain. *Cadernos de Saude Publica*, 36(4) <http://doi.org/10.1590/0102-311X00054020>
- Rahmawati, N. D., Sartika, R. A. D., & Thabrany, H. (2022). Effect of Health and Nutrition Education on Blood Pressure, Knowledge and Compliance among Hypertensive Patients in Bogor District, Indonesia: A Control Quasi-Experiment. *Indonesian Journal of Public Health Nutrition*, 2(2), 13–23. <https://doi.org/10.7454/ijphn.v2i2.5789>
- Rengganis, A. D., Rakhimullah, A. B., & Garna, H. (2020). The Correlation between Work Stress and Hypertension among Industrial Workers: A Cross-sectional Study. *IOP Conference Series: Earth and Environmental Science*, 441(1), 12159. <https://doi.org/10.1088/1755-1315/441/1/012159>
- Riskesdas Jatim. (2021). East Java Provincial Health Service Health Profile 2021. East Java Provincial Health Service.
- Song, L., Cao, Y., Li, J., Lu, M., & Tang, L. (2022). Psychological distress and resilience in patients with gastroenteropancreatic neuroendocrine tumor. *Frontiers in Endocrinology*, 13, 947998. <https://doi.org/10.3389/fendo.2022.947998>

- Umpierre, D., Santos, L. P., Botton, C. E., Wilhelm, E. N., Helal, L., Schaun, G. Z., Ferreira, G. D., De Nardi, A. T., Pfeifer, L. O., da Silveira, A. D., Polanczyk, C. A., Mendes, G. F., Tanaka, H., Alves, L., Galliano, L., Pescatello, L. S., Brizio, M. L., Bock, P. M., Campelo, P., ... Group, T. H. S. (2019). The "Hypertension Approaches in the Elderly: a Lifestyle study" multicenter, randomized trial (HAEL Study): rationale and methodological protocol. *BMC Public Health*, 19(1), 657. <https://doi.org/10.1186/s12889-019-6970-3>
- Ungvari, Z., Toth, P., Tarantini, S., Prodan, C. I., Sorond, F., Merkely, B., & Csiszar, A. (2021). Hypertension-induced cognitive impairment: from pathophysiology to public health. *Nature Reviews Nephrology*, 17(10), 639–654. <https://doi.org/10.1038/s41581-021-00430-6>
- Wang, C., Yuan, Y., Zheng, M., Pan, A., Wang, M., Zhao, M., Li, Y., Yao, S., Chen, S., Wu, S., & Xue, H. (2020). Association of Age of Onset of Hypertension With Cardiovascular Diseases and Mortality. *Journal of the American College of Cardiology*, 75(23), 2921–2930. <https://doi.org/10.1016/j.jacc.2020.04.038>
- Wenger, N. K., Arnold, A., Bairey Merz, C. N., Cooper-DeHoff, R. M., Ferdinand, K. C., Fleg, J. L., Gulati, M., Isiadinso, I., Itchhaporia, D., Light-McGroary, K., Lindley, K. J., Mieres, J. H., Rosser, M. L., Saade, G. R., Walsh, M. N., & Pepine, C. J. (2018). Hypertension Across a Woman's Life Cycle. *Journal of the American College of Cardiology*, 71(16), 1797–1813. <https://doi.org/10.1016/j.jacc.2018.02.033>
- Williams, B., Mancia, G., Spiering, W., Agabiti Rosei, E., Azizi, M., Burnier, M., Clement, D. L., Coca, A., de Simone, G., Dominiczak, A., Kahan, T., Mahfoud, F., Redon, J., Ruilope, L., Zanchetti, A., Kerins, M., Kjeldsen, S. E., Kreutz, R., Laurent, S., ... Desormais, I. (2018). 2018 ESC/ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Cardiology and the European Society of Hypertension: The Task Force for the management of arterial. *Journal of Hypertension*, 36(10), 1953–2041. <https://doi.org/10.1097/HJH.0000000000001940>
- Wu, Q., Xu, Z., Song, S., Zhang, H., Zhang, W., Liu, L., Chen, Y., & Sun, J. (2020). Gut microbiota modulates stress-induced hypertension through the HPA axis. *Brain Research Bulletin*, 162, 49–58. <https://doi.org/https://doi.org/10.1016/j.brainresbull.2020.05.014>
- Xia, N., & Li, H. (2018). Loneliness, Social Isolation, and Cardiovascular Health. *Antioxidants & Redox Signaling*, 28(9), 837–851. <https://doi.org/10.1089/ars.2017.7312>
- Zapater-Fajará, M., Crespo-Sanmiguel, I., Pulpulos, M. M., Hidalgo, V., & Salvador, A. (2021). Resilience and Psychobiological Response to Stress in Older People: The Mediating Role of Coping Strategies. *Frontiers in Aging Neuroscience*, 13, 632141. <https://doi.org/10.3389/fnagi.2021.632141>