The Impact of Anxiety and Sleep Disturbances During COVID-19 Pandemic on Systolic and Diastolic Blood Pressures in a Rural Community

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Abstract. The COVID-19 pandemic, which has occurred since last year, has impacted all aspects of life, including health, in particular the condition of blood pressure. Many factors affect blood pressure during this pandemic, and hypertension is caused by many conditions. The pandemic has also affected the patterns and life cycles of the society. Changes in the economy and in daily life can increase blood pressure and hypertension as they may cause psychosocial or emotional stress, changes in sleep patterns, and diurnal cycles. This study aims to investigate how anxiety levels and sleep disturbances affect blood pressure. This research is a cross-sectional study. The research method used in this research is descriptive to determine the effect of stress caused by the COVID-19 pandemic on the blood pressure of the rural residents. Statistical analysis used is descriptive analysis and linear regression test. The difference seems to be significant when $p < 0.05$. This research has obtained ethics approval from the Ethics Committee of the Faculty of Medicine, Islamic University of Indonesia.A total of 38 respondents participated in this study, 35 females and 3 males (ages 28–67). The results of the linear regression test showed that the level of anxiety and sleep disturbances indicated by the Hamilton Anxiety Rating Scale (HARS) score and the Pittsburgh sleep quality index (PSQI) score did not seem to statistically have a significant contribution to systolic (p 0.166) and diastolic (p 0.166) blood pressure. The results of R2 (R Square) of systolic and diastolic in this study were 0.097 and 0.027 respectively, which showed that the influence of anxiety and sleep disturbances contributed to systolic by 9.7% and diastolic 2.7%. Meanwhile, the coefficient of impact when examined separately on anxiety scores and sleep disturbance scores on systolic and diastolic blood pressures was 0.12, p 0.103; −0.016, p 0.987 and 0.98 p 0.33; −0.4 p 0.692. This may indicate that neither anxiety nor sleep disturbance scores have a significant impact on systolic and diastolic blood pressures.The findings suggest that the level of anxiety and sleep disturbances did not significantly contribute simultaneously to systolic and diastolic blood pressures.

Keywords: hypertension · anxiety · sleep disturbance · COVID-19 pandemic

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1 Introduction

Hypertension is a condition where the measurement of blood pressure is above normal blood pressure.

Incidence of Hypertension is common among Indonesians. As a non-communicable disease and the number one cause of death in the world every year, hypertension has become a special concern for both Indonesia and the world. The danger of hypertension, known as a silent killer, is worrying as the increase in blood pressure often does not show symptoms. As a result, many patients only find out that they have hypertension when they already have complications from the disease. More than 1.3 billion people in the world are suffering from hypertension, increasing by 5.1% compared to that of 2000–2010 [1]. Hypertension is an independent risk factor for cardiovascular events. If this risk factor is not controlled, it can damage the target organs. Based on some consensus, there are several levels of hypertension which are often influenced by age, gender, socio-culture, race, and lifestyle [2]. Changes in daily life due to some rules like social distancing orders and economic changes are other factors that can increase blood pressure and hypertension such as psychosocial or emotional stress, lack of physical exercises, changes in sleep patterns and diurnal cycles can occur during COVID-19 [3]. Anxiety and sleeping difficulty can be the cause of an increase in blood pressure. Excessive emotional conditions can have an influence on hypertension suffered. Psychological factors may play a major role in the process of developing a person's disease. A person's abnormal or excessive psychological condition can trigger the emergence of hypertension [4]. This study aims to analyze the impact of sleep disorders and anxiety during the pandemic on blood pressure in rural communities, in which economic conditions, such as daily income, and incidence of hypertension could be complicated matters. Better economic conditions in general can have a positive impact on health, while less income can be associated with less attention to health care. Socio-economic status has a negative influence on hypertension in developing countries [5].

2 Method

This study is an observational study with a cross-sectional design. The research method used in this study was descriptive to determine the effect of the COVID-19 pandemic stress on the blood pressure of the rural community at Katongan Village, Nglipar District, Gunung Kidul Regency during the period August-September 2021.

Demographic data was collected, comprising gender, age, occupation, income, body mass index (BMI), measurement of anxiety levels using the Hamilton Anxiety Rating Scale (HARS), measurement of sleep disturbance using the Pittsburgh sleep quality index (PSQI) questionnaire, and blood pressure checks (3 times). The inclusion criteria for this study were people ages 18 and older and willing to participate as research respondents, whether they had hypertension or not. Exclusion criteria were having serious illnesses such as stroke, kidney failure, coronary heart disease, coronavirus disease (COVID-19), and other acute illnesses.

3 Result and Discussion

This research was conducted with a total of 38 respondents, 35 women and 3 men. Table 1 shows the distribution of respondents according to seven variables. It could be seen that most of the respondents had normal blood pressure (42.5%). The percentages of respondents with pre-hypertension and stage 2 hypertension were identical, 13%, while those with hypertension stage 1 accounted for 31.5% of all the respondents. 55.3% of

Table 1. Data Distribusion

Variable	n	Percentage
Sex		
Female	35	92,1%
Male	3	7,8%
Age		
18–40	14	36,8%
41–60	21	55,3%
>60	3	7,9%
Body Mass Indexes (BMI)		
<18,5 (underweight)	3	7,9%
18, 5–22,9 (normal)	16	42,1%
23–24, 9 (overweight)	18	47,4%
25–29, 9 (Obese 1)	1	2,6%
Income (IDR)		
<1 million	28	73,7%
1–3 million	9	23,7%
3–5 million	1	2,6%
Blood pressure		
Normal	16	42,5%
Pre-hipertension	5	13%
Hypertension Stage 1	12	31,5%
Hypertension Stage 2	5	13%
Anxiety		
No	3	7,9%
Mild	3	7,9%
Moderate	2	5,3%
High	9	23,7%
Very High	21	55,3%
Sleep disorder		
Good	14	36,8%
Mild	13	34,2%
Moderate	10	26,3%
Poor	1	2,6%

Table 2. Results of Linear Regression Test

Variable		Contribution (Anova)	Power of relationship (R-Square)	Coefficient
Systolic	HARS	0.166	0.097	0.987
	PSQI			0.103
Diastolic	HARS	0.617	0.027	0.692
	PSQI			0.333

respondents. The income of the respondents varies, but the most is in the range below 1 million for 73,7%. Most people of this village lifes in simplicity and live in low economic conditions. Meanwhile, an assessment of the level of anxiety showed that 55,3% respondents had very high anxiety.

The respondent experienced very severe anxiety with a HARS score between 42–52. However, this level of anxiety did not appear to have an impact on sleep disturbances. Most of the respondents felt that their sleep quality was good (36.8%). The percentages of those experiencing mild and moderate sleep disturbances were 34.2% and 26.3% respectively. Only 2.6% of the respondents had poor sleep disturbances.

A linear regression test was then performed to study the association of anxiety and sleep disorders and hypertension. Both systolic and diastolic blood pressures were measured. In table 2, the results of the linear regression test showed that the level of anxiety and sleep disorders as indicated by the Hamilton Anxiety Rating Scale (HARS) score and the Pittsburgh sleep quality index (PSQI) score did not statistically have a significant contribution to systolic (p 0.166) and diastolic blood pressures (p 0.166). 0.61). The result of R2 (R Square) for systolic was 0.097 and diastolic 0.027. This shows that the influence of anxiety and sleep disorders on systole and diastole was 9.7% and 2.7% respectively. These results may indicate that blood pressure is strongly influenced by other factors. The separate impact coefficients on anxiety scores and sleep disturbance scores on systolic and diastolic blood pressure were 0.12, p 0.103; -0.016, p 0.987 and 0.98 p 0.33; -0.4 p 0.692. This could indicate that neither anxiety nor sleep disturbance scores have a significant impact on systolic and diastolic blood pressures.

4 Discussion

The results of this study show that most of the respondents experienced various types of anxiety during this pandemic. However, statistically it had no impact on either systolic or diastolic blood pressure. This shows that there are many factors that affect blood pressure. Based on some consensus, there are several levels of hypertension which are often influenced by age, gender, socio-culture, race, and lifestyle [2].

The impact of the level of anxiety and sleep disturbances on the respondents' blood pressures was not very significant, with a 9.7% increase for the systolic blood pressure and 2.7% for the diastolic blood pressure. Several studies compared the blood pressure of respondents who experienced anxiety with the blood pressure of respondents who did

not. The results showed that patients with anxiety had higher blood pressure than those who did not have an anxiety problem. Anxiety and stress can cause stimulation of the sympathetic nervous system, which increases blood rate, cardiac output, and peripheral vascular resistance. Sympathetic effects not only increase blood pressure, but also mental tension (feeling depressed, moody, confused, anxious, pounding heart, feeling angry, revenge, fear, guilt). This could stimulate the kidney glands to release adrenal hormones and cause the heartbeat to become faster and stronger, increasing blood pressure [6].

In the molecular vascular system, a progressive remodeling process is shown in the form of blood vessel stiffness caused by the accumulation of extracellular matrix in connective tissue and elastin. This part is related to cellular senescence and growth cessation. Although hypertension and atherosclerosis are associated with the accumulation of cellular aging markers in blood vessel walls, these conditions are often associated with vascular dysfunction rather than loss of proliferative capacity [7].

The autonomic nervous system is involved in the regulation of blood pressure. There are two kinds of autonomic nervous system: the sympathetic and the parasympathetic nervous system. The sympathetic nervous system will stimulate the visceral nerves (including the kidneys) through neurotransmitters such as catecholamines, epinephrine, and dopamine, while the parasympathetic nervous system is what inhibits sympathetic stimulation. The regulation of these two nervous systems takes place independently, not influenced by the brain but following the circadian cycle [2]. In the elderly, the quality of sleep will affect hypertension. Recent research studies in samples of the elderly and patients with chronic diseases, such as diabetes, rheumatoid arthritis, and Parkinson's disease have shown that sleep problems have a negative effect on the quality of life, and subsequently impact on blood pressure [8]. The impact of the pandemic has also been felt by community groups in rural areas. The condition of low economic status, poor daily income, and the incidence of hypertension is something that is complicated. Socio-economic status has a negative influence on hypertension in developing countries [5].

Anxiety often has an impact on sleep disturbances. Robbilard et al. reported that about 1/3 of the population had trouble sleeping during the pandemic. An increase in complaints of difficulty sleeping and the use of sleeping pills were also seen during the pandemic. Although some people could still maintain the quality of sleep or the length of sleep increased, 15.6% of the population slept fewer hours compared to pre-pandemic. Interestingly, 27.1% actually slept more [9]. Anxiety is influenced by various factors. In this study, it was found that respondents adapted easily to pandemic conditions. A difficult life did not take away their joy. The ease of adapting and dealing with problems in a relaxed and unambitious way made them more relaxed about life.

5 Conclusion

In the study field, a high anxiety level amid the pandemic was not associated with sleep disturbance and blood pressure values. This study suggests people with low socioeconomic status in rural communities could adapt to the pandemic situation.

References

1. F. Joses and H. Saila, "Literature Review: Hypertension Incidence in Adolescents During a Pandemic," January, 2021.
2. M. Yogiantoro, "Clinical Approach to Hypertension," in PAPDI Textbook, Edition VI., A. F. S. Siti Setiati, Idrus Alwi, Aru W. Sudoyo, Bambang Setiyohadi, VI Ed. Jakarta: InternaPublishing, 2014, pp. 2260–2282.
3. R. Kreutz et al., "Lifestyle, psychological, socioeconomic and environmental factors and their impact on hypertension during the coronavirus disease 2019 pandemic," J. Hypertens., vol. 39, no. 6, pp. 1077–1089, 2021, doi: https://doi.org/10.1097/hjh.0000000000002770.
4. C. Bonner et al., "The Psychological Impact of Hypertension During COVID-19 Restrictions: Retrospective Case-Control Study," JMIRx Med, vol. 2, no. 1, p. e25610, 2021, doi: https://doi.org/10.2196/25610.
5. K. Tang, Y. Zhang, H. Wang, S. H. Tan, L. Bai, and Y. Liu, "Regional economic development, household income, gender and hypertension: Evidence from half a million Chinese," BMC Public Health, vol. 20, no. 1, pp. 1–12, 2020, doi: https://doi.org/10.1186/s12889-020-09002-y.
6. S. M. Hermawan, A. C. Silalahi, and L. M. Lautan, "Factors Affecting Anxiety in Hypertension Patients at M.Th.Djaman General Hospital Sanggau District, West Borneo 2018," Int. J. Nurs. Heal. Serv., vol. 1, no. 2, pp. 40–49, 2019, doi: https://doi.org/10.35654/ijnhs.v1i2.30.
7. T. J. Guzik and R. M. Touyz, "Oxidative stress, inflammation, and vascular aging in hypertension," Hypertension, vol. 70, no. 4, pp. 660–667, 2017, doi: https://doi.org/10.1161/HYPERTENSIONAHA.117.07802.
8. W. N. Alfi and R. Yuliwar, "The Relationship between Sleep Quality and Blood Pressure in Patients with Hypertension," J. Berk. Epidemiol., vol. 6, no. 1, p. 18, 2018, doi: https://doi.org/10.20473/jbe.v6i12018.18-26.
9. R. Robillard et al., "Profiles of sleep changes during the COVID-19 pandemic: Demographic, behavioural and psychological factors," J. Sleep Res., vol. 30, no. 1, pp. 1–12, 2021, doi: https://doi.org/10.1111/jsr.13231