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The Relationship between Lifestyle Physical Activity, Stress and Smoking with the Incidence of Hypertension in Puskesmas Padang

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ABSTRACT

According to data from the World Health Organization (WHO), approximately 1.13 billion people worldwide suffer from hypertension, and less than one in five people with hypertension are well controlled (WHO, 2019). This study aims to examine the relationship between lifestyle physical activity, stress, and smoking with the incidence of hypertension in Puskesmas Padang. This study used a cross-sectional design, which aims to identify the relationship between physical activity lifestyle, stress, and smoking with the incidence of hypertension in the population visiting Puskesmas Padang. Based on the results of univariate analysis, most respondents (65.6%) reported doing physical activity. However, bivariate analysis showed that there was a significant association between physical activity lifestyle and the incidence of hypertension (p-value = 0.000). From the univariate data, only 18.8% of respondents experienced stress. However, bivariate analysis showed that stress had a significant association with the incidence of hypertension (p-value = 0.002). A total of 28.1% of respondents reported smoking. Bivariate analysis showed that smoking did not have a significant association with the incidence of hypertension (p-value = 0.447). It is important to consider other factors that may be more influential in this population. For more effective hypertension control, interventions that focus on increasing physical activity and stress management in addition to smoking reduction efforts are needed.

Keywords : *Physical Activity, Stress, Smoking, Hypertension Incidence*

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INTRODUCTION

Hypertension or high blood pressure is one of the most common and serious health problems worldwide, including in Indonesia (Sumarno et al., 2024). According to data from the World Health Organization (WHO), approximately 1.13 billion people worldwide suffer from hypertension, and less than one in five people with hypertension are well controlled (WHO, 2019). Hypertension is a major risk factor for cardiovascular disease, stroke, and chronic kidney disease, all of which have a significant impact on global morbidity and mortality (Fiqri Muslih Djaya et al., 2021).

Studies have shown that lifestyle has an important role in the development of hypertension. Inadequate physical activity, excessive stress, and smoking are some of the lifestyle factors that have been identified as major contributors to hypertension (Chobanian et al., 2003). In Indonesia, people's lifestyles have also undergone significant changes along with the times, potentially increasing the prevalence of hypertension (Kresdianto D., 2014).

Adequate physical activity has been shown to reduce the risk of hypertension. Research by Pescatello et al. (2004) showed that regular physical activity can lower blood pressure in individuals with hypertension. Conversely, lack of physical activity can lead to an increased risk of hypertension, obesity, and various other cardiovascular diseases.

Stress is also an important factor in the development of hypertension. Chronic stress can lead to increased blood pressure through hormonal and neural mechanisms (Esler et al., 2008). Studies show that individuals who experience high levels of stress tend to have higher blood pressure compared to individuals who have low levels of stress (Steptoe et al., 2005).

Smoking is another risk factor that is closely associated with hypertension. Nicotine in cigarettes can cause constriction of blood vessels and increased blood pressure (Primatesta et al., 2001). In addition, other chemicals in cigarettes can damage artery walls, which can lead to hypertension and other cardiovascular diseases (Benowitz, 2003).

This study aims to assess the relationship between physical activity lifestyle, stress, and smoking with the incidence of hypertension in Puskesmas Padang. Puskesmas Padang was chosen as the research site due to the high prevalence of hypertension in the area. It is hoped that the results of this study can provide greater insight into the risk factors for hypertension and assist in the development of more effective hypertension prevention and control strategies.

METHODS

This study used a cross-sectional design, which aimed to identify the relationship between physical activity lifestyle, stress, and smoking with the incidence of hypertension in the population visiting Puskesmas Padang. The cross-sectional design allows data collection at one specific point in time, making it easier to see the prevalence and relationship between the variables studied. The population in this study were all patients who visited the Padang Health Centre during the study period. Samples were taken using purposive sampling technique, which selects samples based on certain inclusion and exclusion criteria. Inclusion criteria include:

1. Patients who are 18 years old and above.

2. Patients who are willing to participate in the study by signing informed consent.
3. Patients who have a history of hypertension or normal blood pressure at the time of examination.

Exclusion criteria include:

1. Patients who have other chronic diseases other than hypertension that may affect the results of the study.
2. Patients who were unable to communicate effectively (e.g., had mental or cognitive impairment).

The sample size was determined based on the Slovin formula with a confidence level of 95% and a margin of error of 5%. The instrument used in this study was a questionnaire consisting of several parts:

1. Demographics: Information regarding age, gender, occupation, and education level.
2. Physical Activity: Using the Global Physical Activity Questionnaire (GPAQ) developed by WHO.
3. Stress: Using the Perceived Stress Scale (PSS) questionnaire to measure stress levels.
4. Smoking: Using a questionnaire asking about smoking habits, number of cigarettes consumed per day, and duration of smoking habits.
5. Blood Pressure: Measured using a sphygmomanometer by a trained health worker.

Data analysis included descriptive analysis to describe respondents' demographic characteristics, physical activity level, stress level, smoking habit, and prevalence of hypertension. Inferential analysis: Using logistic regression to determine the association between physical activity lifestyle, stress, and smoking with the incidence of hypertension. The chi-square test will be used to see the association between independent and dependent variables, and multivariate logistic regression will be used to control for confounding variables. This study has been approved by the Health Research Ethics Committee. All respondents will be given clear information about the purpose of the study, and their rights as participants. The confidentiality of respondents' data is guaranteed, and the data collected will only be used for research purposes.

RESULTS

1. Univariate Analysis

a. Physical Activity Lifestyle

Table 1. Frequency Distribution of Respondents Based on Physical Activity Lifestyle

Physical Activity Lifestyle	f	Percentage (%)
Not	11	34,4
Yes	21	65,6
Total	**32**	**100**

b. Stress

Table 2. Frequency Distribution of Respondents Based on Stressful Lifestyle

Stress	f	Percentage (%)
Experienced	6	18,8

Not experienced	26	81,3
Total	**32**	**100**

c. Smoking

Table 3. Frequency Distribution of Respondents Based on Smoking Lifestyle

Smoking	f	Percentage (%)
Smoking	9	28,1
No smoking	23	71,9
Total	**32**	**100**

d. Hypertension

Table 4. Frequency Distribution of Respondents Based on Hypertension Disease

Hypertension	f	Percentage (%)
Prehipertensi	10	31,2
Hipertensi stadium 1	19	59,4
Hipertensi stadium 2	3	9,4
Total	**32**	**100**

2. Bivariate Analysis

a. Relationship between Physical Activity Lifestyle and Hypertension Incidence at Puskesmas

Table 5. Relationship between Physical Activity Lifestyle and Hypertension Incidence at Health Centre

Physical Activity Lifestyle	Hypertension Incidence						Total	
	Prehipertensi		Hipertensi stadium 1		Hipertensi stadium 2			
	f	%	f	%	f	%	f	%
Not	0	0	8	27	3	9,4	11	36,4
Yes	10	31,2	11	32,4	0	0	21	63,6
Total	10	31,2	19	59,4	3	9,4	32	100
P-value 0,000								

b. Relationship between Stress Lifestyle and Hypertension Incidence at Health Centre

Table 6. Relationship between Stress Lifestyle and Hypertension Incidence at the Health Centre

Stress	Hypertension Incidence	Total

	Prehipertensi		Hipertensi stadium 1		Hipertensi stadium 2			
	f	%	f	%	f	%	f	%
Experienced	0	0	3	9,4	3	9,4	6	18,8
Not experienced	10	31,2	16	50,1	0	0	26	81,3
Total	10	31,2	19	59,4	3	9,4	32	100
P-value 0,002								

c. Relationship between Smoking Lifestyle and Hypertension Incidence at Health Centre

Table 7. Relationship of Stress Lifestyle with Hypertension Incidence at Health Centre

Smoking	Hypertension Incidence						Total	
	Prehipertensi		Hipertensi stadium 1		Hipertensi stadium 2			
	f	%	f	%	f	%	f	%
Smoking	2	6,3	5	15,5	2	6,3	9	28,1
No smoking	8	24,9	14	43,9	1	3,1	23	71,9
Total	10	31,2	19	59,4	4	9,4	32	100
P-value 0,447								

DISCUSSION

a. Relationship between Physical Activity Lifestyle and Hypertension Incidence

Based on the results of univariate analysis, most respondents (65.6%) reported doing physical activity. However, bivariate analysis showed that there was a significant association between physical activity lifestyle and the incidence of hypertension (p-value = 0.000). Respondents who did not engage in physical activity had a higher proportion in the stage 1 and 2 hypertension categories compared to those who engaged in physical activity. This is in line with previous research which shows that physical activity can reduce the risk of hypertension through the mechanism of decreasing total peripheral resistance and increasing cardiac work efficiency.

This theory states that individuals' daily behaviours, including diet, physical activity, smoking habits, and stress management, greatly influence their health. A healthy lifestyle can reduce the risk of chronic diseases such as hypertension, while an unhealthy lifestyle can increase the risk.

Univariate analysis showed that the majority of respondents (65.6%) reported engaging in physical activity, indicating that physical activity is part of the daily routine of many individuals in this sample. Physical activity, as noted in the literature, plays an important role in maintaining cardiovascular health and lowering the risk of hypertension. Research by Pescatello et al. (2004) revealed that regular physical activity can help lower blood pressure, especially in individuals with a high risk of developing hypertension.

However, when looking at the results of the bivariate analysis, it was found that there was a significant association between physical activity lifestyle and the incidence of hypertension with a p-value = 0.000. This suggests that although most respondents reported doing physical activity, the physical activity performed may not be sufficient to prevent the occurrence of hypertension or there may be other factors that are more dominant in causing hypertension in this group.

In addition, it is also possible that the type or intensity of physical activity performed did not meet the health recommendations necessary to provide full protection against hypertension. Effective physical activity for hypertension prevention usually involves moderate to high-intensity aerobic exercise, performed regularly for at least 150 minutes per week (American Heart Association, 2019). Assumptions of Adherence to Physical Activity Not all respondents may adhere to physical activity guidelines recommended by health organisations. They may perform physical activity sporadically or with insufficient intensity to achieve optimal health benefits.

b. Relationship between Lifestyle Stress and Hypertension

From the univariate data, only 18.8% of respondents experienced stress. However, bivariate analysis showed that stress had a significant association with the incidence of hypertension (p-value = 0.002). Respondents who experienced stress had a higher proportion in the stage 1 and 2 hypertension category compared to those who did not experience stress. Chronic stress can increase blood pressure through the mechanism of sympathetic nervous system activation and the release of stress hormones such as cortisol.

This theory explains how stress can affect physical health. According to this theory, chronic stress can lead to activation of the sympathetic nervous system and the release of stress hormones that can increase blood pressure and the risk of cardiovascular disease (Negara, 2022).

Stressful conditions, although experienced by a small proportion of the population, have a significant impact on blood pressure. This may suggest that for individuals who are susceptible to stress, even if they are few in number, the impact on their cardiovascular health is very real. Stress can trigger physiological responses that lead to chronically elevated blood pressure, and this may explain why stress remains a highly significant factor in the development of hypertension. Although the number of respondents experiencing stress was small, the impact of stress on blood pressure may have been particularly strong in these individuals. This suggests that even moderate or low levels of stress in vulnerable populations can have serious health consequences. It is possible that the stress measured in this study is only a portion of the entire spectrum of stress that respondents experience. Some respondents may have experienced chronic stress that went unreported or was not effectively measured by the instrument used, which could have contributed to the hypertension.

c. Relationship between Smoking Lifestyle and Hypertension Incidence

A total of 28.1% of respondents reported smoking. Bivariate analysis showed that smoking had no significant association with the incidence of hypertension (p-value = 0.447). Respondents who smoked had a higher proportion in the stage 1 and 2 hypertension category compared to those

who did not smoke. Nicotine in cigarettes can cause vasoconstriction and increased blood pressure through stimulation of the sympathetic nervous system.

This theory examines factors that influence individual health behaviour, including predisposing factors (e.g., knowledge and attitudes), enabling factors (e.g., availability of resources), and reinforcing factors (e.g., social support). In the context of this study, this theory may help explain why some individuals choose not to engage in physical activity or quit smoking despite knowing the associated health risks.

These findings are in contrast to previous studies that have generally shown that smoking contributes to an increased risk of hypertension through mechanisms such as vasoconstriction, increased heart rate, and stimulation of the sympathetic nervous system (Benowitz, 2003). Nonetheless, in the context of the population studied, smoking may not be sufficient to significantly influence the prevalence of hypertension, or there may be other variables that are more dominant in influencing blood pressure among smokers. In the population studied, smoking may not be strong enough as a risk factor for hypertension compared to other factors such as genetics, physical activity, or diet. Other factors may have a more dominant role in influencing blood pressure. It is possible that the duration and intensity of smoking among the respondents were not high enough to show a significant impact on blood pressure. For example, respondents may be light smokers or have recently started smoking, so the effect on blood pressure is not yet significant. It is possible that the reported data on smoking habits is inaccurate, for example, if respondents underestimated or did not report their smoking habits correctly. This may lead to underestimation of the relationship between smoking and hypertension.

CONCLUSIONS

This study found that lifestyle, specifically physical activity and stress, had a significant association with the incidence of hypertension among respondents. Inadequate physical activity and high stress levels can significantly increase the risk of hypertension. Meanwhile, although smoking is traditionally considered a risk factor for hypertension, in this population, the association between smoking and hypertension was not found to be significant. These results suggest the importance of considering other factors that may be more influential in this population. For more effective hypertension control, interventions that focus on increasing physical activity and stress management in addition to smoking reduction efforts are needed.

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