Smoking as a Major Risk for Elderly Hypertension in The Covid-19 pandemic: A case-control Study

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***Abstract*: Introduction: Hypertension is a non-communicable disease that is an important public health problem in the world because its prevalence continues to increase and is the third biggest risk of premature death. Lifestyle is the most important risk factor that can cause hypertension, including physical activity, diet, smoking behavior, rest patterns. The purpose of the study was to determine the effect of lifestyle on the incidence of hypertension in the elderly during the Covid-19 pandemic era.**

Materials and Methods: The research design uses a quantitative case-control design approach. A sample of 88 respondents consisted of 48 cases and 40 controls. Sampling method using accidental sampling technique, the instrument used is a questionnaire, data collection method using interviews, data analysis using chi-square test and multivariate logistic regression.

Result: The results showed that there was a significant effect between physical activity (p-value 0.047), diet (p-value 0.012), smoking behavior with the incidence of hypertension (p-value 0.001), and there was no effect of rest patterns with the incidence of hypertension (p-value 0.001). p-value 0.334). Multivariate analysis found that smoking was the most influential factor with the incidence of hypertension (OR=6,647), meaning that respondents who had smoking behavior had a 7 times greater risk of suffering from hypertension than respondents who did not smoke.

Conclusion: There is a significant influence between physical activity, diet, and smoking behavior with the incidence of hypertension and there is no effect of rest patterns with the incidence of hypertension. Smoking behavior is the most influential factor in the incidence of hypertension.

***Keywords*: Physical Activity, Diet, rest pattern, Smoking, Hypertension.**

I. INTRODUCTION

Non-communicable diseases are the leading cause of death in the world. Three of the ten leading causes of death are caused by non-communicable diseases such as stroke, hypertension, and heart disease(1)'(2). Hypertension tends to be higher than coronary heart disease, chronic kidney failure, stroke due to uncontrolled hypertension can cause complications in coronary heart disease, chronic kidney failure, and stroke(3). Hypertension affects more than 26% of the adult population worldwide(4). One-quarter of the world's adult population is estimated to have hypertension, with the worldwide prevalence projected to increase to 60% by 2025(5). Hypertension is a major health problem because 70% is the cause of death in the world(6). Non-communicable diseases are generally chronic so that they can lower the immune system and are very susceptible to infections including COVID-19virus infection(7). COVID-19disease contributed to 0.4 million deaths(8). Hypertension is a contributing factor to the severity of COVID-19(6).

The results of Riskesdas 2018 showed that the prevalence of hypertension rose from 27.8% to 34.1%. The prevalence of hypertension will increase with increasing age(2). The districts or cities with the highest coverage of health services for people with hypertension are Cimahi (122.3%), Cirebon (107.0%), and Tasikmalaya (100.0%)(9).

The increase in the prevalence of non-communicable diseases is related to lifestyle, including smoking, consumption of alcoholic beverages, physical activity, consumption of fruits and vegetables(2). Several factors cause hypertension such as excessive salt consumption, alcohol consumption, physical activity, diet, rest, smoking, and obesity. High salt intake and stress are risk factors for hypertension in the elderly(10). Individual lifestyle behavior and health status affect the risk of being infected with COVID-19(11). Hypertension is one of the most common co-morbidities of COVID-19 is closely related to lifestyle including diet, smoking behavior, physical activity, and stress. Unhealthy smoking behavior can cause uncontrolled hypertension(12). People with comorbidities are one of the groups most vulnerable to being exposed to the Covid-19 virus(13). The results of the study according to Poniyah showed that there was a relationship between physical activity, diet, and the incidence of hypertension in the elderly(14). The results of research on Nor'alia, et al lifestyle associated with the incidence of hypertension are diet, physical activity, and stress(15). Based on the results of previous studies that smoking is closely associated with a higher risk of hypertension in the long term(16).

The people of Cirebon City, who have a different lifestyle from those in rural areas, have experienced a shift in eating patterns that lead to fast food and preserved food. The prevalence of hypertension in 2020 at the age of 60-69 years has increased by 272 people with hypertension compared to 2019 as many as 137 and data on not smoking in the house is obtained 61% of the 100% target(17). Based on the

identification of the research problems above, the purpose of this study is to analyze lifestyle risk factors with the incidence of hypertension in the elderly during the COVID-19 pandemic era.

II. MATERIALS AND METHODS

The research design used a *case-control* quantitative approach. The variables in this study were physical activity, diet, rest habits, smoking habits, and the incidence of hypertension. A sample of 88 respondents consisted of 48 cases and 40 controls. The sampling method used *accidental sampling technique*.

The data collection method used interviews and the data collection instrument used was a questionnaire consisting of statements about physical activity, eating patterns, resting patterns, and smoking behavior.

The inclusion criteria in this study were respondents who were aware, able to communicate well, and were willing to become respondents, while the exclusion criteria were respondents who did not suffer from hypertension, respondents who at the time of the study changed their domicile, and respondents who were sick. Data analysis using c*hi-square test* and multivariate logistic regression.

III. RESULTS

Table 1. Effect of Physical Activity, Diet, Rest Pattern, and Smoking Behavior with Hypertension Incidence in the Elderly in the Covid-19 Pandemic Era

Variable			Incident		Total		*P-Value*
		Case		Control			
	n	%	n	%	n	%	
Physical Activity							
Not good	29	47.5	32	52.5	61	100	
Good	19	70.4	8	29.6	27	100	0.047
Dietary habit							
Not good	32	66.7	16	33.3	48	100.0	
Good	16	40.0	24	60.0	40	100.0	0.012
Rest pattern							
Not good	30	58.8	21	41.2	51	100.0	
Good	18	48.6	19	51.4	37	100.0	0.344
Smoking behavior							
Tall	39	67.2	19	32.8	58	100.0	
Low	9	30.0	21	70.0	30	100.0	0.001

Based on table 1. it is found that respondents who have a poor physical activity pattern are 29 (47.5%) suffering from hypertension and respondents who have a good physical activity pattern are 8 (29.6%) not suffering from hypertension. There is a significant effect between physical activity and the incidence of hypertension in the elderly with a *p-value of* 0.047. And respondents who have bad eating habits are mostly hypertensive as many as 32 (66.7%) and respondents who have good eating habits are mostly not hypertension as much as 24 (60.0%). There is a significant effect between diet and the incidence of hypertension in the elderly with a *p-value of* 0.012.

Respondents who had poor rest habits were 21 (41.2%) did not suffer from hypertension and respondents who had good rest patterns were 18 (48.6%) suffered from hypertension. There is no significant effect between resting patterns and the incidence of hypertension in the elderly with a *p-value of* 0.344. And respondents who have high smoking behavior mostly suffer from hypertension as much as 39 (67.2%) and respondents who have low smoking behavior mostly do not suffer from hypertension as much as 21 (70.0%). There is a significant effect between smoking habits and the incidence of hypertension with a *p-value of* 0.001.

Table 2. Logistics Regression Modeling First Model

Variable	B	P-value	OR	95% CI
1. Physical activity	-,832	0.138	0.435	0.145-1.305
2. Rest pattern	0.732	0.210	2,080	0.662-6.533
3. Smoking behavior	1,721	0.002	5.590	1,864-16,764
4. Dietary habit	1,833	0.002	6,251	1,947-20,066

From the first modeling, it can be seen that the variable that has the largest P-value is the pattern of rest, so that variable is removed from the next model. The next step is to evaluate/calculate the changes in the OR value between before and after the rest pattern variable is excluded for the variables that are still in the model. If there is one variable whose OR

change is > 10%, it is recommended that the previously excluded variables be re-entered in the model.

Table 3. Logistics Regression Modeling Final Model

Variable	B	P-value	OR	95% CI
1. Smoking behavior	1,894	0.001	6,647	2,284-19,347
2. Dietary habit	1,474	0.004	4,367	1.592-11.984

Based on table 3. the results of multivariate analysis showed that the most dominant variable influencing the incidence of hypertension was smoking behavior with an Odds Ratio (OR) of 6.647 (95% CI: 2.284-19.347), meaning that respondents who had smoking behavior had a risk of 7 times greater will suffer from hypertension compared to respondents who do not smoke.

IV. DISCUSSION

Effect of Physical Activity with Hypertension Incidence in the Elderly

The results showed that there was a significant effect between physical activity and the incidence of hypertension in the elderly (*P-value* 0.047). The results of this study are in line with the results of previous studies which state that there is a relationship between physical activity and the incidence of hypertension in the elderly(15)'(16)'(18).

Elderly humans will experience changes that affect all aspects of life including health, with a lack of physical activity there will be an accumulation of fat, so that blood flow is inhibited and a higher heart rate frequency causes the heart muscle to work harder at each contraction which can increase pressure blood (14). Regular exercise can remove cholesterol deposits in the arteries, thus avoiding complications of hypertension(19).

In the results of this study, there are still 47.5% of respondents who are not good at physical activity, according to the researcher, this is an important problem that must be addressed immediately because it is a risk factor for hypertension. Several interventions that must be carried out in tackling the problem of lack of good physical activity include: routinely exercising than 20 minutes for each exercise(20).

Regular physical exercise or exercise can improve health status, one of which is preventing hypertension(7).

Effect of Diet with Hypertension Incidence in the Elderly

The results of this study found that there was a significant effect between diet and the incidence of hypertension in the elderly (P-value 0.012). The results of this study are in line with the results of several previous studies which showed a relationship between food consumption and the incidence of hypertension(14)'(18). Cross-sectional studies have shown that overweight and obesity are significantly associated with increased blood pressure and the prevalence of hypertension(21).

Excess fat intake can increase fat levels, especially cholesterol in the body so that blood volume experiences a greater increase in pressure, besides that excess sodium intake will increase extracellular causing blood volume to have an impact on the onset of hypertension(14). A healthy diet by reducing sodium consumption in food and is recommended to be able to increase the consumption of foods such as low-fat dairy products, fish, chicken, and nuts(22).

The results of this study still have a relationship between diet and the incidence of hypertension, so several interventions that must be carried out include: not consuming foods that contain excess salt and foods high in fat(20), consuming 10 grams of fat per day, consuming 100 meat per day grams, and consumes 60 grams of instant noodles per day(23).

Effect of Rest Pattern with Hypertension Incidence in the Elderly

The results of this study showed that there was no significant effect between resting patterns and the incidence of hypertension in the elderly (P-value 0.344). The results of the study are in line with the results of previous studies which showed that there was no relationship between resting habits and the incidence of hypertension in the elderly with *p.value* = 0.441(14).

Adequate rest is a basic human need to maintain health, rest and sleep can be useful to relax muscles after activities and to calm the mind. Adequate sleep at night 6-8 hours will restore fatigue throughout the day(24). In this study, there were still 58.8% of respondents who had poor rest habits, so it was one of the risk factors for hypertension. So the recommended intervention is to be able to set a minimum of 6-8 hours of rest a day(14).

The Effect of Smoking Behavior is the Most Dominant Risk Factor for Hypertension Incidence in the Elderly

In this study smoking behavior is the most influential variable on the incidence of hypertension with an Odds Ratio (OR) of 6.647, meaning that respondents who have smoking behavior have a 7 times greater risk of suffering from hypertension than respondents who do not smoke, the results of this study are in line with some results of previous studies which state that there is an influence between smoking habits and the incidence of hypertension(25)'(26)'(27). Increased blood pressure is strongly influenced by lifestyle such as smoking, the increasing incidence of hypertension is strongly influenced by unhealthy lifestyles, including smoking(28). Smoking is associated with an increased risk of hypertension in men and has a significant association(29). Smoking was significantly correlated with higher blood pressure, especially among former smokers and new smokers(30). Smoking can hurt the development of hypertension(31).

In this study, smoking affects the incidence of hypertension (p-value 0.001). Cigarettes contain very dangerous chemical compounds, especially nicotine and carbon monoxide, these substances enter the bloodstream, then damage blood vessels causing atherosclerosis, thereby causing pressure in the artery walls to increase(32). Increased heart rate pressure, both systolic and diastolic blood pressure, is due to the ingredients in cigarettes that contain nicotine, which causes damage to the artery walls so that plaque builds up in the long term causing high blood pressure(33)'(34). Carbon monoxide in cigarette smoke will replace oxygen binding in the blood, it causes blood pressure to increase because the heart is forced to pump to put enough oxygen into the organs and other body tissues(33)'(35).

An unhealthy lifestyle is the most important factor influencing health problems, namely smoking habits, diet, and stress(36). One of the diseases caused by smoking is hypertension(37). After just 10 minutes of smoking, hypertension will increase from 140/≥99 mmHg to 151/108(38). Smoking is a risk factor for myocardial infarction(39). Side effects of smoking and hypertension on the heart and blood vessels, both as independent risk factors that can increase cardiovascular disease(40).

The results of this study indicate that respondents with the category of poor smoking habits suffer from hypertension by 67.2%, so the recommended interventions include: you should avoid smoking habits, for example by looking for a substitute for cigarettes, gradually reducing the number, doing exercise 3 times in one day. week. Improving a healthier lifestyle by not smoking, often consuming fruits and vegetables, and often controlling their health(41). Prevention and management of hypertension is a public health challenge for developing and developed countries. Maintaining a healthy weight, not smoking, regular exercise, and maintaining a healthy diet be beneficial, avoiding cardiovascular risk factors such as hypertension(42).

During the Covid-19 pandemic, smoking is a very dangerous habit because it worsens the working system of the lungs, which will become weaker. This can weaken the immune system, making it difficult for the body to fight the incoming coronavirus(43).

There is a relationship between smoking history and Covid-19 cases. Hypertension will increase the risk of Covid-19 disease, optimal hypertension management can contribute to a better covid-19 prognosis(8). By quitting smoking people can increase their body immunity to fight this covid-19(43). During the Covid-19 pandemic, around 60 million Italians stayed at home, this situation created tremendous stress for people who regularly use cigarettes, e-cigarettes, and heated tobacco products(44).

In this study, smoking is the biggest risk factor for increasing the occurrence of hypertension and the impact of the covid-19 pandemic to prevent transmission is recommended by the community to stay at home or limit activities outside the home, causing people to experience stress which ultimately seeks escape to smoking behavior so that they can cause the incidence of hypertension during the Covid-19 pandemic has increased.

The interaction between Covid-19 and smoking behavior is likely to be complex and two-way, leading to a reduction, cessation, and increase in smoking(45). One of the groups that are considered vulnerable to being infected with the Coronavirus is smokers. In addition, the severity of Covid-19 experienced by smokers is usually more severe than for people who do not smoke. During the Covid-19 pandemic, cigarette users increased by 64%(46). The government should use this opportunity to encourage smokers to try to quit and create smoke-free homes, especially during lockdown conditions, for smokers(47).

V. CONCLUSION

There is a significant influence between physical activity (p-*value* 0.047), eating patterns (p-*value* 0.012), smoking behavior with the incidence of hypertension (p-*value* 0.001), and there is no effect of rest patterns with the incidence of hypertension (p-*value* 0.334). Multivariate analysis found that smoking behavior was the most influential factor with the incidence of hypertension (OR = 6.647), meaning that respondents who had smoking behavior had a 7 times greater risk of suffering from hypertension than respondents who did not smoke.

Conflict of Interests

The authors declare that they have no conflict of interest.

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Authors' Contribution

Cucu Herawati made writing and editing of the manuscript and data analysis, Septi Wulandari and Dewi Mutiah collected research data, Nuniek Tri Wahyuni processed and interpreted data, Suzana Indragiri and Didik Sumanto analyzed data and prepared initially published articles. All authors reviewed the manuscript and approved the final manuscript.

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RECOMMENDATIONS

It is better to improve public health efforts in the promotive and preventive fields, including the need to provide access to information that is easily understood by the public in the form of posters, people with hypertension to always control blood pressure and avoid risk factors that cause an increase in blood pressure. Get used to be having a healthy lifestyle.

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