

Research Article



## Risk Factors for Hypertension in the Coastal Area of Konawe Regency

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### ABSTRACT

**Background:** Hypertension is a health problem in all parts of the world and is a major risk factor for cardiovascular disease. Konawe Regency is in second place after Muna as a district with the most hypertension sufferers in Southeast Sulawesi. The purpose of this study was to analyze the incidence of hypertension in the coastal area of Konawe Regency.

**Methods:** This type of research uses quantitative methods with a case control study design. The population in this study amounted to 1,398 people, with a sample of 218 people. In this study, sampling was carried out by Cluster Sampling, with statistical tests using Odds Ratio.

**Results:** The results of the OR 95% CI statistical test showed that there was a relationship between genetics (OR=3.204), salt consumption habits (OR=2.791), physical activity (OR=4.497), stress levels (OR=2.603), and smoking habits (OR=6.201) to the incidence of hypertension in the coastal area of Konawe Regency.

**Conclusion:** It can be concluded that the risk factors for hypertension in the coastal area of Konawe Regency include genetics, salt consumption habits, physical activity, stress levels, and smoking habits. It is hoped that the health center will collaborate with cross-sectors that are closest to the community such as health cadres and others, in efforts to detect here as well as counseling hypertension and certain other non-communicable diseases.

**Key words:** Risk Factors, Hypertension, Coastal

## INTRODUCTION

Hypertension is a health problem in all parts of the world and is a major risk factor for cardiovascular disease. Hypertension is also referred to as a non-communicable disease, because hypertension is not transmitted from person to person. This is because the emergence of PTM is generally caused by the lifestyle of each individual who pays little attention to health(1). Data released by WHO (2018) shows that around 26.4% of the world's population has hypertension with a ratio of 26.6% of men and 26.1% of women. Approximately 60% of people with hypertension are in developing countries, including Indonesia(2).

The results of Basic Health Research (Riskesmas) in Indonesia show that 34.11% of respondents had been diagnosed by a doctor as having hypertension in 2018. The estimated number of cases of hypertension in Indonesia is 63,309,620 people, while the death rate in Indonesia due to hypertension is 427,218 deaths.(3). The increase in the prevalence of hypertension in Indonesia is accompanied by an increase in the proportion of risk factors for hypertension in Indonesian society. Risk factors for hypertension are divided into 2, namely modifiable risk factors (obesity, lack of physical activity, consumption of fat, excess salt consumption, lack of consumption of fruits and vegetables, smoking habits) and risk factors that cannot be changed (age, gender, genetic)(4).

The Southeast Sulawesi Health Profile for 2021 shows that hypertension ranks second in the top 10 highest diseases with 62,964 cases(5). Konawe Regency is the second highest district after Muna with the most hypertension sufferers in Southeast Sulawesi. Konawe Regency in 2021, of the 60,336 estimated number of hypertension  $\geq$

15 years who received services, 28,686 (47.66%) had received health services(6).

Soropia Subdistrict and Lalonggasumeeto Subdistrict are two subdistricts in Konawe Regency, which are located in the lowlands and include coastal areas and are mostly inhabited by the Bajau tribe. The habit of consuming foods high in salt and high cholesterol in coastal communities without realizing it has become a risk factor for hypertension. As a result of this lifestyle, there is a tendency for hypertension to occur in coastal communities. People's lifestyles that do not reflect a healthy lifestyle are closely related to an increase in the number of people with hypertension. As in coastal communities, lifestyle with the habit of consuming foods with high sodium intake, lack of sleep and stress are things that can threaten the health of coastal communities.

Several studies have shown that the prevalence and risk of hypertension in coastal areas is more significant. Therefore, further research related to the risk factors for hypertension in coastal areas is important to do.

## METHOD

This type of research uses quantitative methods with a case control study design (case control study). The population in this study was divided into two, namely the case population and the control population. In this study the case population was people with hypertension and recorded in the medical records of the Soropia Health Center in 2022 as many as 1,398 people. The control population is all people in the coastal area of Lalonggasumeeto District who do not suffer from hypertension in 2022 with a total of 2,261 people. There were 109 case samples



in this study, with a 1:1 control sample ratio, bringing the total sample to 118 people. Sampling using Cluster Random Sampling and through individual age matching. Data

obtained from interviews with respondents using a questionnaire. Analysis of research data using the Odd Ratio test.

RESULTS

Table 1 shows that from the results of the Odds Ratio (OR) statistical test, the value of OR = 3.024 is obtained, which is greater than 1. Also obtained are Lower Limit values of 1.715 and Upper Limit of 5.332 with CI = 95%. Because the OR value is greater than 1, genetic variables are a risk factor for hypertension.

Table 2 shows that from the results of the Odds Ratio (OR) statistical test, the value of OR = 2.791 is obtained, where this value is greater than 1. Also obtained are Lower Limit values of 1.301 and Upper Limit of 5.987 with CI = 95%. Because the OR value is greater than 1, the salt consumption habit variable is a risk factor for hypertension

Table 3 shows that from the results of the Odds Ratio (OR) statistical test, the value of OR = 4.497 is obtained, where this value is greater than 1. Also obtained are Lower Limit values of 2.468 and Upper Limit of 8.197 with CI = 95%. Because the OR value is greater than 1, the physical activity variable is a risk factor for hypertension.

Table 4 shows that from the results of the Odds Ratio (OR) statistical test, the value of OR = 2.603 is obtained, where this value is greater than 1. Also obtained are Lower Limit values of 1.497 and Upper Limit of 4.526 with CI = 95%. Because the OR value is greater than 1, the physical activity variable is a risk factor for hypertension.

Table 5 shows that from the results of the Odds Ratio (OR) statistical test, the value of OR = 6.201 is obtained, where this value is greater than 1. Also obtained are Lower Limit values of 3.398 and Upper Limit of 11.317 with CI = 95%. Because the OR value is greater than 1, smoking habit is a risk factor for hypertension.

Table 1. Genetic Risk Factors for Hypertension in the Coastal Area of Konawe Regency

Genetics	Hypertension				Total		OR	95% CI
	Case		Control		n	%		
	n	%	n	%				
Risk	80	73,4	52	47,7	132	60,6	3,024	1.715-5.332
No Risk	29	26,6	57	63,3	86	39,4		
<b>Total</b>	<b>109</b>	<b>100</b>	<b>109</b>	<b>100</b>	<b>218</b>	<b>100</b>		

Source: Primary Data, 2023

**Table 2. Risk Factors of Salt Consumption Habits on Hypertension Incidence in the Coastal Area of Konawe Regency**

Consumption Salt	Hypertension				Total		OR	95% CI
	Case		Control		n	%		
	n	%	n	%				
Tall	83	76,1	98	89,9	181	83,0	2,791	1.301-5.987
Normal	26	23,9	11	10,1	37	17,0		
<b>Total</b>	<b>109</b>	<b>100</b>	<b>109</b>	<b>100</b>	<b>218</b>	<b>100</b>		

Source: Primary Data, 2023

**Table 3. Risk Factors of Physical Activity for Hypertension in Coastal Areas of Konawe Regency**

Activity physique	Hypertension				Total		OR	95% CI
	Case		Control		N	%		
	N	%	N	%				
Currently	58	53,2	22	20,2	80	36,7	4,497	2,468-8,197
Light	51	46,8	87	79,8	138	63,3		
<b>Total</b>	<b>109</b>	<b>100</b>	<b>109</b>	<b>100</b>	<b>218</b>	<b>100</b>		

Source: Primary Data, 2023

**Table 4. Risk Factors for Stress Levels for Hypertension in the Coastal Area of Konawe Regency**

stress level	Hypertension				Total		OR	95% CI
	Case		Control		N	%		
	N	%	N	%				
Heavy	75	68,8	50	45,9	125	57,3	2,603	1,497-4,526
Light	34	31,2	59	54,1	93	42,7		
<b>Total</b>	<b>109</b>	<b>100</b>	<b>109</b>	<b>100</b>	<b>218</b>	<b>100</b>		

Source: Primary Data, 2023

**Table 5. Distribution of Respondents Based on Smoking Habits on Hypertension Incidence in Coastal Areas of Konawe Regency**

Smoking habit	Hypertension				Total		OR	95% CI
	Case		Control		N	%		
	N	%	N	%				
Heavy	86	78,9	41	37,6	127	58,3	6,201	3,398-11.317
Light	23	21,1	68	62,4	91	41,7		
<b>Total</b>	<b>109</b>	<b>100</b>	<b>109</b>	<b>100</b>	<b>218</b>	<b>100</b>		

Source: Primary Data

## DISCUSSION

### Genetic Risk Factors for Hypertension

Family history risk factor is one of the factors included in the category of non-modifiable risk factors. This is because

through these factors, hypertension becomes a genetic disease. The risk of someone experiencing hypertension will increase if there are parents or close relatives who suffer from hypertension(7). Based on statistical tests obtained from the OR value (95% CI)

of 3.024 (1.715 – 5.332). These results indicate that there is a significant relationship between genetics and the incidence of hypertension in the coastal area of Konawe Regency. Respondents who have a family history of hypertension have a 3.024 times greater risk of experiencing hypertension compared to respondents who do not have a family history of hypertension. The results of this study are in line with the research that has been done which shows that there is a significant relationship between family history and the incidence of hypertension(8).

The genetic formula for hypertension is caused by certain gene mutations. These genes help to control the body's fluid and salt balance so that when mutations occur, these functions can be hampered and affect blood pressure. There are more than 100 genetic variations associated with hypertension. The most common studies regarding the relationship between heredity and hypertension involve genes that act on the renin-angiotensin-aldosterone system. This system functions to produce hormones that regulate blood pressure as well as fluids and salt in the body. The researchers assumed that variations in these genes might interfere with blood pressure control processes that contribute to the development of hypertension. Other genes that have associations with hypertension are genes in blood vessels. This gene change causes endothelial dysfunction. These changes cause abnormal narrowing of blood vessels thereby increasing blood pressure(9).

In this discussion, hypertension is a hereditary disease. Hereditary diseases are diseases caused by changes in the genetic substance, namely DNA, either in part or in whole. These disorders can be caused by mutations in one gene, mutations in several genes, a combination of gene mutations and

environmental factors or by chromosomal damage(10).

### **Risk Factors of Salt Consumption Habits with Hypertension**

In the case group, 76.1% of respondents had a history of high salt consumption. Whereas in the control group, respondents who had a history of high salt consumption were 89.9%. Based on statistical tests obtained from the OR value (95% CI) of 2.791 (1.301 – 5.987). This shows that there is a significant relationship between salt consumption habits and the incidence of hypertension in the coastal area of Konawe Regency. Respondents who had a history of high salt consumption had a 2.791 times greater risk of experiencing hypertension than respondents who had a history of normal salt consumption. This is related to the respondents' tendency to consume high salt and the respondents' habit of preserving excess seafood by salting it.(11).

Theoretically, sodium consumption affects blood pressure. Consumption of high amounts of sodium and inadequate intake of potassium contribute to increased blood pressure. People with higher salt intake have higher blood pressure. Systolic blood pressure in people with high salt intake increases by about 4.58 mmHg per 1000 mg 24 hours of sodium excretion(12). High sodium consumption which causes high blood pressure is related to water retention in the body, modification of sympathetic activity and modulation of the autonomic nerves in the circulatory system. In addition, high sodium intake also contributes to arterial stiffness. The relationship between sodium intake and arterial stiffness has been clarified and the results show that an average decrease in salt intake is associated with a 2.8% reduction in arterial stiffness.(13).

Sodium intake should be limited to 2 grams per day or the equivalent of 5 grams (1 teaspoon) of table salt. According to the RI Ministry of Health (2018) this method can reduce systolic blood pressure by 3.7 mmHg and diastolic blood pressure by 2 mmHg. In people with hypertension, sodium consumption is limited to even lower levels, namely 1.5 to 4 grams per day. Sodium sensitivity is not experienced by all hypertensive patients, but limiting sodium intake can help treat hypertension and reduce the risk of cardiovascular disease(14).

### **Risk Factors of Physical Activity with Hypertension**

In the case group, 53.2% of respondents had a history of moderate physical activity. Whereas in the control group, respondents who had a history of moderate physical activity were 20.2%. Based on the results of statistical tests obtained from the OR value (95% CI) of 4.497 (2.468 – 8.197). Respondents who have moderate physical activity have a 4.497 times greater risk of experiencing hypertension compared to respondents who have a history of light physical activity. This shows that there is a relationship between physical activity and the incidence of hypertension in the coastal area of Konawe Regency. The majority of respondents in this study work as traders and fishermen who work from day to night, so that respondents do not have time to exercise regularly.(15).

Not doing enough physical activity as part of a lifestyle will increase the risk of high blood pressure. Proper physical activity is very good for the health of the heart and circulatory system(16). Low levels of physical activity are directly related to weight gain. The increase in body weight occurs due to the accumulation of nutrients,

especially carbohydrates, proteins and fats. Research shows that reducing systolic blood pressure by 5 mmHg, death from stroke can be reduced by 14% and death from coronary heart disease can be reduced by 9%. Regular physical activity is the most important step to prevent and treat hypertension(17).

### **Stress Risk Factors with Hypertension Incidence**

In the case group, 68.8% of respondents had a history of severe stress. Whereas in the control group, respondents who had a history of severe stress were 45.9%. Based on statistical tests obtained from the OR value (95% CI) of 2.603 (1.497 - 4.526). Respondents who have high levels of stress have a 2.603 times greater risk of experiencing hypertension compared to respondents who have a history of low levels of stress. This shows that there is a significant relationship between stress levels and the incidence of hypertension in the coastal area of Konawe Regency. Respondents often experience things such as anxiety, headaches, due to the uncertain climate and crop failures which have an impact on the income experienced by fishermen. Symptoms of emotional stress include increased anger, frustrated and difficult to control emotions. Behavioral symptoms of stress can be in the form of increased smoking habits and caffeinated drinks. The results of this study are in line with other studies that have been conducted which show that there is a relationship between stress and the incidence of hypertension in the working area of the Lalang Health Center, Medang Deras Batubara District(15).

Stress is a common condition experienced by humans. However, if the level of excessive stress will affect the

increase in blood pressure. The adrenaline hormone that increases when stressed results in the process of pumping blood carried out by the heart. The heart will pump blood faster, causing an increase in blood pressure(18). There is significant evidence suggesting that stress has an important role in the development of hypertension.

Stress is defined as an organism's adaptation process that affects psychological conditions as well as biological changes that are at risk of disease. Blood pressure and serum cholesterol that increase when humans experience stress provide strong suspicions about the association of stress and hypertension. This fact explains that psychosocial factors affect the mental formation process consciously or unconsciously(19).

### **Risk Factors of Smoking Habits with Hypertension**

In the case group, it was found that 78.9% of respondents had heavy smoking habits. Whereas in the control group, respondents who had heavy smoking habits were 37.6%. Based on statistical tests obtained from the OR value (95% CI) of 6.201 (3.398 – 11.317). Respondents who had a history of heavy smoking had a 6.201 times greater risk of experiencing hypertension compared to respondents who had a history of light smoking. This shows that there is a relationship between smoking habits and the incidence of hypertension in the coastal area of Konawe Regency. Where respondents think smoking can be a way to deal with difficult and dangerous working conditions due to days at sea which can trigger stress and stress diversion by respondents is by smoking. Respondents who work as fishermen admit that smoking makes them feel warm when the conditions

are cold at sea or smoking is used as a stress reliever. The results of this study are in line with research conducted by Kamaruddin, et al (2023) which shows that there is a relationship between smoking habits and the incidence of hypertension in the elderly(20).

In people whosmoking more increases the risk of coronary or blood vessel disease which can play a role in increasing blood pressure. The role of smoking in blood pressure is a complex thing that can lead to atherosclerosis, increased thrombogenesis and vasoconstriction of blood vessels and coronary artery spasm, increased blood pressure, increased heart rate, increased oxygen demand and increased oxygen transport capacity. Cigarettes contain thousands of toxic inorganic substances, such as nicotine, carbon monoxide, cyanide, and other carcinogenic substances. However, the components most often studied are nicotine and carbon monoxide.(21).

### **CONCLUSION**

Based on the results of the study, it can be concluded that genetics, salt consumption habits, physical activity, stress levels, and smoking habits are risk factors for hypertension in the coastal area of Konawe Regency. It is hoped that the Konawe District Health Office will collaborate with cross-sectors that are closest to the community such as health cadres and others, in efforts to detect here and educate on hypertension and certain other non-communicable diseases. As well as for researchers who will conduct similar research, where future researchers can develop the existing conceptual framework by adding other variables related to hypertension risk factors

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