



Determinants of Hypertension in Coastal Communities: A Study in the East Mawasangka Health Center Area, Indonesia

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Article Info	ABSTRACT
Article History: Received 24 May 2025 Revised 07 Jun 2025 Accepted 15 Jul, 2025	Introduction: Hypertension is a growing health problem and is one of the leading causes of morbidity and mortality worldwide. Coastal communities in the East Mawasangka Health Center working area show an increasing trend of hypertension cases every year. This study aims to analyze the relationship between family history, obesity, stress, and sodium consumption with the incidence of hypertension. Methods: This study used a cross-sectional design, involving 82 respondents (n=82) from eight villages selected through accidental sampling in the East Mawasangka Health Center, Central Buton Regency, Southeast Sulawesi, from Juni to Juli 2023. Data were obtained through direct interviews using a structured questionnaire. Data were analyzed using the chi-square test to see the relationship between these variables and hypertension. Results: The results of this study showed a p-value for family history (p-value = 0.004 <0.05), obesity (p-value = 0.048 <0.05), stress (p-value = 0.047 <0.05), and sodium consumption (p-value = 0.014 <0.05) with the incidence of hypertension in coastal communities in the East Mawasangka Health Center working area. Conclusion: The study concluded that Family history, obesity, stress, and high sodium consumption are significantly associated with hypertension in coastal residents of East Mawasangka, so intensive and continuous education to the community, practical salt consumption reduction strategies, routine hypertension and obesity screening programs in posyandu, schools, and workplaces need to be strengthened for early detection and appropriate follow-up, accompanied by nutritional and psychological counseling services for individuals with risk factors in coastal communities.
Keywords: Family History, Obesity, Stress, Sodium Consumption, Hypertension	
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INTRODUCTION

Hypertension, often referred to as the “silent killer”, is a major global health problem due to its asymptomatic nature and its role in serious complications such as cardiovascular disease and stroke. According to the WHO, more than 1.13 billion people suffer from hypertension worldwide, a figure projected to reach 1.5 billion by 2025 (Dewati et al., 2023) . In Indonesia, the prevalence is 34.1%, with Southeast Sulawesi showing a higher rate than the national average (Casmuti & Fibriana, 2023).

Coastal communities, such as those in the working area of Puskesmas Mawasangka Timur, Central Buton District, face a unique set of risk factors, including high sodium intake from salty foods and stress due to unstable livelihoods. Between 2020 and 2022, hypertension cases in the region increased from 290 to 456 (Profil Puskesmas Mawasangka Kabupaten Buton Tengah, 2022) . Factors such as obesity, family history, stress, and sodium consumption are suspected to be the cause fish (Ranti, 2021). In addition, existing health programs such as Posyandu Lansia and Prolanis have not effectively curbed this increase. Therefore, this study aims to analyze the relationship between these risk factors and the incidence of hypertension in coastal communities in East Mawasangka. This study aims to analyze the relationship between family history, obesity, stress, and sodium consumption with the incidence of hypertension.

METHODS

This study used a quantitative approach using an analytic observational design with a cross sectional method. The study was conducted in the work area of the East Mawasangka Health Center, Central Buton Regency, Southeast Sulawesi, from June to July 2023.

The study population was all patients (N=456) who performed routine blood pressure checks at the East Mawasangka Health Center from January to December 2022. The sample size was determined using the Slovin formula with a margin of error of 10%, resulting in a total sample of 82 respondents (n=82). Sampling was conducted using accidental sampling, which was considered appropriate due to time constraints and accessibility to field conditions.

Respondents were categorized by age into three groups, namely 18-25 years, 26-45 years, and 46-91 years, which was obtained from self-report and verification during data collection. Gender was recorded based on self-identification as male or female. Hypertension status was classified into at-risk and not at-risk based on blood pressure check results. Family history of hypertension was determined from reports of an immediate family member with hypertension. Obesity was measured using Body Mass Index (BMI) with categories of obesity ($\text{BMI} \geq 25 \text{ kg/m}^2$) and normal ($\text{BMI} < 25 \text{ kg/m}^2$). Stress level was assessed through a questionnaire or self-report scale, with stress and non-stress categories. Sodium consumption was measured through the amount of respondents' daily salt consumption, either from household measurement or individual consumption estimation with the categories of consumption of more than one spoon per day (>1 tablespoon per day) and one spoon or less ≤ 1 tablespoon per day).

Data was collected through structured interviews using a validated questionnaire and blood pressure measurements taken using a digital sphygmomanometer, following World Health Organization (WHO) standards. The questionnaire underwent validity and reliability testing, with validity assessed through item-total correlation, and reliability determined using Cronbach's alpha, which yielded a coefficient of 0.812, indicating acceptable internal consistency.

RESULTS

The results of the study are presented in the form of tables and narratives to facilitate interpretation. This study was conducted on 82 respondents spread across eight villages in the working area of the East Mawasangka Health Center, Central Buton Regency. Respondent characteristics included gender, age, education level, occupation, family history, obesity, stress level, and sodium consumption. Data analysis was conducted with a univariate approach to describe the distribution of variables, bivariate to test the relationship between independent and dependent variables.

Univariate Analysis

Tabel 1. Distribution of Respondent by Characteristics

Characteristics	Category	n	%
Age	18-25 years old	2	2.4
	26-45 years old	6	7.3
	46-91 years old	74	90.2
Gender	Male	11	13.4
	Female	71	86.6
Hypertension	At Risk	65	79.3
	Not at Risk	17	20.7
Family History	History	31	37.8
	No History	51	62.2
Obesity	Obesity	38	47.3
	Normal	44	53.7
Stress	Stress	29	35.4
	Not Stressed	53	64.6

Sodium Consumption	>1 spoon	70	85.4
	≤1 spoon	12	14.6
Total	-	82	100

Source: Primary Data, 2023

Based on Table 1, it shows that the majority of respondents were in the older age group (46-91 years, 90.2%) and dominated by women (86.6%). Most respondents (79.3%) were in the hypertension risk category, although the majority had no family history of hypertension (62.2%). Almost half of the respondents were obese (47.3%), and more than a third were stressed (35.4%).

Most striking was the high consumption of sodium above 1 tablespoon per day in 85.4% of respondents, which is a major risk factor for hypertension. These findings indicate the need for serious attention to salt consumption behaviors and other lifestyle factors associated with hypertension risk.

Bivariate Analysis

Tabel 2. Relationship between Risk Factors and Hypertension Incidence

Variables	Category	Hypertension (%)	No Hypertension (%)	<i>p-value</i>
Family History	History	61.3	38.7	0.004
	No History	9.8	90.2	
Obesity	Obesity	68.4	31.6	0.048
	Normal	11.4	88.6	
Stress	Stress	65.5	34.5	0.047
	Not Stressed	86.8	13.2	
Sodium Consumption	> 1 spoon	84.3	15.7	0.014
	≤ 1 spoon	50	50	

Source: Primary Data, 2023

Based on Table 2, the results of bivariate analysis, showed showed that there was a significant association between several risk factors and the incidence of hypertension. Individuals with a family history of hypertension had a prevalence of hypertension of 61.3% compared to only 9.8% in those with no history ($p = 0.004$), suggesting a genetic or familial environmental influence. Obesity also played an important role, with 68.4% of obese individuals having hypertension compared to 11.4% in normal weight individuals ($p = 0.048$). Stress contributed significantly, with 65.5% of stressed individuals suffering from hypertension, significantly higher than 13.2% of non-stressed individuals ($p = 0.047$). In addition, sodium consumption of more than one spoon per day was associated with the incidence of hypertension by 84.3%, while consumption of ≤1 spoon was only 50% ($p = 0.014$). These findings confirm that family history, obesity, stress, and excess salt consumption are important risk factors that significantly increase the likelihood of developing hypertension.

DISCUSSION

Family History

The results showed that family history had a significant relationship with the incidence of hypertension ($p = 0.004$). Individuals with hypertensive parents are at twice the risk of developing hypertension than those without a history (Sri Tanti Rahmayani, 2019). This is due to genetic factors that affect blood pressure regulation, such as increased intracellular sodium and other metabolic mechanisms that are inherited (Faida & Santik, 2020). In addition, family members living in the same neighborhood tend to have similar lifestyles, such as high salt consumption, physical inactivity, smoking, and alcohol consumption, which also increase the risk of hypertension. However, the high prevalence of hypertension in the no family history group also

suggests that lifestyle factors play an important role in the incidence of hypertension. Lifestyle factors such as a high sodium (salt) diet, low physical activity, obesity, stress, smoking, and alcohol consumption can increase the risk of high blood pressure (Aryantiningsih, 2019). A diet rich in salt and processed foods can cause sodium buildup in the body which triggers an increase in blood pressure (Grillo, Salvi, Coruzzi, Salvi, & Parati, 2019). Lack of physical activity leads to decreased calorie burning and increased fat accumulation, which in turn increases the heart's workload and vascular resistance (Pinckard, Baskin, & Stanford, 2019).

Obesity

Obesity has a significant association with the incidence of hypertension, with a value of $p = 0.048$, whereby obese individuals have a 2 to 6 times higher risk of developing hypertension. This is due to the accumulation of body fat that increases cardiac workload and vascular resistance, as well as physiological mechanisms such as increased sympathetic nerve activity, insulin resistance, and stimulation of the renin-angiotensin system that contribute to high blood pressure (Miah et al., 2024). The study showed that the majority of obese respondents suffered from hypertension, confirming the strong influence of obesity on blood pressure. However, the also high proportion of hypertension in the non-obese group indicates that obesity is not the only determining factor, but rather interacts with other lifestyle factors such as sodium consumption, stress, and family history (Jiang et al., 2024). These findings suggest an association between obesity and hypertension (Mohd-Sidik, Lekhraj, & Foo, 2021), although there were other studies by Dunn et al. that found no significant association, likely due to differences in population and research methods. Biologically, the hormone leptin released by adipose tissue plays an important role in triggering hypertension through stimulation of blood vessel growth in the hypothalamus and activation of the sympathetic nervous system as described in recent experimental studies (Ali et al., 2022). Therefore, weight control becomes a key strategy in the prevention and management of obesity-related hypertension (Carey, Muntner, Bosworth, & Whelton, 2018).

Stress

Stress has a significant association with the incidence of hypertension, with a p value = 0.047, where individuals who experience stress have a higher risk of developing high blood pressure than those who do not experience stress. The physiological mechanism underlying this relationship involves increased activity of the sympathetic nervous system due to the release of adrenaline and cortisol hormones, which accelerate the work of the heart and cause constriction of blood vessels, resulting in increased blood pressure (Hidayati, dkk. 2022, n.d.). There were respondents who experienced stress (65.5%) who also suffered from hypertension, thus strengthening the evidence that stress plays a role in increasing blood pressure. However, the high proportion of hypertension in respondents who did not experience stress (86.8%) suggests that stress is not the only factor causing hypertension. Other factors such as a high-salt diet, lack of physical activity, and family history are also influential (Program et al., 2024). In contrast, some respondents who experienced stress but were not hypertensive (34.5%) indicated that the intensity of stress or the physiological response of each individual can be different. Recent experimental studies explain that chronic stress can alter the regulation of the renin-angiotensin system and increase vascular sensitivity to vasoconstrictor hormones, which aggravates hypertension (Lukitaningtyas, 2023).

Sodium Consumption

Excess sodium consumption has a significant association with the incidence of hypertension, with a p value = 0.014, where individuals who consume excessive sodium have a higher risk of developing high blood pressure than those who do not. High sodium intake, especially from table salt (NaCl), causes fluid retention in the body, thereby increasing blood volume and pressure on blood

vessel walls, which ultimately triggers hypertension (Indriyani, Rahim Kamil, & Studi Keperawatan, n.d.). Research conducted in the East Mawasangka Health Center working area showed that 84.3% of respondents with excessive sodium consumption had hypertension, which was thought to be influenced by an irregular diet. However, 15.7% of them did not experience hypertension, possibly due to having physically active habits and living a healthy lifestyle. In contrast, 50% of respondents with low sodium consumption still had hypertension, which could be attributed to low levels of physical activity. Only 50% of respondents who did not consume excessive sodium did not develop hypertension, indicating that a healthy lifestyle plays a role in maintaining normal blood pressure. Biologically, sodium affects blood pressure through an increase in osmotic pressure and activation of the renin-angiotensin-aldosterone system that retains fluid and sodium in the body.

Although the results of this study indicate a significant relationship between factors such as family history, obesity, stress, and sodium consumption with the incidence of hypertension, there are several limitations that need to be considered, namely the cross-sectional design of this study, so that the relationship found is only associative and cannot prove a direct causal relationship. The results of this study have important implications for the development of policies and public health education programs, including the need for comprehensive educational programs on healthy lifestyles, especially in terms of reducing salt consumption, increasing physical activity, managing stress, and controlling body weight, routine blood pressure screening should be carried out regularly, especially for individuals with risk factors such as family history and obesity, for early detection and prevention of further complications, community-based interventions that encourage behavior change and promotion of low sodium food consumption.

CONCLUSION

It can be concluded that family history, obesity, stress, and excess sodium consumption have a significant association with the incidence of hypertension in the East Mawasangka Health Center working area. Genetic factors from family history contribute to the risk of hypertension, while obesity increases blood pressure through the accumulation of body fat. Stress affects hypertension through stimulation of the adrenaline hormone, and excess sodium consumption increases blood volume, triggering hypertension. However, a healthy lifestyle, such as a balanced diet, regular physical activity and stress management, can reduce the risk of hypertension despite the presence of other risk factors.

Therefore, intensive and sustainable education is needed to the community through community-based intervention models, such as Posbindu PTM (Pos Pembinaan Terpadu Penyakit Tidak Menular), which can involve health cadres in providing routine counseling on healthy eating, physical activity, and stress control. Practical salt consumption reduction strategies can be carried out through training on healthy cooking without excess salt, promotion of the use of natural seasonings as salt substitutes, and distribution of information through leaflets and local social media on the dangers of high sodium. In addition, regular hypertension and obesity screening programs at posyandu, schools, and workplaces need to be strengthened for early detection and appropriate follow-up, accompanied by nutritional and psychological counseling services for individuals with risk factors. Local governments are also expected to implement sodium labeling policies on local processed food products and support the development of affordable and accessible public sports facilities, such as jogging trails and active parks, to encourage increased physical activity. These efforts are important to create an enabling environment conducive to the sustainable prevention and control of hypertension.

This study has several limitations, such as a cross-sectional design that cannot explain the causal relationship, and no objective measurement of sodium levels. Therefore, further research with a longitudinal design and biomarker approach is needed to strengthen these findings and provide a more accurate picture of the determinants of hypertension in the community.

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