

Research Article

The Relationship Between High Sodium and Potassium Consumption Patterns and the Incidence of Hypertension at the Community Health Center (UPT Puskesmas) in Bantaeng Regency

Nisphu Ramadhan. R^{1*}, Irmawati², Musfirah³

¹⁻³ Universitas Tamalatea Makassar; Jl. Perintis Kemerdekaan KM No.12, Tamalanrea, Makassar, Kota Makassar, Sulawesi Selatan 90242

* Corresponding Author : nishpuramadhan@gmail.com

Abstract: A high-sodium and low-potassium consumption pattern can increase the risk of hypertension. Excess sodium can cause fluid retention and increase blood volume, while potassium plays a role in regulating fluid balance and blood pressure. This study aims to determine the relationship between high-sodium and high-potassium consumption patterns and the incidence of hypertension at the City Community Health Center (UPT Puskesmas) in Bantaeng Regency. The research method used was quantitative analytic with a cross-sectional study approach. The study population was all 278 patients visiting the City Community Health Center (UPT Puskesmas) in Bantaeng Regency. The sample size was 74 residents of the community at the City Community Health Center (UPT Puskesmas). Purposive sampling was used. The research instrument used was a questionnaire, which was distributed to respondents. The Food Frequency Questionnaire (FFQ) was used for sodium and potassium consumption. The results showed a relationship between sodium consumption and the incidence of hypertension ($p=0.003$ meaning H_a was accepted). The results showed a relationship between potassium consumption and the incidence of hypertension ($p=0.001$) meaning H_a was accepted. Researchers hope that this research can be used as a support or source of information to develop knowledge in the field of community health, especially in nursing, related to sodium and potassium consumption in reducing blood pressure in hypertension patients.

Keywords: Community health; Dietary patterns; Hypertension; Potassium; Sodium.

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1. Introduction

According to World Health Organization By 2024, it is estimated that there will be 1.13 billion people with hypertension worldwide, two-thirds of cases in lower-middle-income countries. This number will continue to increase every year and by 2025 it is expected to reach 1.5 billion cases, and the death rate due to hypertension and its complications is estimated to reach 9.4 million people every year (WHO, 2024).

According to the Indonesian Health Survey (SKI) in 2023, 34.1% of hypertension rates are reported at the age of over 18 years. It was 31.6% in the 31-44 year age group, 45.3% in the 45-54 year age group, and 55.2% in the 55-64 year old age group. Of the 34.1% of people with hypertension, only 8.8% of people are diagnosed with hypertension, as many as 13.3% of people diagnosed with hypertension do not take medication, and 32.3% of people who suffer from hypertension do not take medication regularly. This shows that there are still many hypertensive patients who have not received proper treatment (Ministry of Health, 2023).

According to data from the South Sulawesi Provincial Health Office in 2022, the number of people experiencing hypertension was 27.3% of all visits to health services. Meanwhile, in 2023 people will experience hypertension as much as 28.1% of all visits to health services and in 2024 people will experience hypertension as much as 29.6% of all visits to health services (Ministry of Health, 2024).

Data obtained from the Bantaeng Regency Health Office in 2022 showed that the number of people experiencing hypertension was 10,256 cases from all visits to health services. Meanwhile, in 2023 people will experience hypertension as many as 11,074 cases from all visits to health services and in 2024 the number of people experiencing hypertension will be 11,462 cases from all visits to health services (Ministry of Health, 2024).

Data obtained from the Bantaeng Regency City Health Center in 2022 shows that the number of hypertensive patients is 4489 people. Meanwhile, in 2023 the number of hypertensive patients is 5438 people and in 2024 the number of hypertensive patients is 6873 people and from January to March 2025 the number of hypertension patients is 1934 people (Medical Records, 2025).

The researcher raised the title because there is still a lack of information obtained by the public in preventing hypertension. Therefore, by providing education to the public, it is hoped that it can increase insight and knowledge on how to prevent the increase in hypertension. This is the basis for the researcher to conduct a study entitled "The Relationship between High Sodium and Potassium Consumption Patterns and the Incidence of Hypertension at the UPT Puskesmas Kota Bantaeng Regency".

Related Work

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2. Proposed Method

The type and method of research used were quantitative analysis with a cross-sectional study approach. This type of research emphasizes the time of measurement/observation of independent and dependent variable data, at a single point in time. Measurement of unlimited variables must occur at exactly the same point in time. Sampling in this study was conducted using purposive sampling. This sampling technique limits the population based on variables determined by the researcher. The research instrument used in this study was a questionnaire distributed to respondents. For the sodium and potassium consumption variables, the FFQ (Food Frequency Questionnaire) was used.

Data Analysis Techniques

Univariate analysis was conducted to obtain a general overview by describing each variable in the study, namely by creating a frequency distribution table and narrative. The data collected in the study were processed analytically using the Chi Square test and the results were processed to determine the relationship between the two independent variables and the dependent variable.

Overview of Research Locations

The City Health Center is located in the District Capital and the Regency Capital, namely in Pallantikang Village, has a working area in some of Bantaeng Districts which oversees 5 Villages with an area of 14.35 Ha and covers 52 hamlets/neighborhoods. The geographical conditions are in the form of lowlands with an altitude of 100 m from sea level and a temperature of 23 – 31°C which is rice fields, gardens and yards so that it is easy to reach by car or motorbike to the hamlet. The boundaries of the City Health Center's work area are:

North : Kayu Loe Village, Bantaeng District,

South : According to Flores

Eas : Mamampang Village (Eremerasa District), Letta District, Lembang District (Bantaeng District)

West : Bonto Sunggu District, Bonto Rita (Bissappu District), Bonto Bulaeng Village (Sinoa District)

Geographically, the UPT City Health Center is located in a strategic location, which is located on Jalan Elang which is one of the axes of Bantaeng Regency Road, around which there are several Government Offices, several Elementary Schools and Senior High Schools. The work area of the UPT Puskesmas Kota is an urban area where the majority of people are employees and employees. Transportation between sub-districts can be passed by all vehicles, both 2-wheeled and 4-wheeled. The area is approximately 14.35 Ha.

3. Research Results & Discussion

Research Results

The type and method of research used is quantitative analytics with an approach Cross Sectional Study. The population of this study was 278 patients who visited the UPT Puskesmas Kota Bantaeng Regency as many as 278 people. In this study, the sample taken was some of the people who were in the UPT Puskesmas Kota Bantaeng Regency as many as 74 people. Sampling in the study was carried out Purposive Sampling.

Table 1. Distribution of Respondent Characteristics by Age at the UPT Puskesmas Kota Bantaeng Regency Year 2025

Age	F	%
35-45 Years	38	51,3
46-55 Years	16	21,7
56-65 Years	14	18,9
66-75 Years	6	8,1
Total	74	100,0

Source : Primary Data 2025

Based on table , it shows that out of 74 sampled people, 38 respondents were 35-45 years old (51.3%), 46-55 years old as many as 16 people (21.7%), 56-65 years old as many as 14 people (18.9%) and 66-75 years old as many as 6 people (8.1%).

Table 2. Distribution of Respondent Characteristics by Education at the UPT Puskesmas Kota Bantaeng Regency Year 2025

Education	F	%
SD	13	17,6
SMP	14	18,9
SMA	21	28,4
College	26	35,1
Total	74	100,0

Source : Primary Data 2025

Based on table, it shows that out of 74 samples, respondents were educated in elementary school as many as 13 people (17.6%), junior high school as many as 14 people (18.9%), high school as many as 21 people (28.4%) and university as many as 26 people (35.1%).

Table 3. Distribution of Respondent Characteristics by Occupation at the UPT Puskesmas Kota Bantaeng Regency

Work	Year 2025	
	F	%
IRT	16	21,6
ASN	8	10,8
Self employed	14	18,9
Farmer	15	20,3
Merchant	5	6,8
Pensioner	5	6,8
Honor	9	12,2
Nurse	1	1,4
Midwife	1	1,4
Total	74	100,0

Source : Primary Data 2025

Based on table, it shows that out of 74 samples, respondents worked as IRTs as many as 16 people (21.6%), ASN as many as 8 people (10.8%), self-employed as many as 14 people (18.9%), farmers as many as 15 people (20.3%), traders as many as 5 people (6.8%), pensioners as many as 5 people (6.8%), honorary as many as 9 people (12.2%), nurses as many as 1 person (1.4%) and as many as midwives as many as 1 person (1.4%).

Univariate Analysis

Distribution of Respondents Based on High Sodium Consumption Patterns at the UPT Puskesmas Kota Bantaeng Regency Year 2025

Sodium Consumption	F	%
Infrequently	40	54,1
Often	34	45,9
Total	74	100,0

Source : Primary Data 2025

Based on, out of 74 samples, the dominant respondents with sodium consumption patterns in the rare category were 40 respondents (54.1%) and 34 respondents with the frequent category (45.9%).

Distribution of Respondents Based on Potassium Consumption Patterns at the UPT Puskesmas Kota Bantaeng Regency Year 2025

Potassium Consumption	F	%
Infrequently	54	73,0
Often	20	27,0
Total	74	100,0

Source : Primary Data 2025

Based on table, out of 74 samples, the dominant respondents with infrequent potassium consumption patterns were 54 respondents (73.0%) and 20 respondents (27.0%) were overweight.

Distribution of Respondents by Incidence of Hypertension at the UPT Puskesmas Kota Bantaeng Regency Year 2025

Incidence of Hypertension	F	%
No	31	41,9
Ya	43	58,1
Total	74	100,0

Source : Primary Data 2025

Based on table, it shows that out of 74 samples, the dominant respondents who had hypertension were 43 people (58.1%) and 31 people who did not have hypertension (41.9%).

Bivariate Analysis

The Relationship between Sodium Consumption and the Incidence of Hypertension At the UPT Puskesmas Kota Bantaeng Regenc Year 2025

Sodium Consumption	Incidence of Hypertension				Sum	Value <i>p</i>
	No		Ya			
	f	%	f	%	∑f	%
Infrequently	23	57,5	17	42,5	40	100,0
Often	8	23,5	26	76,5	34	100,0
Total	31	41,9	43	51,8	74	100,0

Based on table, it shows that out of 74 samples, respondents who consumed sodium rarely and had hypertension were 17 people (42.5%) and those who did not have hypertension were 23 people (57.5%). Meanwhile, 26 people (76.5%) consumed sodium frequently and experienced hypertension and 8 people

(23.5%) did not experience hypertension. By using analysis Chi Square Score $p=0,003$ which means H_a is accepted. Thus, there is a relationship between sodium consumption and the incidence of hypertension.

The Relationship between Potassium Consumption and the Incidence of Hypertension

At the UPT Puskesmas Kota Bantaeng Regency Year 2025

Potassium Consumption	Incidence of Hypertension:				Sum		p-value
	No		Yes		$\sum f$	%	
	f	%	f	%			
Infrequently	7	20.6	27	79.4	34	100.0	0.001
Often	24	60.0	16	40.0	40	100.0	
Total	31	41.9	43	58.1	74	100.0	

Source : Primary Data, 2025

Based on Tabel, it shows that out of 74 samples, 27 respondents who consumed potassium in the rare category and experienced hypertension were 27 people (79.4%) and those who did not have hypertension were 7 people (20.6%). Meanwhile, 16 people (40.0%) consumed potassium with frequent and experienced hypertension and 24 people (60.0%) did not experience hypertension. By using analysis Chi Square Score $p=0,001$ which means H_a is accepted. Thus, there is a relationship between potassium consumption and the incidence of hypertension.

Discussion

The Relationship of Sodium Consumption with the Incidence of Hypertension

Hypertension can affect anyone and a wide range of age, social and economic groups. Hypertension is also the third largest risk factor for premature death because it can trigger heart failure and cerebrovascular disease. Hypertension is a disease that is often caused by a person's risk factors such as lifestyle, consumption habits, gender and stress. Lifestyle describes everyday behaviors that lead to efforts to maintain physical, mental and social conditions, including sleeping habits, eating fast food, excessive salt, smoking or even drinking alcoholic beverages (Rodiah, 2023).

The results showed that out of 74 samples, respondents who consumed sodium infrequently and experienced hypertension were 17 people (42.5%) and those who did not experience hypertension were 23 people (57.5%). Meanwhile, 26 people (76.5%) consumed sodium frequently and experienced hypertension and 8 people (23.5%) did not experience hypertension.

By using analysis Chi Square Score $p=0,003$ which means H_a is accepted. Thus, there is a relationship between sodium consumption and the incidence of hypertension.

High sodium consumption causes swelling in the walls of arterioles, which are small arteries that are responsible for carrying blood containing high oxygen to parts of the body. When the walls of the vessels are swollen, there is only a small amount of space that can be passed so that blood forces into the narrowed artery and there is an increase in blood pressure and an increase in blood pressure (Deasy, 2023).

High sodium intake can lead to increased plasma volume, cardiac output and blood pressure. Sodium causes the body to retain water at a level that exceeds the body's normal threshold so that it can increase blood volume and high blood pressure. High sodium intake causes hypertrophy of adipocyte cells due to lipogenic processes in white fat tissue, if it persists it will cause narrowing of blood vessels by fat and result in an increase in blood pressure. In addition, overweight and obese individuals are more likely to have salt sensitivity that affects blood pressure (Hasbullah, 2023).

The results of this study are in line with Hulzana (2023) found 127 people (56.7%) who consumed abnormal salt and 97 people (43.3%) who consumed normal salt, while 123 people (54.9%) who had hypertension and 101 people (49.1%) who did not have hypertension. The relationship between salt consumption patterns and the incidence of hypertension in the elderly was obtained with a p value of $0.012 < \alpha 0.05$. In conclusion, there is a relationship between salt consumption patterns and the incidence of hypertension in the elderly at the Central City Health Center.

The results of this study are not in line with those conducted by Murniati Tiho (2024) where the results of the study obtained a total of 160 research samples, which were dominated by the age group of 55–64 years (30.6%), female gender (53.1%), patients with normal blood sodium levels (60.6%), and grade 2 hypertension (60.6%). The results of the analysis of the Spearman correlation test obtained a $p>0.05$ value for the relationship between sodium levels and systolic ($p=0.121$) and diastolic ($p=0.425$) blood pressure. The conclusion of this study is that there is no meaningful relationship between blood sodium levels and blood pressure in patients with hypertension at ODSK Hospital in North Sulawesi Province

The researchers concluded that in order for the sodium concentration to return to normal, the intracellular fluid was pulled out which caused the volume of extracellular fluid to rise. Increased volume of extracellular fluid leads to increased blood volume. Sodium intake above normal limits triggers narrowing of arterial diameter and endothelial constriction, so the heart has to pump harder to push blood to be able to pass through the narrowing atrium of the heart, a series of things that result in an increase in systolic and diastolic blood pressure. The relationship between sodium consumption and blood pressure can also be seen from the Western diet where many sodium source foods are consumed from processed foods. Dietary intake high in sodium is associated with the kidneys' inability to adapt to the sodium excretion process leading to sodium retention in the kidneys. As a result there is an excessive level of sodium in the body, which is stored in intracellular and extracellular.

The Relationship between Potassium Consumption and the Incidence of Hypertension

The pathophysiology of hypertension has not been definitively explained. A small percentage of hypertensive patients (2-5%) have kidney disease underlying their blood pressure condition. While the rest have no causes that can be identified singularly and clearly. A number of physiological mechanisms are involved in the maintenance of normal blood pressure. Abnormalities in these mechanisms cause hypertension. Among the factors that have been intensively studied are salt intake, obesity, insulin resistance, renin-angiotensin system and sympathetic nervous system. In recent years, other factors have been evaluated including family history, endothelial dysfunction, low birth weight and intrauterine nutrition, and neurovascular anomalies (Agnesia, 2020)).

The results showed that out of 74 samples, respondents who consumed potassium rarely and experienced hypertension were 27 people (79.4%) and those who did not experience hypertension were 7 people (20.6%). Meanwhile, 16 people (40.0%) consumed potassium and experienced hypertension and 24 people (60.0%) did not experience hypertension.

By using analysis Chi Square Score $p=0.001$ which means H_a is accepted. Thus, there is a relationship between potassium consumption and the incidence of hypertension.

Hypertension begins with atherosclerosis which causes the anatomical structure of peripheral blood vessels to be impaired and continues to become stiff blood vessels. These stiff blood vessels are accompanied by plaque formation and narrowing that inhibits peripheral blood circulation. The sluggishness of blood flow causes the heart load to increase which ultimately results in an increase in the work of the heart pump (August, 2020)).

The results of this study are in line with those conducted by Octarini (2023) showing that most of them are 45-59 years old (66.7%), female (60.4%), work as housewives (27.1%), rarely consume foods high in sodium (58.3%), rarely consume foods high in potassium (60.4%), blood pressure of respondents is mostly hypertension (70.8%), there is a relationship between high sodium food consumption habits and blood pressure ($p=0.002$) and there is a relationship between food consumption habits potassium with blood pressure ($p=0.003$).

The results of this study are not in line with those conducted by Usfa (2023) the results of a study on the Relationship between Potassium Intake and Hypertension in Minangkabau Ethnic Women, so the conclusion was obtained in the form of no meaningful relationship between potassium intake and blood pressure in Minangkabau ethnic women statistically marked by a p-value of 0.496. This is because ethnicity greatly affects a person's diet or society and the majority of Minangkabau women consume insufficient potassium intake.

Researchers concluded that potassium levels affect blood pressure if sodium levels in the body are increased but if sodium levels are normal or lacking in the body then it has no effect. The combination of potassium levels and sodium levels has a significant relationship

with blood pressure compared to just potassium levels or sodium levels. Potassium functions as an intracellular fluid regulator so as to prevent the buildup of fluid and sodium in cells which can increase blood pressure. Potassium is a good mineral for lowering or controlling tension. Potassium is also beneficial for triggering the work of muscles and nerve nodes. High potassium will also facilitate the delivery of oxygen to the brain and help balance fluids in the body. Thus, the consumption of fruits rich in potassium will help the body to be refreshed.

Research Limitation

Sample size : Studies with a small sample may not be enough to represent a larger population, making it difficult to generalize the results of the study.

Study time : Short-term studies may not be able to capture long-term changes in blood pressure or response to interventions.

Confounding factors : It is difficult to control all factors that can affect blood pressure, such as lifestyle, stress, or other medical conditions, making it difficult to isolate the effects of the variables being studied.

Research on hypertension using the food recall method has several limitations. The main limitations are the potential for bias in remembering and reporting food intake, as well as difficulties in measuring the right portions. In addition, the 24-hour food recall may not fully represent respondents' daily eating habits.

4. Conclusions

The results of this study showed that there was a significant relationship between sodium consumption and the incidence of hypertension, with a p-value of 0.003. Furthermore, the study also demonstrated a significant relationship between potassium consumption and the incidence of hypertension, with a p-value of 0.001.

Suggestions

For hypertension sufferers, it is recommended to limit sodium intake by reducing the use of table salt when cooking and at the dinner table, avoiding processed and packaged foods high in sodium, checking food labels for sodium content before purchasing, and using spices and herbs as alternatives to salt. Additionally, patients are encouraged to increase potassium intake by consuming potassium-rich foods such as bananas, avocados, oranges, spinach, broccoli, potatoes, nuts, and low-fat dairy products. However, individuals with kidney disease should be cautious, as they may need to limit potassium intake, and it is advisable to consult a doctor if such conditions exist.

For educational institutions, the researcher hopes this study can serve as additional information regarding the importance of applying non-pharmacological therapy as a supportive measure to lower blood pressure alongside medications. This can contribute to the success of health services and interventions in reducing hypertension-related complications and mortality, as well as serve as counseling guidelines for nurses. Moreover, this research is expected to provide useful insights and a scientific basis for further development in the field of community health, particularly in nursing, with respect to sodium and potassium consumption in managing blood pressure among hypertensive patients.

For future researchers, it is suggested to include additional characteristics in the study, such as assessing the level of nurses' knowledge and its influence on the success of patient services in both health centers and the community, as well as further exploring the relationship between sodium, potassium, and hypertension.

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