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Relationship Between Sodium Consumption Patterns and Hypertension Incidents in the Elderly in the Work Area of the Wirang Public Health Center

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ABSTRACT

Background & Objective: Hypertension is a common health issue among the elderly, with prevalence increasing as age advances. According to the WHO, approximately 1.13 billion people worldwide suffer from hypertension, with the elderly being the most vulnerable group. Poor hypertension management can lead to serious complications such as stroke, heart failure, and chronic kidney disease. Medication adherence is crucial in preventing such complications. However, elderly individuals with low educational attainment often struggle to understand medical instructions and the importance of consistent medication use. This study aims to analyze the relationship between education level and adherence to hypertension treatment among the elderly in the working area of Puskesmas Datah Kotou, Puruk Cahu. **Method:** This study used a quantitative research design with a cross-sectional approach. The sample consisted of 30 elderly individuals diagnosed with hypertension. Data were collected using a questionnaire measuring education level and adherence, assessed through the Morisky Medication Adherence Scale (MMAS-8). Correlation analysis was used to evaluate the data. **Result:** A total of 83.3% of respondents had a low level of education (elementary school), and 63.3% showed low adherence to treatment. Statistical analysis revealed a significant relationship between education level and treatment adherence, with a correlation coefficient of 0.691 and a p-value of 0.000. **Conclusion:** The study concludes that education level significantly affects the adherence of elderly individuals to hypertension treatment, highlighting the need for more effective health education interventions.

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Introduction

Hypertension is one of the most prevalent global health problems affecting the world's population. According to data from the World Health Organization (WHO), approximately 1.13 billion people worldwide live with hypertension, and more than 30% of the adult population suffers from this condition (WHO, 2021). Often referred to as the "silent killer," hypertension typically presents no symptoms in its early stages, yet can lead to serious complications such as coronary heart disease, stroke, and kidney failure if not properly managed. WHO reports that each year, hypertension is responsible for about 9.4 million deaths due to the cardiovascular complications it causes (WHO, 2021).

The global rise in hypertension prevalence is largely influenced by unhealthy lifestyles, including high salt intake, lack of physical activity, obesity, and genetic factors (He & MacGregor, 2020). Excessive sodium intake has been proven to be a major risk factor in elevating blood pressure. Several countries have implemented policies to reduce salt consumption in an effort to lower hypertension rates and other cardiovascular diseases (He & MacGregor, 2020).

In Indonesia, hypertension remains one of the most prevalent non-communicable diseases. Data from the 2018 Basic Health Research (Riskesdas) shows that the prevalence of hypertension in Indonesia reached 34.1%, with higher rates among the elderly, especially those over 60 years of age (Ministry of Health, 2020). As life expectancy increases, the elderly population in Indonesia continues to grow. Based on data from the Central Statistics Agency (BPS) in 2020, the elderly population in Indonesia was estimated to reach 27.1 million people or about 10.3% of the total population. This growing elderly population presents new challenges in healthcare, particularly in managing degenerative diseases such as hypertension.

The elderly are more vulnerable to hypertension due to physiological changes that occur with aging. These changes include decreased vascular elasticity, reduced kidney function in regulating fluid and electrolyte balance, and increased sensitivity to sodium (Saleh & Majeed, 2021). Research shows that high sodium intake can accelerate the rise in blood pressure among the elderly compared to younger age groups.

In South Kalimantan, hypertension is also a major health issue, particularly among the elderly. The habit of consuming high-salt foods is a significant factor contributing to the increased risk of hypertension in this region. Various studies indicate that people in this area tend to consume salt in amounts that exceed the WHO's recommended daily limit of 5 grams of salt, or approximately 2 grams of sodium (WHO, 2021).

High-salt dietary patterns in South Kalimantan are influenced by several factors, including culinary culture that favors seasoning with high sodium content, taste preferences developed from a young age, and a lack of understanding about the health impacts of excessive salt intake (Setiawan et al., 2021). Some studies also show that many elderly individuals in this area have the habit of adding salt or soy sauce to their food to enhance flavor, unaware that this behavior increases their risk of hypertension.

In the working area of the Wirang Public Health Center, Tabalong Regency, hypertension among the elderly has become an increasingly significant issue.

According to data on the ten most common diseases, hypertension ranks first with 2,178 recorded cases. The number of visits indicates that the incidence of hypertension remains high at the Wirang Health Center. In 2024, 398 elderly individuals were reported to have hypertension, with most cases occurring in those over 60 years of age. However, no specific study has yet examined the relationship between sodium intake patterns and hypertension in this area.

The lack of epidemiological data on sodium consumption among the elderly in the Wirang Health Center's working area poses a challenge to developing effective prevention strategies. Meanwhile, studies from other regions have shown that reducing salt consumption can significantly lower blood pressure in both normotensive and hypertensive individuals.

To gain an initial understanding of the conditions in the field, a preliminary study was conducted involving 10 elderly individuals who frequently visit the Wirang Health Center. The results showed that 7 out of 10 respondents had a habit of adding excessive salt to their meals, both during cooking and at the table. Of these 10 respondents, 7 had systolic blood pressure readings above 140 mmHg and/or diastolic readings above 90 mmHg. In addition, most respondents stated that they had never received nutritional education specifically addressing the dangers of excessive salt consumption.

Based on the preliminary study results, it can be concluded that high sodium intake potentially increases the incidence of hypertension among the elderly in the Wirang Health Center's working area. The habit of adding excessive salt to food requires particular attention, especially considering the increased sensitivity to sodium in older adults. Moreover, the lack of optimal education regarding safe sodium intake limits and its impact on health remains a significant challenge in preventing hypertension among the elderly.

This study is expected to provide more comprehensive data on the salt consumption patterns of the elderly, as well as the factors influencing their salt intake behavior. Therefore, the findings may serve as a strong foundation for the development of more effective, evidence-based hypertension prevention programs, ultimately aiming to improve overall public health. It is hoped that the results of this research will contribute to enhancing the quality of life for the elderly and reducing the incidence of hypertension at the community level.

Objective

The objective of this study is to analyze the relationship between sodium consumption patterns and the incidence of hypertension among the elderly in the working area of the Wirang Public Health Center.

Method

This study employed a quantitative approach with a cross-sectional design aimed at analyzing the relationship between sodium consumption patterns and the incidence of hypertension among the elderly in the working area of the Wirang Public Health Center. This design enabled the researchers to collect data on dietary patterns and blood pressure simultaneously at a single point in time, thus allowing for an efficient analysis of the relationship between the two variables. The study was conducted over a three-week period in May 2025, across several villages within the

Wirang Health Center's coverage area, which is known for a relatively high prevalence of hypertension among the elderly.

The study population consisted of all elderly individuals aged ⩾60 years registered in the Wirang Health Center area, totaling 58 people. A sample of 30 respondents was selected using an accidental sampling technique, whereby participants were chosen based on availability and willingness to participate at the time of the research. Data collection was carried out through interviews using a validated and reliable Food Frequency Questionnaire (FFQ), along with blood pressure measurements using a sphygmomanometer.

The independent variable in this study was sodium consumption patterns, while the dependent variable was the incidence of hypertension. Sodium intake was categorized based on daily intake recommendations: normal (⩽2000 mg) and excessive (>2000 mg). Blood pressure was classified as hypertensive if it measured ⩾ 140/90 mmHg. Data analysis was conducted using both descriptive and inferential statistics, with the Chi-Square test applied to examine associations, and a significance level set at $p<0.05$.

This study received ethical approval from the relevant ethics committee, as well as research site permission and informed consent from all respondents. Anonymity and confidentiality of participant data were strictly maintained.

Results

TABLE 1. Frequency Distribution of Respondents' Gender

Variable	N	%
Gender		
Men	6	20
Women	24	80

Table 1 presents the distribution of respondents by gender. Among the 30 elderly participants, the majority were female, accounting for 24 individuals (80%), while the remaining 6 individuals (20%) were male.

TABLE 2. Frequency Distribution of Respondents' Education Level

Variable	N	%
Blood Pressure		
Normal	12	40
Hypertension	18	60

Table 2 presents the distribution of blood pressure among elderly respondents. A total of 18 respondents (60%) were classified as having hypertension, whereas 12 respondents (40%) had normal blood pressure.

TABLE 3. Frequency Distribution of Respondents' Compliance Level

Variable	N	%
Sodium Consumption Pattern		
Normal	10	33.3
Excessive	20	66.7

Table 3 illustrates the sodium consumption patterns among elderly respondents. Out of the total sample, 20 individuals (66.7%) were found to have excessive sodium intake, whereas 10 individuals (33.3%) consumed sodium within the recommended limits.

TABLE 4. The Relationship Between Sodium Consumption Patterns and the Incidence of Hypertension Among the Elderly in the Working Area of the Wirang Health Center: Bivariate Analysis

Blood Pressure	Sodium Consumption Pattern		Total	Correlation Coefficient	p-value
	Normal	Excessive			
Normal	9	3	12	0.722	0.000
Hypertension	1	17	18		
Total	10	20	30		

Based on Table 4, the analysis presents the relationship between sodium consumption patterns and respondents' blood pressure. Among the 18 respondents diagnosed with hypertension, 17 individuals (94.4%) had excessive sodium consumption, while only 1 individual (5.6%) had normal sodium intake. Conversely, among the 12 respondents with normal blood pressure, 9 individuals (75%) consumed sodium within the recommended range, and only 3 individuals (25%) had excessive intake.

Statistical analysis revealed a correlation coefficient (r) of 0.722 with a p-value of 0.000, indicating a strong and significant relationship between sodium consumption patterns and the incidence of hypertension in the elderly. The findings suggest that the higher an individual's sodium intake, the greater their likelihood of developing hypertension.

Discussion

Frequency Distribution Based on the Gender of Elderly Respondents in the Working Area of Wirang Public Health Center

Based on the frequency distribution data, the composition of respondent gender in this study was identified. The results show that out of a total of 30 elderly respondents surveyed in the working area of the Wirang Public Health Center, 24 individuals (80%) were female, while only 6 individuals (20%) were male. These findings indicate a predominance of elderly women over men in the study population.

This phenomenon aligns with various studies indicating that women tend to have a higher life expectancy than men, which demographically leads to a larger proportion of elderly women (Rosdiana & Santoso, 2021). This difference can be attributed to several factors, including biological differences, lifestyle behaviors, and access to healthcare services. Women are known to utilize health services more frequently and undergo routine health check-ups, which contributes to their longer life expectancy (Husna et al., 2023).

Globally, reports from the World Health Organization (2022) also reveal that women tend to live longer than men in nearly every country. For example, in developed countries, the average life expectancy for women exceeds 80 years, while for men it ranges from approximately 74 to 76 years. This helps to explain the predominance of female respondents in this study.

Beyond biological and health behavior factors, social and cultural roles also influence gender distribution among the elderly. In Indonesian culture, elderly women are often more actively involved in community activities such as elderly health posts (Posyandu Lansia), religious gatherings, and other social programs. This active participation facilitates data collection, as women are more accessible to

researchers or healthcare workers compared to elderly men, who may tend to stay at home or be less socially engaged (Safitri & Andini, 2020).

Nevertheless, the predominance of women in the elderly population warrants special attention in health intervention efforts. Elderly women are vulnerable to various chronic health issues such as hypertension, osteoporosis, and metabolic disorders, which are associated with postmenopausal hormonal changes (Rahmawati et al., 2022). Therefore, elderly women require focused promotive and preventive health approaches, including the management of diet and physical activity.

A study by Lubis et al. (2021) also notes that elderly women exhibit a slightly higher prevalence of hypertension compared to elderly men. This may be related to hormonal differences as well as psychosocial factors such as stress, feelings of loneliness, and the dual role burden experienced by women throughout their lives.

Taking into account the gender distribution of respondents and relevant literature, it is important for primary healthcare services such as Puskesmas to consider the higher proportion of elderly women in the planning of promotive and preventive activities. Gender-sensitive health programs are essential to ensure that the specific needs of elderly women are adequately addressed.

As a concrete step, the Puskesmas could develop targeted programs such as nutrition education, elderly exercise classes, and routine health screenings tailored to the conditions and needs of elderly women. Furthermore, community-based approaches should also be implemented to encourage greater participation from elderly men in health activities, thereby ensuring more representative data and more inclusive health interventions.

In conclusion, the information on gender-based frequency distribution not only provides a descriptive overview but also serves as a crucial foundation for planning effective and gender-equitable elderly health programs.

Frequency Distribution Based on Blood Pressure Among the Elderly in the Working Area of Wirang Public Health Center

Based on observations of blood pressure distribution among respondents, it was found that out of a total of 30 elderly individuals, 18 (60%) had hypertension, while 12 (40%) had normal blood pressure. This finding indicates that more than half of the elderly participants in this study suffer from hypertension.

A hypertension prevalence rate of 60% falls into the high category and highlights that hypertension is a significant health concern among the elderly population in this area. This is consistent with findings from the Ministry of Health of the Republic of Indonesia, which reported that the prevalence of hypertension among the elderly in Indonesia has continued to increase each year, reaching 63.2% in individuals over the age of 60 in 2023 (Ministry of Health RI, 2023).

Hypertension in the elderly is a chronic condition influenced not only by age but also by lifestyle, dietary patterns, physical activity, and genetic factors. As individuals age, vascular elasticity declines, peripheral resistance increases, and blood pressure tends to rise naturally. Additionally, decreased kidney function and hormonal regulation contribute to elevated blood pressure in older adults (Setiawan et al., 2021).

At the global level, the World Health Organization (2022) has emphasized that hypertension is a leading cause of premature death due to heart disease and stroke. The elderly are particularly vulnerable because of the accumulation of risk factors over

their lifetimes. Uncontrolled hypertension can lead to serious complications such as heart failure, kidney disorders, and visual impairment.

These findings also indicate the urgent need for early detection and effective management of blood pressure among the elderly. Interventions should be comprehensive, including the adoption of a healthy lifestyle—such as reducing salt intake, engaging in light physical activity, and routine blood pressure monitoring. Furthermore, educating families and caregivers plays a crucial role in the management of hypertension among the elderly (Ningsih & Lestari, 2022).

A study by Sari & Wardhani (2020) found that elderly individuals with high sodium intake, low fruit and vegetable consumption, and limited physical activity are more likely to suffer from hypertension. This is in line with the data presented in the following sections, which demonstrate a strong correlation between excessive sodium consumption and the incidence of hypertension.

Moreover, community-based approaches, such as strengthening elderly health posts (Posyandu lansia), should be enhanced to serve as platforms for early detection and regular blood pressure monitoring. These activities are particularly important, considering that many elderly individuals are often unaware they have hypertension, as the symptoms are frequently mild or unnoticeable (Rahman et al., 2021).

From a policy perspective, these findings underscore the urgency of implementing an integrated national program for hypertension control, especially for the elderly population. Such a program should be supported by the availability of blood pressure measuring devices in primary healthcare facilities, training for health cadres, and access to affordable antihypertensive medications.

With a hypertension prevalence of 60% among the elderly in the working area of Wirang Public Health Center, it is imperative to intensify promotive and preventive efforts to reduce the burden of chronic disease in the future. Increasing awareness, medication adherence, and behavior change are essential components in the management and control of hypertension among the elderly.

Frequency Distribution Based on Sodium Consumption Patterns Among the Elderly in the Working Area of Wirang Public Health Center

Based on observational data on sodium consumption patterns among respondents, it was found that out of the 30 elderly individuals studied in the working area of the Wirang Public Health Center, 20 individuals (66.7%) had excessive sodium intake, while only 10 individuals (33.3%) had sodium intake within normal limits. These findings indicate that the majority of elderly individuals still consume sodium in amounts that exceed the body's daily requirement.

Excessive sodium intake is one of the primary risk factors contributing to elevated blood pressure and the incidence of hypertension, particularly among the elderly. Sodium, most commonly found in the form of table salt (sodium chloride), is essential for the body but only in small amounts. According to the World Health Organization (2021), the recommended maximum daily sodium intake for adults is 2,000 mg, equivalent to about 5 grams of salt. Intake beyond this threshold increases the risk of fluid retention, elevated blood pressure, and kidney workload.

In the elderly population, these risks are exacerbated due to the physiological decline in kidney and cardiovascular function. A study by Santoso et al. (2022) found that elderly individuals with high sodium intake are twice as likely to develop hypertension compared to those with normal sodium intake levels.

The distribution of sodium consumption patterns observed in this study is consistent with trends seen across various regions of Indonesia, where salt consumption remains high. Traditional foods, processed foods, and the widespread use of flavor enhancers such as monosodium glutamate (MSG), soy sauce, and similar condiments all contribute to excessive daily sodium intake. Research by Wahyuni & Herlina (2021) highlights that limited knowledge among the elderly about daily salt limits, along with the lack of habit in reading nutritional labels, contributes to this high sodium intake.

This situation underscores the importance of continuous nutritional education for the elderly, particularly regarding the impact of excessive salt consumption on cardiovascular health. Such education should ideally involve family members or caregivers, as many elderly individuals rely on family for meal preparation. Involving families in dietary management has been shown to help reduce sodium intake and improve overall eating patterns (Fitriani & Widodo, 2023).

Additionally, the elderly need to be informed about healthier salt alternatives, such as using natural seasonings (e.g., bay leaves, garlic, turmeric) and cooking methods that retain flavor without the need for excessive salt. Community health centers (Puskesmas) and elderly health posts (Posyandu Lansia) can play a key role by organizing healthy cooking classes or low-salt cooking demonstrations.

When linked to the blood pressure levels of the elderly, it becomes evident that the high proportion of excessive sodium consumption correlates with the high rate of hypertension among respondents. This is further supported by the analysis presented in the following sections, which demonstrates a significant relationship between sodium intake patterns and the incidence of hypertension. Therefore, dietary modification—particularly reducing sodium intake—is one of the primary strategies that must be implemented to lower hypertension rates among the elderly.

Overall, these findings provide a clear picture that excessive sodium consumption remains a behavioral issue that needs to be addressed. Systematic and educational nutritional interventions are essential to reduce the long-term impact of high salt intake among the elderly population.

The Relationship Between Sodium Consumption Patterns and Hypertension Incidence Among the Elderly in the Working Area of Wirang Public Health Center

Based on the analysis of the relationship between sodium consumption patterns and the incidence of hypertension among the elderly, it was found that the majority of elderly individuals with hypertension had excessive sodium intake. Out of the 30 respondents, 18 were diagnosed with hypertension, of whom 17 (94.4%) consumed excessive sodium, while only 1 individual (5.6%) had normal sodium intake. Conversely, among the 12 elderly individuals with normal blood pressure, 9 (75%) had normal sodium consumption patterns, and only 3 (25%) had excessive intake.

Statistical analysis yielded a p-value of 0.000 and a correlation coefficient (r) of 0.722. The p-value, being less than 0.05, indicates a highly significant relationship between sodium intake and hypertension incidence among the elderly. The correlation coefficient, which approaches 1, signifies a strong and positive relationship—meaning the higher the sodium intake, the greater the likelihood of developing hypertension.

This result is consistent with physiological theories stating that excessive sodium consumption increases extracellular fluid volume and blood pressure. High sodium

or salt intake can lead to fluid retention by the kidneys, which subsequently raises vascular pressure (Santoso et al., 2022). This effect is particularly critical in the elderly, as vascular elasticity and kidney function naturally decline with age, amplifying the impact of sodium intake on blood pressure (Setiawan & Nuraini, 2021).

These findings are supported by previous studies. Wahyuni and Herlina (2021) reported a strong association between high sodium intake and the incidence of hypertension, especially among the elderly. Elderly individuals who consume high-sodium foods are at greater risk of increased blood pressure compared to those on a low-sodium diet. This emphasizes the importance of dietary modification as a non-pharmacological intervention in managing hypertension.

Globally, the World Health Organization (2021) also emphasizes reducing salt intake as one of the key strategies to prevent hypertension and cardiovascular disease. The organization recommends reducing sodium intake to below 2,000 mg per day as part of a global strategy to prevent non-communicable diseases. A meta-analysis by Jayedi et al. (2020) across dozens of international studies confirmed that reduced salt intake significantly lowers both systolic and diastolic blood pressure, especially in individuals with hypertension.

The correlational data in this study reflect the reality that excessive sodium consumption remains a common habit among the elderly, particularly in the Wirang Public Health Center's working area. This may be due to low awareness of sodium content in daily foods, limited knowledge about the side effects of high salt intake, and a lack of targeted nutritional education for older adults (Fitriani & Widodo, 2023).

Cultural factors also play a significant role. Traditional foods high in salt—such as salted fish, spicy condiments, and various processed foods—are deeply embedded in local dietary habits. This is compounded by a widespread tendency to use artificial flavor enhancers such as MSG, soy sauce, and instant seasonings, all of which are high in sodium. Therefore, changes in dietary behavior require a gradual approach that is sensitive to local culture (Rahmawati et al., 2022).

The correlation results in this study reinforce the argument that interventions targeting sodium consumption patterns can significantly impact hypertension control. Consequently, it is crucial for health centers and primary healthcare workers to carry out promotive and preventive measures focusing on nutritional education for the elderly. Activities such as promoting the DASH (Dietary Approaches to Stop Hypertension) diet, training on reading nutrition labels, and introducing low-sodium seasoning alternatives can be regularly conducted at elderly health posts (Posyandu Lansia).

In addition to education, the involvement of family members or caregivers in dietary management is essential. Many elderly individuals do not have full control over their meals, as they depend on family members. Therefore, family-based interventions are critical to ensuring the effectiveness of sodium reduction efforts.

In conclusion, the findings from this analysis not only demonstrate a statistically significant relationship but also offer a concrete perspective that controlling hypertension among the elderly can start with a simple yet impactful intervention—regulating daily sodium intake.

Conclusion

This study aimed to analyze the relationship between sodium consumption patterns and the incidence of hypertension among the elderly in the working area of

the Wirang Community Health Center. The results indicate that the majority of respondents (66.7%) had excessive sodium intake, and 60% were classified as hypertensive. Notably, among those with hypertension, 94.4% consumed sodium beyond the recommended daily intake of 2,000 mg.

Statistical analysis revealed a strong and significant relationship between sodium intake and hypertension, with a correlation coefficient of 0.722 and a p-value of 0.000. These findings suggest that excessive sodium consumption is strongly associated with an increased risk of hypertension among the elderly. The physiological decline in vascular elasticity and kidney function with aging may exacerbate the impact of high sodium intake on blood pressure.

The findings emphasize the importance of implementing community-based dietary interventions, particularly aimed at reducing sodium intake among older adults. Health education programs should be designed to improve awareness of the health risks associated with excessive salt consumption and promote the adoption of low-sodium dietary practices.

However, this study was limited by its small sample size and cross-sectional design, which does not allow for causal inference. Future research with larger and more diverse samples, as well as longitudinal or experimental designs, is needed to further investigate the long-term effects of sodium reduction and to identify additional behavioral, cultural, and socioeconomic factors influencing dietary habits and hypertension risk among the elderly.

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