



Effect of a Combination of Salt Reduction and Guided Imagery Therapy on Blood Pressure in Hypertensive Patients

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Abstract. Hypertension is one of the non-communicable diseases that significantly contributes to global morbidity and mortality. In Indonesia, the prevalence of hypertension continues to increase every year, and excessive salt consumption is one of the main risk factors. Non-pharmacological interventions, such as reducing salt intake and guided imagery therapy, have been shown to help control blood pressure. This study aims to analyze the effect of a combination of lowering salt intake and guided imagery therapy on blood pressure in hypertensive patients. The study used a quasi-experimental design with a one-group pretest-posttest approach involving 35 hypertensive respondents at the Tanah Kuning Health Center, North Kalimantan, selected using accidental sampling. The intervention was in the form of education on reducing salt intake and implementing guided imagery for three consecutive days. Data were analyzed using the Wilcoxon test. The results showed a significant decrease in systolic blood pressure from 152.11 mmHg to 122.94 mmHg and diastolic from 92.54 mmHg to 78.17 mmHg ($p = 0.000$). These findings indicate that the combination of interventions is effective in lowering blood pressure. Therefore, a combination intervention of reducing salt intake and guided imagery can be considered as a supportive therapy in community-based hypertension management.

Keywords: Hypertension, Salt Consumption, Guided Imagery, Blood Pressure, Nonpharmacological Intervention

INTRODUCTION

Hypertension is defined as an increase in systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg [1]. Globally, in 2015, it was recorded that around 1.13 billion people suffered from hypertension, with a prevalence of 30–45% in the adult age group, and more than 60% in individuals over 60 years of age. In Indonesia, the prevalence of hypertension shows an increasing trend, from 25.8% in 2013 to 34.1% in 2018 [2]. North Kalimantan is in ninth place nationally with a prevalence of 33.02%. The majority of sufferers in this region do not routinely take antihypertensive drugs because they feel healthy (67.6%), use traditional medicine (23.6%), or forget (12.8%). Other contributing factors are cost constraints (2.5%) and drug side effects (4.7%) [3]. In Bulungan Regency, the prevalence of hypertension reached 68% in 2021, increasing significantly from 3,703 cases in 2020 to 7,871 cases. Of this number, 39.78% of sufferers did not take medication regularly, and 22.82% did not take medication at all [4]. A preliminary study in 2025 at the Tanah Kuning Health Center recorded 527 sufferers of hypertension, and from blood pressure measurements of 7 patients, six people had hypertension.

Hypertension is called a "silent killer" because it often does not cause symptoms until it causes serious complications, such as a heart attack, stroke, and kidney failure. An increase in systolic blood pressure of 20 mmHg or diastolic blood pressure of 10 mmHg increases the risk of death from cardiovascular disease [5][6]. Risk factors for hypertension include age, gender, family

history, and modifiable factors such as smoking, obesity, stress, lack of physical activity, and excessive salt consumption [7]. The results of a study conducted [8] showed that the higher the daily salt intake, the higher the level of hypertension in a person. This is in line with research [9] showing a relationship between salt intake and blood pressure in people with hypertension.

Salt consumption of more than 5 grams per day has been shown to increase blood pressure and increase the risk of heart disease and stroke. Currently, the global average salt consumption reaches 10 grams per day (equivalent to 4 grams of sodium), although WHO recommends daily salt consumption below 5 grams to prevent hypertension and its complications [10]. In Indonesia, the level of salt consumption is relatively high, with 53.7% of the population consuming more than 5 grams per day, and around 18.9% even consuming between 10 and 30 grams per day [11]. The habit of eating high salt in Indonesia is exacerbated by cooking traditions that often rely on salty flavors as a flavor enhancer, even salt is used to brew tea traditionally. Lack of knowledge about healthy eating patterns in the community, especially among older people, also contributes to this [12]. Other challenges faced are the lack of communication skills by health workers, limited knowledge, and weak coordination between programs and related sectors [13], [14].

Several studies have shown that lifestyle changes play an essential role in managing hypertension [15]. Recommended interventions include losing weight, limiting salt, implementing the DASH diet, exercising regularly, reducing alcohol, and quitting smoking [16]. WHO recommends a maximum sodium intake of 1,500 mg per day or about 2/3 teaspoon [17]. A low-salt diet can activate the RAAS, which initially adjusts body fluids, but in the long term, is effective in lowering blood pressure, both in people with hypertension and healthy people, regardless of gender or ethnicity. This decrease in blood pressure can reduce the risk of death and cardiovascular events [5], [15].

One non-pharmacological approach that can help lower blood pressure is guided imagery therapy. This method involves mental visualization of calming situations to influence the patient's emotional and physiological condition [18], [19]. In its implementation, patients are invited to imagine positive things while doing slow breathing, which stimulates the release of endorphins through activation of the hypothalamus, pituitary gland, and adrenal medulla, thus creating a feeling of relaxation and comfort [20]. Several studies have shown that guided imagery for 15 minutes per day for three days can effectively lower blood pressure in hypertensive patients [21]–[24].

Hypertension not only endangers individual health but also burdens the country's economy. The World Economic Forum (2012) estimates that Indonesia will lose up to US\$4.4 trillion or Rp 58,542 trillion due to non-communicable diseases in 2030, including medical costs and lost productivity. The Chronic Disease Management Program (Prolanis) from BPJS Kesehatan is a preventive effort to improve the quality of life of hypertension patients and reduce health costs. However, indirect medical costs for hypertension patients are often higher than direct costs, with average monthly expenditures ranging from Rp213,284 to Rp434,632 [25]–[27].

Based on these data and facts, researchers are interested in studying "The Effect of Combination of Salt Reduction Interventions and Guided Imagery Therapy on Blood Pressure in Hypertension Patients.

METHODS

This study was conducted at Tanah Kuning Health Center, Bulungan Regency, North Kalimantan, with a quasi-experimental approach using a one-group pretest-posttest design. The population in this study included all hypertension sufferers registered at Tanah Kuning Health Center in 2025, totaling 520 people. The research sample was determined using the Charan & Biswas (2013) formula, resulting in 35 respondents. The sampling technique used was Accidental Sampling. This study used SOP guide imagery, observation sheets, and sphygmomanometers to measure blood pressure and followed standard blood pressure measurement procedures. Inclusion criteria included patients with blood pressure >140/90 mmHg, while exclusion criteria included patients undergoing alternative or non-pharmacological therapy and those with hearing loss.

The intervention to reduce salt consumption began with a 10-minute counseling session conducted at each participant's home on the first day, emphasizing the importance of limiting sodium intake to less than 1500 mg per day. After the education, it was continued with guided imagery therapy for 15 minutes every day for three consecutive days. Blood pressure was measured twice, namely before the intervention began (pre-test) on the first day and after the intervention was completed (post-test) on the third day. Data collection took place from March to April 2025 at the Tanah Kuning Health Center. Data analysis was carried out using descriptive tests and normality tests to determine the appropriate statistical method. Furthermore, the Wilcoxon test was used to measure the effect of the combination of interventions activating salt consumption and guided imagery on blood pressure in hypertensive patients. All data analysis was carried out using SPSS software version 22.

RESULTS AND DISCUSSION

Table 1. Frequency distribution of respondents (N=35).

Respondent Characteristics	N	%
Gender		
Male	15	42,9
Female	20	57,1
Total	35	100
Age		
26-35 years	5	14,3
36-45 years	5	14,3
46-55	12	34,3
56-75	13	37,1
Total	35	100
Education		
Primary School	12	34,29%
Junior High School	14	40 %
High School	9	25,71%
Total	35	100
Employment Status		
Working	25	71,4
Not working	10	28,6
Total	35	100
Marital Status		
Married	29	82,9
Unmarried	3	8,6
Widower/Widow	3	8,6
Total	35	100
Smoking		
Yes	8	22,9
No	27	77,1
Total	35	100

Based on Table 1, this study involved 35 participants with various characteristics. Most participants were female (57.1%) and were in the age range of 46 to 75 years. The highest level of education was junior high school graduates (40%). The majority of participants had active employment status (71.4%) and were married (82.9%). In addition, most did not have a smoking habit (77.1%).

Table 2. Comparison of blood pressure before and after reducing salt consumption and guided imagery therapy in hypertension patients (n=35).

	Pre-Test			Post Test		
	(Mean±SD)	Min	Max	(Mean±SD)	Min	Max
Systole	152,11±5,940	140	160	122,94±7,372	110	140
Diastol	92,54±2,683	90	98	78,17±6,515	63	92

Based on Table 2, the average systolic blood pressure decreased from 152.11 mmHg before the intervention to 122.94 mmHg after the intervention. Diastolic blood pressure also reduced from an average of 92.54 mmHg to 78.17 mmHg after the intervention.

Table 3. Normality test.

	Shapiro-Wilk		
	Statistic	sig	Description
Pre-Intervention Systole	0,926	0,021	Not Normal
Pre Intervention Diastole	0,834	0,000	Not Normal
Post Intervention Systole	0,951	0,120	Normal
Post Intervention Diastole	0,944	0,072	Normal

Based on Table 3, the distribution of blood pressure data before the intervention was not normal because the significance value was <0.05, while after the intervention, the data tended to be normal with a significance value >0.05. Therefore, the researcher used the Wilcoxon test as a non-parametric test.

Table 4. illustrates the impact of the combined intervention of reducing salt intake and guided imagery relaxation therapy on lowering blood pressure in patients with hypertension (n=35).

	(Mean±SD)	Z	P Value
Siastol Pre test	152,11±5,940	-5,162	0,000
Siastol Pos Tes	122,94±7,372		
Diastole Pre-test	92,54±2,683	-5,065	0,000
Diastole Post tes	78,17±6,515		

Based on Table 4, there was a significant decrease in systolic and diastolic blood pressure after the intervention, indicated by the p-value = 0.000 from the Wilcoxon test. This suggests that the combination of reducing salt consumption and guided imagery therapy is effective in lowering blood pressure in hypertensive patients.

Respondents' Blood Pressure Before Being Given a Combination of Salt Consumption Reduction and Guided Imagery Therapy

Blood pressure is an important indicator to assess the health of the heart and blood vessels. In this study, blood pressure measurements were conducted to determine the initial physiological condition of the participants before being given a combination of reduced salt intake and guided imagery therapy. The measurement results showed that most respondents had mild to moderate hypertension. Based on Table 2, the average systolic blood pressure before the intervention was 152.11 mmHg, while the average diastolic pressure reached 92.54 mmHg. Both of these values are above the standard threshold ($\leq 120/80$ mmHg), according to the classification of hypertension grade 1–2 based on the American Heart Association [28].

High blood pressure before intervention in this study was likely triggered by factors such as stress, unhealthy lifestyle, lack of physical activity, and excessive salt consumption. [29] stated that salt intake above 5 grams per day significantly increases the risk of hypertension. High sodium intake causes fluid retention, increased osmotic pressure, and plasma volume, which leads to increased cardiac output and blood pressure. In addition, excess sodium can also damage endothelial function and increase arterial stiffness, worsening hypertension chronically.

Research by [30] stated that reducing daily salt intake by 6 grams can reduce systolic blood pressure by an average of around seven mmHg in hypertensive patients. This shows that the contribution of sodium intake to increased blood pressure is substantial and can be modified through lifestyle changes. In addition, a study conducted by [31] found a strong correlation between high sodium intake and high blood pressure, especially in urban populations with processed food consumption habits. A study by [32] reported a decrease of 4.18 mmHg with a reduction of 4.4 grams. Other studies also confirmed the close relationship between high sodium intake and hypertension, especially in urban areas. These findings confirm that lifestyle changes, such as reducing salt and practicing relaxation, are effective in controlling blood pressure.

This study describes the characteristics of respondents that provide essential context for understanding the factors that cause high blood pressure before intervention. One of the main factors that is often overlooked is excessive salt consumption, which is related to age, education level, gender, and employment status. The majority of respondents were in the age range of 46–75 years, a group that is more susceptible to hypertension due to decreased blood vessel elasticity and renal regulation of sodium. In addition, in adulthood, among older people, eating habits that consume salty foods, such as processed foods and high-sodium snacks, tend to be maintained. Research by [33], [34] showed that elderly individuals who consumed more than 5 grams of salt per day had a risk of hypertension twice as high as those who controlled their salt intake.

In terms of education level, 40% of respondents only had a junior high school education, and the rest had an elementary and junior high school education. Education level is often associated with health literacy levels, including knowledge about the dangers of excessive salt consumption. Individuals with low education tend to have less understanding of the importance of controlling sodium in food and are not accustomed to reading nutrition labels on food products. A study from [35] states that education level is directly proportional to a person's ability to make healthy dietary decisions, including avoiding foods high in sodium.

In terms of gender, the proportion of women is slightly higher (57.1%). Although hypertension is not exclusively based on gender, studies have shown that middle-aged women and above are more susceptible to hypertension, especially post-menopause, which is accompanied by hormonal and metabolic changes. Several reports have also shown that women tend to consume processed household foods such as instant chili sauce, crackers, and other salty foods that are rich in sodium [36]. Considering these demographic characteristics, it appears that the majority of respondents are in the high-risk category for hypertension due to excessive salt consumption, either due to age, education, or lifestyle factors.

The combined effect of reducing salt intake and guided imagery therapy on blood pressure in hypertensive patients

This study indicated a significant decrease in systolic and diastolic blood pressure after patients received a combined intervention in the form of education on limiting salt consumption and the application of guided imagery relaxation techniques for three consecutive days. As a result, systolic blood pressure decreased from 152.11 mmHg to 122.94 mmHg, while diastolic pressure decreased from 92.54 mmHg to 78.17 mmHg. The Wilcoxon statistical test showed a p -value <0.05 , which means that the intervention had a significant effect in lowering blood pressure in hypertensive patients.

Reducing sodium intake is a proven effective dietary intervention to stabilize blood pressure. High salt intake can increase fluid retention in the body, increase cardiac output, and cause greater pressure on blood vessel walls [37]. In this study, low-salt diet counseling was provided systematically, including recommendations for the use of natural spices as a substitute for table salt, avoiding preserved or processed foods, and the habit of reading sodium content labels on products. Previous studies have also shown that community-based nutrition education can reduce systolic blood pressure by 4–5 mmHg in the long term [38]. In addition, this education plays an important role in improving patients' ability to control their hypertension risk factors independently.

After providing diet education, the intervention was continued with guided imagery therapy, which functions to optimize relaxation and reduce the body's stress response. This technique involves structured imagination of calming situations, such as peaceful natural settings. Physiologically, this method stimulates the parasympathetic nervous system and decreases sympathetic nervous activity, thereby reducing levels of stress hormones such as cortisol and adrenaline. Activation of the limbic system and decreased activity of the HPA axis (hypothalamus-pituitary-adrenal) contribute to decreased heart rate and peripheral vascular resistance [39], [40]. In addition, increased vagus nerve tone will stimulate the release of acetylcholine, which triggers vasodilation and slows the heart rate, so that blood pressure becomes more stable [41], [42]. These findings are in line with previous studies showing that guided imagery can suppress the release of stress hormones and trigger a state of physiological relaxation in the body [43]. Thus, this intervention not only has an impact on psychological aspects but also provides direct benefits to the regulation of the cardiovascular system.

After the intervention, the patient's blood pressure range was within the recommended range, namely systolic between 110–140 mmHg and diastolic 63–92 mmHg. These results indicate that the combined strategy of reducing salt consumption and guided imagery is feasible to be implemented in primary health services, such as Community Health Centers. This approach is essential for patients with mild hypertension who do not yet require pharmacological treatment. This non-drug therapy is economical, easy to learn, can be done independently, and has excellent potential to be implemented in a community [41], [44]–[46]. Overall, this combination of interventions was effective in lowering blood pressure and supporting the implementation of a national hypertension control program. Further research is recommended to assess long-term effectiveness and feasibility of broader implementation.

CONCLUSIONS

The results of this study indicate that the combination of interventions in the form of salt consumption and controlled imagery therapy has a significant effect in lowering blood pressure in individuals with hypertension. The average systolic blood pressure decreased from 152.11 mmHg to 122.94 mmHg, while the diastolic blood pressure decreased from 92.54 mmHg to 78.17 mmHg after the intervention. Statistical analysis using the Wilcoxon test showed a very significant p value ($p <0.05$), which confirms that both forms of intervention are effective in lowering blood pressure in hypertensive patients. Thus, this approach has the potential to be a non-pharmacological therapy option that can complement hypertension management in addition to conventional medical therapy.

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